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FINAL EXECUTION PLAN, RADIOLOGICAL REMEDIATION AND SUPPORT, PARCEL D-1, PHASE 2

07/01/2013

ITSI GILBANE COMPANY

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FINAL
EXECUTION PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared under:

Contract Number N62473-10-D-0808
Contract Task Order Number CTO 0004
Document Control Number: ITSI-0808-0004-0013

Prepared for:

Base Realignment and Closure
Program Management Office, West
1455 Frazee Road, Suite 900
San Diego, California 92108

Under contract to:

DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, California 92132

Prepared by:

ITSI Gilbane Company
2730 Shadelands Drive
Walnut Creek, California 94598

July 2013

ITSI Gilbane Project No. 07204.0004

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Attachment 2 Project Contractor Quality Control Plan
Attachment 3 Radiation Protection Plan
Attachment 4 Dust Control Plan
Attachment 5 Stormwater Pollution Prevention Plan
Attachment 6 Accident Prevention Plan and Site Safety and Health Plan

ACRONYMS AND ABBREVIATIONS

ALARA	as low as reasonably achievable
ASCII	American Standard Code for Information Interchange
Bi-214	bismuth-214
BRAC	Base Realignment and Closure
CCR	California Code of Regulations
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cm	centimeter
Cs-137	cesium-137
CSO	HPNS Caretaker Site Office
CTO	contract task order
DoD	Department of Defense
DON	Department of the Navy
DQO	data quality objectives
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
ES	excavated soil
FSS	final status survey
ft	foot, feet
ft^2	square feet
HPNS	Hunters Point Naval Shipyard
HRA	Historical Radiological Assessment
IR	Installation Restoration
ITSI Gilbane	ITSI Gilbane Company
LLRW	low-level radioactive waste
m	meter(s), milli (e.g., mCi, mrem)
m^2	square meter(s)
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NCP	National [Oil and Hazardous Substances Pollution] Contingency Plan
NELAP	National Environmental Laboratory Accreditation Program
NRDL	Naval Radiological Defense Laboratory
pCi/g	picocuries per gram
PDF	portable document format
PPE	personal protective equipment
Pu-239	plutonium-239
QC	quality control
Ra-226	radium-226
RACR	removal action completion report
RASO	Naval Sea Systems Command Detachment, Radiological Affairs Support Office
RCRA	Resource Conservation and Recovery Act

ACRONYMS AND ABBREVIATIONS (Continued)

ROC	radionuclide of concern
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RSO	Radiation Safety Officer
RSOP	radiation safety operating procedure
RSOR	Radiation Safety Officer Representative
RSY	radiological screening yard
SAP	Sampling and Analysis Plan
SOP	standard operating procedure
Sr-90	strontium-90
STLC	Soluble Threshold Limit Concentration
SUPR	survey unit project report
T&D	transportation and disposal
TCRA	time-critical removal action
TtEC	Tetra Tech EC, Inc.
TTLC	Total Threshold Limit Concentration
TSP	task-specific plan
WA	work area
WET	Waste Extraction Test

1.0 INTRODUCTION

The Department of the Navy (DON) contracted with the ITSI Gilbane Company ((ITSI Gilbane) to continue the removal action at Parcel D-1 in accordance with the final Base-wide Radiological Removal Action, Action Memorandum - Revision 2006 (DON, 2006). This removal action consists of the removing the remaining storm drain and sanitary sewer lines and the subsequent radiological surveying, sampling, and remediation of excavations in Parcel D-1. Also included are the radiological surveying, sampling, and remediation of the former Naval Radiological Defense Laboratory (NRDL) site; ship berths adjacent to Parcel D-1; and railroad tie stockpiles at Hunters Point Naval Shipyard (HPNS), San Francisco, California. Parcel D-1 work areas are shown in Figure 1-1.

The radiological screening yard (RSY) will be used to radiologically clear the excavated soil. Following radiological processing, the excavated soil will be staged in the DON-designated area pending reuse as backfill material in the excavated trenches or staged for off-site disposal at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) landfill by the DON's disposal contractor.

To perform this work, the Basewide Radiological Management Plan (ITSI Gilbane, 2013), including the Basewide Storm Drain and Sanitary Sewer Removal Plan as an attachment, will be used in conjunction with this Execution Plan and the site-specific information provided in a design plan or task-specific plan (TSP).

The following six additional documents have been developed and are presented as attachments to this Execution Plan:

- Sampling and Analysis Plan (SAP) (Attachment 1)
- Project Contractor Quality Control Plan (Attachment 2)
- Radiation Protection Plan (Attachment 3)
- Dust Control Plan (Attachment 4)
- Stormwater Pollution Prevention Plan (Attachment 5)
- Accident Prevention Plan and Site Safety and Health Plan (Attachment 6)

1.1 SITE HISTORY

HPNS is located in the southeastern part of San Francisco on a long promontory that extends east into San Francisco Bay. Presently, HPNS encompasses approximately 866 acres, including approximately 420 acres on land. The land portion of HPNS was purchased by the DON in 1939 and leased to Bethlehem Steel Corporation. At the start of World War II in 1941, the DON took possession of the property and operated it as a shipbuilding, repair, and maintenance facility until 1974 when the DON deactivated HPNS. From 1976 to 1986, the DON leased HPNS to Triple A Machine Shop, Inc. (Triple A), a private ship repair company. In 1986, Triple A ceased operations and the DON resumed occupancy through 1989. In 1991, HPNS was placed on the DON's Base Realignment and Closure (BRAC) list, and its mission as a DON shipyard ended in April 1994.

A 1998 BRAC decision requires full closure and cleanup of HPNS. Essentially, this may entail removal of buildings and structures, including subsurface systems, as well as removal of contaminated materials. HPNS was divided into 12 parcels, A, B, C, D-1, D-2, E, E-2, F, G, UC1, UC2, and UC3. Parcel A, consisting of the most inland 75 acres, was transferred to the San Francisco Redevelopment Agency in 2004. The remainder of HPNS will be conveyed to the Office of Community Investment and Infrastructure as the Successor Agency to the San Francisco Redevelopment Agency once the environmental cleanup is complete.

1.2 REGULATORY FRAMEWORK

Environmental investigation and remediation activities are being conducted at HPNS under the Department of Defense (DoD) Installation Restoration (IR) Program in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Under Executive Order 12580, the DON is the lead agency responsible for implementation of the IR Program and the removal action. The U.S. Environmental Protection Agency (EPA) is the lead regulatory agency, while the California Department of Toxic Substances Control and Regional Water Quality Control Board San Francisco Bay Region will provide state regulatory oversight.

1.3 REMOVAL ACTION OBJECTIVES

Based on its radiological operational history, the DON determined that low-level radioactive contamination potentially present in some buildings, storm drain and sanitary sewer lines, soil, debris, and slag material at HPNS required a response action. The Action Memorandum (DON, 2006) was prepared to document the DON's decision to undertake time-critical removal actions (TCRAs) at areas throughout HPNS identified as radiologically impacted in the Historical Radiological Assessment, Volume II (HRA) prepared by Naval Sea Systems Command in 2004 (NAVSEA, 2004). The HRA lists the radionuclides of concern (ROCs) for the storm drain and sanitary sewer systems as cesium-137 (Cs-137), radium-226 (Ra-226), and strontium-90 (Sr-90), and for the former NRDL site and ship berths as Cs-137, plutonium-239 (Pu-239), Ra-226, and Sr-90. The ROCs for the railroad tie stockpiles are Cs-137 and Ra-226.

The DON has determined (based on its radiological operational history and site-specific investigative data) that the storm drain and sanitary sewer system in Parcel D-1 may contain radioactive material and that the former NRDL site and ship berths along Parcel D-1 may also be radiologically impacted as a result of OPERATION CROSSROADS ship decontamination and material testing. Therefore, the DON has initiated removal actions in accordance with the Action Memorandum (DON, 2006) for the screening, characterization, and remediation of radiologically impacted storm drain and sanitary sewer lines within Parcel D-1, the former NRDL site, and the ship berths adjacent to Parcel D-1 to protect the public health and welfare, and the environment, from actual or potential releases of radiologic contaminants. These removal actions will substantially eliminate the potential threat posed by future migration and/or off-site releases of radioactive material potentially present into the surrounding environment.

1.4 RELEASE CRITERIA

Regulatory agencies establish radiation dose standards based on risk considerations and scientific data relating dose to risk. Residual levels of radioactive material that correspond to allowable radiation dose standards are derived by analysis of various pathways and scenarios such as direct exposure, inhalation, and ingestion. Release limits are presented in terms of soil activity concentration and usually refer to average levels of radiation or radioactivity above appropriate background levels. Release limits applicable to soil are expressed in units of activity concentration or picocuries per gram (pCi/g).

Development of cleanup levels for HPNS was based on the Nuclear Regulatory Commission's screening levels, the EPA's preliminary remediation goals, or agreements between the DON and regulatory agencies. The radiological release criteria for HPNS were established in the Action Memorandum (DON, 2006) for the ROCs identified in the HRA (NAVSEA, 2004). The radiological release criteria for the Parcel D-1 Phase II storm drain and sanitary sewer system, the former NRDL site, the ship berths, and the railroad tie stockpiles are presented in the SAP (Attachment 1).

Chemical contamination at HPNS will be addressed through the IR Program process, consistent with CERCLA and the NCP. The SAP (Attachment 1) identifies the IR Program sites located within the Parcel D-1 Phase II work areas and their associated chemicals of concern.

1.5 AS LOW AS REASONABLY ACHIEVABLE

A basic concept in radiation protection specifies that exposure to ionizing radiation and releases of radioactive material should be managed to reduce collective dose to workers and the public and ensure that exposure is as low as reasonably achievable (ALARA). The ALARA principle will be considered during the course of the radiological work carried out under this Execution Plan. The ALARA environmental process will be implemented as described in the Basewide Radiological Management Plan (ITSI Gilbane, 2013).

1.6 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) specify project objectives, data collection boundaries and limitations, the most appropriate type of data to collect, and the level of acceptable decision error. In addition, the quality and quantity of data required to implement environmental removal actions are defined. The DQOs for the Parcel D-1 Phase II work scope are identified and described in the SAP (Attachment 1).

1.7 PROJECT POINTS OF CONTACT

Figure 1-2 presents the key individuals who are responsible for oversight and/or implementation of the site activities.

1.8 PROJECT SCHEDULE

Figure 1-3 presents the overall project schedule for completing the planning, construction, and reporting activities for this CTO.

1.9 PLAN ORGANIZATION

This Execution Plan is organized as follows:

- Section 1.0 provides the introduction, site history and current operations, regulatory framework, removal action objectives, release criteria, ALARA concept, DQOs, project points of contact, and report organization.
- Section 2.0 describes the work implementation for the radiologically impacted ship berths and area surveys and for the storm drain and sanitary sewer removal work, including screening and laboratory operations and quality control (QC) checks.
- Section 3.0 describes stormwater pollution prevention measures, site-specific requirements for dust control during implementation of the site work, and spill/release prevention, response, and reporting.
- Section 4.0 provides traffic control measures for diverting traffic and details alternate access routes for site tenants and contractors during construction.
- Section 5.0 describes the cultural resource controls that will be applied during work activities.
- Section 6.0 presents details for project reporting.
- Section 7.0 lists the references cited in the text.
- Figures are included after the text.
- Attachment 1 presents the SAP. This plan details laboratory operations that will support the survey activities. Included are procedures for swipe sample analysis, soil sample preparation, gamma spectroscopy analysis, and quality checks.
- Attachment 2 presents the Project Contractor Quality Control Plan. This plan establishes specific procedures and methods for field inspections, and provides an effective quality control system to ensure the quality of all work performed by ITSI Gilbane and its subcontractor personnel during the implementation of the Parcel D-1 Phase II fieldwork.
- Attachment 3 presents the Radiation Protection Plan. This plan identifies the day-to-day management of radiologically impacted sites, remediation, surveys, training requirements, health and safety concerns, and material handling requirements for this project.
- Attachment 4 presents the Dust Control Plan. This plan identifies the steps to be taken to reduce fugitive dust emissions during excavation, transportation of soil and debris, and installation/removal of construction site infrastructure.
- Attachment 5 presents the Stormwater Pollution Prevention Plan. This plan provides details for implementing best management practices for controlling storm water runoff and erosion during field activities.
- Attachment 6 presents the Accident Prevention Plan and Site Safety and Health Plan, including the Activity Hazard Analysis. These plans present the health and safety measures that will be implemented and maintained during field activities.

2.0 WORK IMPLEMENTATION

The following sections discuss the guidance documents and procedures for performing the radiological release of radiologically impacted structures, storm drain and sanitary sewer removal, RSY operations, and laboratory operations.

2.1 RADIOLOGICAL SURVEYS

The Basewide Radiological Management Plan (ITSI Gilbane, 2013) describes survey and remediation approaches that will be implemented in support of the radiological release of the former NRDL site and ship berths 21, 22, and 29. Under this CTO, the procedures outlined in the Basewide Radiological Management Plan (ITSI Gilbane, 2013) will be followed to conduct Final Status Surveys (FSSs).

Task-specific plans (TSPs) will be developed for the former NRDL site and the ship berths, and survey activities will be conducted in accordance with the guidelines in the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) (NUREG-1575; DoD et al., 2000) and Action Memorandum (DON, 2006). Survey activities as well as activities not addressed by MARSSIM will be performed in accordance with this plan, the TSP, and the radiation safety operating procedures (RSOPs) presented in the Radiation Protection Plan (Attachment 3). An FSS report will be generated upon completion of the survey and remediation activities

2.1.1 Former Naval Radiological Defense Laboratory Site

The former NRDL site is approximately 300 ft (feet) (100 meters [m]) north-northwest of ship berth 21 and encompasses approximately 38,750 square feet (ft^2) (3,600 square meters [m^2]). The NRDL was established with the original mission of supporting the decontamination efforts on OPERATION CROSSROADS ships. Consequently, it is a potential storage site of OPERATION CROSSROADS material. Currently, the site is largely an asphalt-covered unused open area with no structures on it.

2.1.2 Ship Berths 21, 22, and 29

Ship berths 21, 22, and 29 (to the Parcel D-1 boundary) make up the perimeter of the Phase II focus area. They occupy a shoreline of approximately 1,525 ft (465 m) and, by definition, extend from the mean low low water line to a point 50 ft (15 m) inland from the edge of the

original berth. This combines for an approximate land surface area of 76,350 ft^2 (7,100 m^2). Although the ship berths are identified as part of Parcel F, the land included in this work scope is considered Parcel D-1. Some of the ships involved in atomic weapons testing in the Pacific Ocean, including OPERATION CROSSROADS, were brought to HPNS for decontamination. Ship berths 21, 22, and 29 may have berthed OPERATION CROSSROADS ships and a radioactive waste disposal barge. In addition, these berths may have been used by NRDL. Currently, the ship berths are unused and no vessels are berthed. The berths have deteriorated significantly and in some areas, all that remains of the edge of the berth are pilings and other structures surrounded by water.

2.2 STORM DRAIN AND SANITARY SEWER REMOVAL

Approximately 5,700 lineal ft (1,740 lineal m) of piping will be removed from Parcel D-1. The remaining piping is located within Parcel D-1 work areas designated as Work Area (WA)-13 and WA-25 (Figure 2-1). The removal of storm drains and sanitary sewers will be conducted in accordance with the Basewide Storm Drain and Sanitary Sewer Removal Work Plan, Attachment 1 to the Basewide Radiological Management Plan (ITSI Gilbane, 2013). The Basewide Storm Drain and Sanitary Sewer Removal Work Plan provides procedures for performing the radiological surveys of the trench units and removed materials.

A design plan will be prepared that provides project-specific details pertaining to the removal of storm drain and sanitary sewer lines within Parcel D-1. The design plan will identify the storm drain lines, sanitary sewer lines, and manholes to be removed and provide construction procedures to conduct these work activities. The general approach will be to remove the overlying pavement, excavate the soil overlying the storm drain and sanitary sewer lines, and subsequently remove the lines. A minimum of 1 foot of soil will be excavated around and below the pipe. Radiological screening and sampling will be performed ex situ on the pipe. Open storm drain or sanitary sewer lines left in place during the removal process will be plugged to prevent water from entering or exiting pipes. FSSs will be performed on the exposed, excavated trench surfaces. After the results of these activities are evaluated, any identified radiological contamination is removed, and concurrence is received from the Radiological Affairs Support Office, the trenches will be backfilled and the site restored.

Throughout the excavation process, soil and piping will be visually inspected for staining or odors. Material that emits odors or is stained will be segregated for further sampling and analysis in accordance with the Basewide Storm Drain and Sanitary Sewer Removal Work Plan.

2.3 RADIOLOGICAL SCREENING YARD OPERATIONS

Soil excavated during the removal action activities will be transported to the RSY for processing. Processing activities in the RSY include surveying, characterizing, remediating (as necessary), radiologically clearing the materials for either reuse or disposal, and chemical sampling soils derived from IR Program sites. The survey activities performed during processing were designed using MARSSIM (DoD et al., 2000) guidance. The objective of the processing activities in the RSY for excavated soil is to demonstrate that identified residual radioactivity levels for the ROCs in the material to be used as backfill meet the release criteria identified in the SAP (Attachment 1).

2.3.1 Reference Area

Reference area samples for the storm drain and sanitary sewer excavated soil processed in the RSY were obtained in April 2006 in an area of the Building 813 parking lot in Parcel D-2. Building 813 was identified in the HRA (NAVSEA, 2004) as radiologically impacted; however, its attendant parking lot was not impacted. Eighteen soil samples were collected systematically from the parking lot and were analyzed at the on-site screening laboratory by gamma spectroscopy for use in TCRA remediation decisions. Ten percent of these samples were also analyzed for Sr-90. These reference area samples provided a basis for the net Ra-226 activity concentration.

Background activity for Ra-226 was determined to be 0.485 pCi/g, placing the remediation decision level at 1.485 pCi/g of Ra-226 for radiological remediation decisions and for use as definitive data for each excavated soil (ES) survey unit. Curtis and Tompkins Laboratories, which performed the analyses, is a DoD Environmental Laboratory Accreditation Program (ELAP) and a California Department of Health (CDPH) National Environmental Laboratory Accreditation Program (NELAP) accredited laboratory.

2.3.2 Radiological Screening Yard Processing

Radiological processing of excavated soil in the RSY is an iterative process that may involve soil characterization and remediation, if appropriate, prior to the actual FSS activities. The processing of excavated soil begins after the transfer of the excavated material from the trenches to the RSY. The excavated soil transfer process is detailed below.

2.3.2.1 Transfer of Excavated Soil for Processing

Excavated soil entering the RSY must be accompanied by a truck ticket to facilitate transfer of the material for radiological processing. This ticket will provide the RSY staff with the following information:

- Work area (location of excavation)
- Trench segment identification number
- Load number
- Volume of soil
- Date/time of excavation
- Associated IR Program site (00 for non-chemically impacted soils)
- Notes on any odor or visible chemical contamination

Because excavated soil removed from within an identified IR Program site typically will be managed separately from non-IR Program sites and to facilitate returning radiologically surveyed and released soil to the general area from which it was excavated, it is imperative that the appropriate information is provided on each truck ticket. No soil will be accepted from trucks without a completed truck ticket.

Placement of soil on a screening pad in the RSY will continue until one of the following occurs:

- No additional soils from the associated work area or IR Program site will be generated.
- The soil placed on the screening pad reaches capacity and is ready for processing.

To facilitate radiological processing, excavated soil is spread out on the screening pads in lifts approximately 6 inches in height and up to 1,000 m^2 in surface area. Throughout processing, ES survey units are visually inspected for staining or odors. Soil that emits odors or is stained will be segregated for further sampling and analysis in accordance with the SAP (Attachment 1).

As necessary, the soil spread on the screening pads will be allowed to dewater before radiological surveys are initiated. Water collected from the screening pads will be characterized for chemical and radiological constituents, prior to proper disposal. Wastewater sampling will be conducted according to procedures detailed in the SAP (Attachment 1).

2.3.2.2 Gamma Scan Surveys of Excavated Soil Survey Units

Each ES survey unit will undergo a 100 percent radiological surface survey using a towed array survey consisting of a high-density gamma scan supported by global positioning system equipment or other Radiological Affairs Support Office (RASO)-approved scanning instruments, as detailed in the Basewide Radiological Management Plan (ITSI Gilbane, 2013).

Data obtained during the surface gamma scan surveys will be analyzed as the data are received. Following data analysis, areas where surface radiation levels appear to be greater than 3-sigma of the mean reference (background) level (or other RASO-approved investigation level) will be noted on a grid map and flagged in the field for verification. Radioactive material, such as point sources, identified during surface scans will be collected, segregated, and stored in appropriate containers in accordance with the Basewide Radiological Management Plan (ITSI Gilbane, 2013) and the Waste Management Plan (see Section 3.4).

Manual scans using a hand-held instrument may be performed to further delineate suspected contaminated areas on the screening pads. The instruments, calibration, maintenance, testing, and inspection activities are listed in the SAP (Attachment 1). Biased soil samples may be collected, as directed by the RSOR, to establish the presence and extent of radiological contamination within an ES survey unit. Soil sampling procedures are described in the SAP (Attachment 1). Collected biased samples will be transferred to the Curtis and Tompkins laboratory under chain-of-custody procedures as identified in the SAP (Attachment 1) for analysis by gamma spectroscopy.

Sandblast grit, bottles, jars, and/or other unidentified containers found during radiological processing in the RSY will be handled in accordance with the most current RASO-approved work instruction or RSOP specifically written to govern these materials.

2.3.2.3 Systematic Screening Sampling and Remediation

Following the completion of the scan surveys, the entire area of each ES survey unit processed in the RSY will be plotted. Typically, 20 systematic soil samples will be collected based on sample spacing using Equation 4-2 from the Basewide Radiological Management Plan (ITSI Gilbane, 2013). Biased samples to verify the potential presence of contamination will be plotted based on the results of the scan survey, as appropriate. Sample collection methodology and sample numbering procedures are described in the SAP (Attachment 1). The 20 systematic and biased soil samples collected from each ES survey unit are submitted to the Curtis and Tompkins laboratory for analysis using gamma spectroscopy under chain of custody as described in the SAP (Attachment 1).

If radiological contamination is identified in the systematic and/or biased soil samples, remediation will be performed for the associated ES survey unit. The extent of the remediation area is bounded by those samples that do not exceed the release criteria. Additional characterization will be performed, as necessary, to reduce the volume of soil placed in low-level radioactive waste (LLRW) bins for off-site disposal. Following remediation, 20 systematic soil samples will be plotted and collected followed by laboratory analysis. This iterative process will continue until no contamination is identified in the sample results or 20 systematic soil samples have been collected and analyzed with no radiological contamination found. ES survey units that have undergone three phases of systematic sampling and analysis with continued radiological contamination identified in the third phase may be disposed of in their entirety as LLRW with the concurrence of the RASO.

Soil samples collected from ES survey units and analyzed by the Curtis and Tompkins laboratory that indicate concentrations of Cs-137 at or above its release criterion will be analyzed by GEL Laboratories, a DoD ELAP and CDPH NELAP accredited laboratory, for total strontium or Sr-90. If the laboratory results indicate the presence of total strontium or Sr-90 concentrations at or above the release criterion, additional analysis for isotopic plutonium and uranium may be performed.

To facilitate operation of the RSY, the ES survey unit screening analytical data will be provided to the RASO with a request for concurrence to stage the material in the stockpile area designated

by the DON CSO pending receipt of the definitive data from the Curtis and Tompkins laboratory. No excavated soil will be removed from the RSY without the RASO's concurrence. Once concurrence from the RASO is received, the affected ES survey unit will be transferred to the stockpile area and marked with its unique ES survey unit number and applicable IR Program site designation. The locations and status of each ES survey unit will be tracked in the database management program.

2.3.2.4 Excavated Soil Survey Units

With the RASO's concurrence that the ES survey unit can be staged pending receipt of the definitive data, the final 20 ES survey unit systematic soil samples will be reanalyzed by gamma spectroscopy after bismuth-214 (Bi-214) approaches secular equilibrium with Ra-226 (typically 21 days) for definitive analysis under chain-of-custody procedures as identified in the SAP (Attachment 1).

Once the definitive data (including chemical results, as applicable) are received and reviewed, ITSI Gilbane will determine whether the soil meets the release criteria or if additional remediation is required. The definitive data will be sent to the RASO for concurrence to 1) use the soil as backfill material, or 2) stage the ES survey unit pending off-site disposal as non-LLRW or LLRW (if additional contamination is identified) by the appropriate DON waste contractors.

ITSI Gilbane will be responsible for third-party data validation of the Curtis and Tompkins laboratory and the GEL laboratory results (except waste classification data) associated with each ES survey unit. Data validation will be performed in accordance with the SAP (Attachment 1).

2.3.2.5 Waste Classification Sampling

Excavated soil derived from IR Program sites will be generated during field activities and will require sampling for proper classification. Waste characterization and disposal are not included in the current scope for ITSI Gilbane, but chemical sampling of excavated IR Program site soils to determine suitability for use as backfill material is required. Excavated soil generated from IR Program sites will be sampled and analyzed for the associated chemicals of concern. Sampling and analysis for each IR Program site will be performed as identified in the SAP (Attachment 1). Based on chemical sampling analytical results, material not suitable for backfill may be

consolidated for off-site disposal once the ES survey unit has been radiologically free released. Radiologically surveyed and released ES survey units derived from IR Program site soils that meet the chemical sampling analytical criteria may be used as backfill.

2.4 LABORATORY OPERATIONS

The Curtis and Tompkins laboratory will perform gamma spectroscopy and gross alpha/beta analyses using analytical standard operating procedures (SOPs) provided in the SAP (Attachment 1). The Curtis and Tompkins laboratory is a DoD ELAP and CDPH NELAP accredited laboratory. In addition, any analyses required beyond gamma spectroscopy or gross alpha/beta will be performed by the GEL laboratory if the Curtis and Tompkins laboratory does not have these capabilities. All samples submitted to the laboratories will utilize chain-of-custody procedures described in the SAP (Attachment 1). Copies of the DoD ELAP and CDPH NELAP certifications will be located in the on-site project files.

2.4.1 Laboratory Procedures

The integrity and traceability of samples from the time they are collected through the time data are reported are essential in any sampling and analysis program. The samples will be delivered to authorized staff in the laboratories in accordance with the SAP (Attachment 1). Upon receipt of a sample, the sample condition will be inspected, and verification of the information on the sample container will be checked against that on the chain-of-custody record.

When the samples are received by the Curtis and Tompkins laboratory, each sample will be verified to contain less than 10 percent moisture content by weight when massed. Samples with moisture in excess of the 10 percent limit are dried in a laboratory oven. Once the moisture content is determined to be less than 10 percent, the sample is passed through consecutively smaller sieves, ending at a number 40, to screen for any foreign materials that may be present. An aliquot of the remaining material is then placed and sealed in 250-milliliter "tuna can" geometry necessary for analysis. Soil and swipe samples are analyzed in accordance with the SAP (Attachment 1).

2.4.1.1 Gamma Spectroscopy

The Curtis and Tompkins laboratory will perform gamma spectroscopy analysis on solid samples using hardware features that include a high-purity germanium gamma photon detector with

60 percent or greater efficiency supported by Ortec® software. Instrument hardware is calibrated using a multi-energy National Institute of Standards and Technology-traceable source ranging from 50 kiloelectron volts to 2.6 megaelectron volts. All results are reported in pCi/g. Data results will undergo a QC review.

Analysis and review processes will address count integration, efficiency, and background corrections, as well as the processing of overlapping peaks. Gamma spectroscopy focuses on energetic photons emitted from the ROCs. A spectral region of interest results around a specified energy range, which allows for identification and quantification of associated nuclides and daughter products. Additional reviews consist of ensuring that 100 percent of the data complies with the method- and project-specific requirements as outlined in the SAP (Attachment 1). The procedures for gamma spectroscopy analysis are also presented in the SAP (Attachment 1).

The gamma vision software produces a report once the analysis is complete. Each report is typically eight pages long with a summary provided on the last page. The report identifies flags (or symbols) that may be associated with each radionuclide, if appropriate.

Gamma spectroscopy data will be reviewed and, if acceptable, a portable document format (PDF) file of the Ortec-generated American Standard Code for Information Interchange (ASCII) file will be created. Both files will be submitted to the RSOR for evaluation of the laboratory data. The RSOR will coordinate with the laboratory if additional radiological analysis, other than gamma spectroscopy, is required. If required, these samples will be submitted to the GEL laboratory.

2.4.1.2 Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys

Swipe samples will be screened using a Protean WPC 9550 gas-flow proportional alpha and beta/gamma radiation counter (or equivalent), which features a low-background counting chamber. A microprocessor allows for data processing, and the unit provides a full range of simultaneous alpha and beta/gamma analysis at levels required for environmental release surveillance. Data are reported in units of disintegrations per minute per 100 square centimeters. Procedures for swipe sample analysis are presented in the SAP (Attachment 1).

2.4.2 Other Radiological and Chemical Samples

As required, additional radiological and chemical analyses will be performed by the GEL laboratory in accordance with the procedures described in the SAP (Attachment 1). Analytical results will be provided electronically as a PDF of an EPA Level III- or IV-equivalent data package along with an electronic data deliverable compatible file.

2.4.2.1 Total Strontium/Strontium-90Analysis

The GEL laboratory determines total strontium and Sr-90 through separation and isotopic measurement. For soils, the strontium is transferred from the soil into a liquid matrix prior to precipitation as insoluble carbonate. Total strontium and Sr-90 are counted for beta particle activity by gas flow proportional counters. The results of total strontium and Sr-90 analyses are reported in pCi/g. Any sample exhibiting Cs-137 activity greater than the release criterion is also analyzed for total strontium/Sr-90. In addition, a minimum of 10 percent of the FSS samples are randomly chosen for Sr-90 analysis at the GEL laboratory.

2.4.3 Laboratory Documentation

Screening and definitive data packages will be generated as detailed in the SAP (Attachment 1). All FSS or IR reuse soil samples will be validated by an independent data validation company. The validation report will include the data validation findings worksheets and will contain the appropriate information as identified in the SAP (Attachment 1).

2.4.4 Quality Control Checks

QC checks will be performed by both laboratories in accordance with the SAP (Attachment 1). QC checks will be performed on instrumentation to ensure proper operation and to maintain calibration. The laboratory QC checks, as required, include:

- Instrument calibration
- Instrument blanks
- Method blanks
- Laboratory duplicates
- Laboratory control samples
- Matrix spikes
- Surrogate standards

- Post-digestion spikes and the Method of Standard Addition
- Preventive maintenance

These QC checks will be documented, reviewed, and maintained in accordance with the requirements of the SAP (Attachment 1). The laboratory will review all data results, including energy spectrums, for quality assurance and to verify count integration, efficiency, and background corrections, as well as to identify overlapping peaks. If there is any question on the analysis results, the sample will be counted for a longer interval. Data reviews include checking for compliance with the required QC practices, SOPs, and method and project requirements.

Data trends outside the tolerance limits will be investigated to determine the cause and potential effect on measurement results. Procedures for QC checks are presented in the SAP (Attachment 1).

2.5 RAILROAD TIE SURVEY AND DISPOSAL

Several large stockpiles of creosote railroad ties exist in the southern portion of Parcel D-1 near Berths 22 and 29 and at the head of Gun Mole Pier adjacent to Berth 14. The railroad ties were removed from radiologically contaminated areas on the Gun Mole Pier and the South Pier and, therefore, are considered radiologically impacted. The railroad ties will be radiologically surveyed, released from radiological controls, if possible; and disposed as non-LLRW. Material unsuitable for disposal as non-LLRW will be turned over to the DON's waste contractor for disposal as LLRW. It is estimated that no more than 5% of the railroad ties will require disposal as LLRW.

The railroad ties exist in various deteriorated states and will be sorted based on their physical condition, i.e., whether or not their surfaces are flat, smooth, and adequate for a standard surface contamination survey. Heavy equipment, such as an excavator with a hydraulic bucket thumb and a forklift, will be used to sort and segregate the railroad ties. Intact railroad ties with surfaces suitable for surveying will be stacked and moved to survey stands. Degraded railroad ties whose surfaces cannot be reasonably surveyed will be staged for further processing.

2.5.1 Survey and Sampling

The degraded railroad ties will be surveyed and sampled in a manner similar to soil on an RSY screening pad; however, no constructed pad will be used. An area of suitable size, no larger than 1,000 m^2, adjacent to the stockpile will be used as the screening area. A gamma scan will be performed over the surface of the screening area prior to use to establish a baseline or reference background. The degraded railroad tie material will be spread out over the area to a depth of approximately 6 to 9 inches (15 to 23 cm). The depth equates to the nominal width of a railroad tie. A gamma scan will be performed over 100% of the surface area. Collected data will be logged and survey points plotted on maps to document survey results. Areas where surface radiation levels appear to be greater than 3-sigma of the mean reference (background) level (or other DON-approved investigation level) will be noted on a grid map and flagged in the field for verification. Manual scans using a handheld instrument will be performed to further delineate suspected contaminated material. Contaminated material identified during surface scans will be collected, segregated, and stored in appropriate containers.

Twenty random-start systematic and up to 10 biased samples of railroad tie material will be collected and analyzed in accordance with the SAP (Attachment 1). Ten percent of the samples will also be analyzed for Sr-90. The biased samples will be collected at locations suspected to have the highest concentrations of radioactivity. Samples will also be collected from railroad ties found in non-impacted areas at HPNS to establish representative material background concentrations. Residual radioactivity exceeding the release criteria will be investigated and remediated, as necessary, and additional survey and sampling will be performed to verify release criteria are met. The soil (or volumetric) residual radioactivity release criteria in the SAP (Attachment 1) will be used to determine whether the railroad tie material is suitable for release from radiological controls.

The intact railroad ties will be placed on survey stands (i.e., metal saw horses) and individually surveyed. A beta/gamma surface scan will be performed over 100% of the exposed surfaces of each railroad tie. Measurements of total and removable residual radioactivity will be collected at the location of highest measured radioactivity. An alpha/beta static surface measurement will be performed and a smear sample collected. The static measurement results will be compared to the surface residual radioactivity criteria in the SAP (Attachment 1) to determine whether the tie is

suitable for release from radiological controls. An arbitrary value of 20% of the release criteria will be used to compare smear sample results. For conservative simplicity in execution, gross beta activity will be assumed to be Sr-90 and gross alpha activity will be assumed to be Ra-226 unless isotopic analysis is performed or a technical basis for an alternate approach is documented and approved by the DON.

2.5.2 Release and Disposal

The DON will review the survey and sample data prior to the release of any railroad ties (or railroad tie material) from radiological controls. The railroad ties will not be recycled or re-used, but will be disposed of at a permitted waste disposal facility. Transportation and disposal activities will be coordinated with the DON. Material leaving HPNS will exit the base through a portal monitor. Railroad ties (or railroad tie material) with residual radioactivity below the release criteria will be considered suitable for release from radiological controls and deemed non-LLRW. It will be staged temporarily for subsequent loading and shipment to a California-permitted Class I landfill for disposal as decommissioned materials. In 2002, *Executive Order D-62-02 by the Governor, State of California* (Davis, 2002) established a moratorium on the disposal of "decommissioned materials" (i.e., materials with low residual levels of radioactivity) to Class III landfills and unclassified waste management units. Class II landfills will not accept decommissioned materials.

Railroad ties (or railroad tie material) with residual radioactivity above the release criteria will not be considered suitable for release from radiological controls and will be deemed LLRW. Where the extent of the elevated residual radioactivity is localized, the offending piece(s) of the railroad tie may be removed and treated as LLRW and the remainder of the railroad tie resurveyed. The railroad ties (and material deemed LLRW) will be loaded into LLRW bins and turned over to the DON's waste contractor for disposal as LLRW. ITSI Gilbane will coordinate with the DON's waste contractor to determine the number of LLRW bins required for disposal.

2.5.3 Site Survey

Following the removal of the railroad ties, an FSS will be performed of the immediate area of the railroad tie stockpiles to verify and document any residual radioactivity is within acceptable levels. Survey measurements will include 100% gamma scan, and direct surface measurements

in the form of beta/gamma scan measurements and alpha/beta static measurements. Volumetric samples of soil or other surface material will be collected at selected locations to verify residual radioactivity constituents and concentrations.

3.0 ENVIRONMENTAL PROTECTION PLAN

The following sections discuss stormwater pollution prevention measures, site-specific requirements for dust control measures to be implemented, spill or release prevention/response/ reporting, and waste management practices.

3.1 STORMWATER POLLUTION PREVENTION

A Stormwater Pollution Prevention Plan provided as Attachment 5 provides details for implementing the best management practices during field activities.

3.2 FUGITIVE DUST CONTROL MEASURES

Work activities will follow procedures and controls set forth in the Dust Control Plan provided as Attachment 4.

3.3 SPILL/RELEASE PREVENTION, RESPONSE, AND REPORTING

The following sections describe spill/release prevention, response, and reporting associated with the Parcel D-1 Phase II work activities.

3.3.1 Spill/Release Prevention

The primary activities that may result in a spill or release include vehicle fueling and management of decontamination waste. Spill/release prevention practices for these activities are as follows:

- Fueling - All vehicles will be fueled and serviced prior to moving onto the site. Any on-site fueling of vehicles will be conducted within a designated and controlled area. Bulk quantities of fuel exceeding 1,320 gallons will not be stored on-site. Absorbent pads or drip pans will be placed on the ground at the fueling point to catch any spills. Fueling operations will be attended and observed at all times. No latch-on fueling will be performed.
- Decontamination Wastewater - Wastewater will be stored in double-walled temporary tanks or 55-gallon drums within a secondary containment area. Therefore, any spills from the containers or tanks will be contained and will not be released into the surrounding areas.

3.3.2 Spill/Release Response

In the event of a release of hazardous material into the environment, per the Accident Prevention Plan/Site Safety and Health Plan (Attachment 6), ITSI Gilbane will contain or control the release

or evacuate the area if the spill is significant or represents an immediate health threat. Spills, leaks, and fires at HPNS must be reported to the Remedial Project Manager (RPM) and CSO. In addition, all spills involving radioactive material must be reported to the RSO and the RASO. Absorbent pads, shovels, and U.S. Department of Transportation-approved containers will be kept on-site to address the possibility of spills.

Spill cleanup materials and waste will be containerized, managed, and disposed of as described in the Waste Management Plan (see Section 3.4).

3.3.3 Spill/Release Reporting

The steps below outline the chain of communication that will be followed should a significant spill of any hazardous substance occur. Any spill over the reportable quantity as determined by federal and/or state regulations will be considered a significant spill, as will any spill below the reportable quantity not properly contained and released into the environment.

1. Site personnel involved in the spill will immediately contact the Project Manager (or designee) and RSOR (if radioactive material is involved). The Project Manager (or designee) will contact the RPM and CSO. The RSOR will contact the RASO.
2. If a release of a waste or hazardous substance, regardless of quantity, could threaten human health or the environment outside the facility, the Project Manager (or designee) will verify that the National Response Center (800-424-8802) and the local Fire Department have been notified by the DON. Releases will be reported, and written follow-up emergency notices will be submitted under the Superfund Amendments and Reauthorization Act, Title II requirements.
3. Any release of fuels or other products that causes sheen on water at the site or any release into the surrounding waters of San Francisco Bay must be reported to the DON immediately, who will then contact the National Response Center.

3.4 WASTE MANAGEMENT PRACTICES

Waste management will follow the procedures presented in the Waste Management Plan below, which describes the procedures that will be used to handle wastes, transfer wastes to the DON's waste contractor, and to document handling of wastes. These requirements are in addition to those in the Basewide Radiological Management Plan (ITSI Gilbane, 2013).

Waste materials anticipated to be generated during this project are as follows:

- Excavated soil and materials.
- Storm sewer and sanitary drain pipes

- Discarded personal protective equipment (PPE).
- Miscellaneous disposable sampling devices.

For waste designated as hazardous, the DON will provide the appropriate EPA identification number, sign the required transportation and disposal (T&D) documentation, and perform other related functions required of a hazardous waste generator. Every effort will be made to characterize, profile, and remove hazardous waste from the site within 90 days of characterization. Final off-site transportation and disposal of hazardous soil and debris wastes will be managed under a separate base-wide chemical waste transportation and disposal contract.

3.4.1 Waste Minimization Practices

The production of solid waste, un-recyclable, and non-biodegradable wastes will be minimized through reuse or recycling of debris found at work sites and by careful use of the appropriate quantity of materials brought onto the site. With the exception of equipment fuel, lubricants, and detergents in required quantities, the types and quantities chemicals brought onto the site will be minimized.

3.4.2 Solid Waste Generation and Handling

In addition to excavated soil, solid waste will consist primarily of debris from a limited amount of piping, and discarded PPE from surveying and material removal activities. Field activities will generate used PPE, which may include Tyvek™ over-garments, latex gloves, paper towels, filters, tape, plastic sheeting, and plastic packaging. These materials will be collected in plastic bags at each field activity location and turned over to the DON's waste contractor for disposal.

3.4.3 Solid Waste Profiling for Off-Site Disposal

Profiling of soil, related excavation and D&D materials will be necessary for waste characterization and, ultimately, acceptance by a waste disposal facility.

The following radiological field screening protocol for the material will be followed. Aliquots of collected investigation-derived waste samples will be surveyed for gamma and beta using portable hand-held instruments. Gamma surveys will be performed with sodium iodide detectors and a total contamination survey (no swipe data will be taken) will be performed using a scintillation detector connected to a dual-channel instrument (Ludlum 2360 or equivalent). If no indication of discrete particles is identified, the sample will be placed in a certified clean glass

container. A contamination survey (including swipe data) will be performed on the exterior of the sample container. Samples will be labeled as Radioactive Material. Before samples are shipped to the lab, a contamination and dose rate survey will be performed on the shipping container. A notice will be placed with the bill of lading for the samples indicating that the shipment may contain exempt quantities of radioactive material.

The radionuclide soil samples will be analyzed for:

- Cesium-137
- Radium-226
- Thorium-232
- Pu-239

Based on the results of the waste characterization analysis, the following disposal options will be applied to the wastes:

- LLRW will be transferred to the DON's basewide radiological contractor for eventual off-site disposal.
- With the exception of the railroad ties, soil, debris, intended for off-site disposal that are classified as Toxic Substances Control Act hazardous, Resource Conservation and Recovery Act (RCRA) hazardous, or non-RCRA (California) hazardous waste will be transported to EPA-approved and permitted treatment and/or disposal facilities under a separate base-wide chemical waste transportation and disposal contract.
- Soil classified as non-RCRA and non-hazardous will be transported to the nearest Comprehensive Environmental Response, CERCLA-approved Class II landfill facilities under a separate base-wide chemical waste transportation and disposal contract.
- Debris intended for off-site disposal and classified as non-hazardous waste will be transported to a CERCLA-approved waste or recycling facility.
- Any general construction debris, if encountered, will be transported to the nearest municipal landfill.

Wastes determined to be hazardous wastes under California regulations, but not under federal regulations, are referred to as non-RCRA hazardous wastes. California Code of Regulations (CCR) Title 22, Section 66261.24(a)(2) lists the Total Threshold Limit Concentrations (TTLCs) and the Soluble Threshold Limit Concentrations (STLCs) for non-RCRA hazardous waste. A waste is considered non-RCRA hazardous if its total concentrations exceed the regulatory limits for TTLCs or if the extract concentrations from the Waste Extraction Test (WET) exceed the

regulatory limits for STLCs. A WET is required when the total concentrations exceed the STLC by a factor of ten, but are less than the TTLCs. Alternately, there can be a standard for treatment if soluble concentrations are above the STLC even if TTLC is exceeded. California also has additional hazardous waste classification criteria (including 96-hour fish bioassays) that may need to be considered on a case-by-case basis.

Representative samples for chemical (non-radiological) analysis will be collected from each bin or stockpile. Samples will be collected using suitable tools. For example, a small, disposable trowel will be used to collect soil from bin or stockpile. Samples will be transferred into certified clean containers provided by the laboratory. Each sample container will be given a unique identity number and containers will be labeled, preserved according to EPA SW-846 requirements, and transported under chain-of-custody protocol to the laboratory for analysis.

Depending on the requirements of the disposal facility, waste characterization analytical parameters are likely to include:

- Total extractable petroleum hydrocarbons,
- Volatile organic compounds,
- Polychlorinated biphenyls,
- Organochlorine pesticides,
- CCR Title 22 Metals,
- Toxicity Characteristic Leaching Procedure,
- Waste Extraction Test, and
- Reactivity, corrosivity, and ignitability.

Additional analytical parameter may be included based on actual site conditions and/or analytical results associated with initial analysis.

3.4.4 Waste Disposal

Hazardous wastes will be transported off site for appropriate recycling or disposal. Other waste streams requiring off-site disposal will be sampled and analyzed, as necessary, to ensure that all waste is properly characterized and profiled and meets the waste acceptance criteria and packaging requirements for the proposed treatment, storage and disposal facility prior to transport.

Hazardous waste will be disposed only at a hazardous waste disposal permitted for the disposal of the particular type of hazardous waste involved. Wastes disposed off-site will be sent to RCRA Subtitle C or RCRA Subtitle D facilities that meet the requirements of 40 Code of Federal Regulations (CFR), Part 300.440 (CERCLA off-site policy). Final off-site disposal of soil and debris wastes will be managed under a separate base-wide chemical waste transportation and disposal contract.

3.4.5 Waste Transportation

Transportation of radiological and non-radiological waste for disposal will be managed by the DON basewide radiological and non-radiological waste contractor.

Hazardous wastes will be transported for off-site disposal or recycling according to U.S. Department of Transportation Hazardous Material Transportation regulations in 49 CFR, Parts 171 through 177, 40 CFR Part 262, Subpart B, and 22 CCR, Section 66262, which involves packaging, placarding, labeling, and manifesting requirements. Documentation for hazardous waste transported for off-site disposal or recycling will include applicable land disposal restriction certification notices, as required by 40 CFR, Part 268, and 22 CCR, Section 66268.

3.4.6 Inspections

While waste-accumulation areas will be inspected informally on a daily basis, formal inspections for container-accumulation areas will be conducted and recorded on a weekly basis, at minimum, according to 40 CFR, Part 264, Subpart I, and with 22 CCR, Section 66264. Inspections will be recorded and documentation submitted to the DON RPM, ROICC, and CSO.

3.4.7 Hazardous Waste Manifests

Documentation requirements apply to all waste managed during project activities. Field records will be kept for all waste T&D activities. Copies of the field records will be submitted to the DON in a manner requested by the DON (e.g., included as an attachment to the final report or submitted following completion of field activities).

Manifests for radiological waste transport will be prepared by the DON basewide radiological T&D contractor. Manifests for hazardous waste transport will be prepared by the DON's non-radiological base-wide chemical waste transportation and disposal contractor. DON CSO

personnel will be responsible for reviewing and signing all waste documentation including waste profiles, manifests, and land disposal restriction notifications (manifest packages). Before signing the manifest, the designated CSO official will ensure that pre-transport requirements as to packaging, labeling, marking, and placarding are met according to 49 CFR, Parts 171 through 177, 40 CFR Part 262, Subpart B, and CCR Title 22, Section 66262.

4.0 TRAFFIC CONTROL

This section describes alternate traffic routes for site tenants and contractors during remedial activities and details traffic control measures to minimize impacts on normal traffic flow.

4.1 REVISED SITE TRAFFIC ROUTES

The storm drain and sanitary sewer removal and radiological survey and sampling activities will be executed in a manner that avoids conflicts with other contractors performing work at HPNS and maintains uninterrupted traffic flow through the site. A traffic control plan will be prepared and submitted to the DON prior to field mobilization to ensure that the traffic flow across Parcel D-1 is maintained while removing the storm drain and sanitary sewer lines.

To expedite the passage of facility traffic through or around work areas, ITSI Gilbane will install and maintain necessary signs, temporary railings, barricades, and other means to safely direct traffic.

4.2 TRAFFIC CONTROLS

Appropriate on-site traffic control measures will be selected in the field based on actual field conditions at the active work areas. Traffic controls will provide for efficient performance of the work in a safe environment while minimizing the impact on normal traffic flow. Traffic controls will be required during construction activities to provide safe working conditions for equipment operations and truck loading for on-site and off-site transportation. Traffic controls may include, but are not limited to, the following:

- The loading and transporting of waste and debris will be scheduled to minimize disruptions to facility traffic.
- Transportation management strategies such as carpool/vanpool for construction workers will be encouraged.
- Transport trucks removing waste and debris from site areas will adhere to schedules to avoid backups along major streets. Close coordination between ITSI Gilbane and the truck dispatcher will be maintained at all times during loading and unloading activities.
- An area sufficient to park passenger vehicles on-site in the support areas and to park haul trucks in the exclusion zones will be provided.
- Cones, flags, signs, and other traffic control measures will be used as needed to facilitate loading and unloading.

To facilitate safe traffic patterns, trench plates may be used, when necessary, over open excavations.

These safety and control measures will conform to the applicable specifications of the Manual of Traffic Controls for Construction and Maintenance Work Zones (California Department of Transportation 1996).

Materials and equipment will not be stored where they might interfere with the free and safe passage of personnel and tenants. At the end of each day's work and at other times when construction operations are suspended for any reason, ITSI Gilbane will remove equipment and other obstructions from the portion of the roadway used by traffic. In addition, ITSI Gilbane will adhere to all speed limit requirements.

5.0 CULTURAL RESOURCE CONTROLS

To comply with the substantive requirements of Section 106 of the National Historic Preservation Act for undertakings at HPNS during removal and remedial actions, the DON is responsible to define areas of potential effects. Based on findings of a 1998 cultural resource inventory of HPNS (Hamusek-McGann et al. 1998), the DON has determined that there are no archaeologically sensitive areas within the Parcel D-1 Phase II work scope. Therefore, archaeological monitoring is not necessary for Parcel D-1 Phase II removal or remedial actions.

6.0 REPORTING

Over the course of this project, three types of reports will be drafted. These include the Survey Unit Project Reports (SUPRs), FSS Reports, and the Removal Action Completion Report (RACR). Each type of report is described in this section.

6.1 SURVEY UNIT PROJECT REPORTS

For each survey unit excavated, surveyed, and sampled during the removal of the storm drain and/or sanitary sewer line, a SUPR will be drafted. SUPRs will be based on the Survey Unit Project Report Abstract for the Sanitary Sewer and Storm Drain Removal Conducted After January 1, 2011, Hunters Point Naval Shipyard, San Francisco, California, July 2011 (TtEC, 2011). Per the SUPRs Abstract, each SUPR will cover the following:

- Summary of survey unit activities
- Sampling approach for the survey unit
- Sampling methods used
- Data assessment
- Data evaluation
- Dose modeling
- Recommendation for unrestrictive release

6.2 FINAL STATUS SURVEY REPORTS

In support of site closure and unrestricted free release, FSS Reports will be completed for the former NRDL site and the ship berths surveyed and found to meet the radiological remediation objective for unrestricted free release. Similar to the SUPRs, the FSS Reports will include the following:

- Summary of site activities
- Sampling approach for the site
- Sampling methods used
- Data assessment
- Data evaluation
- Dose modeling
- Recommendation for unrestrictive release

6.3 REMOVAL ACTION COMPLETION REPORT

Once the SUPRs and the FSS Reports are finalized, a RACR will be drafted. This report will:

- Summarize the findings of the SUPRs and FSS Reports
- Characterize the nature and extent of any contamination encountered
- Present a conceptual site model
- Provide a summary of any remaining risks following remediation
- Discuss the ALARA analysis
- Support clean closure and free release for the work area

A separate report is not required for the survey and disposition of the railroad tie stockpiles. Rather, a section of the RACR will summarize the procedures and findings of the surveys and final disposition.

7.0 REFERENCES

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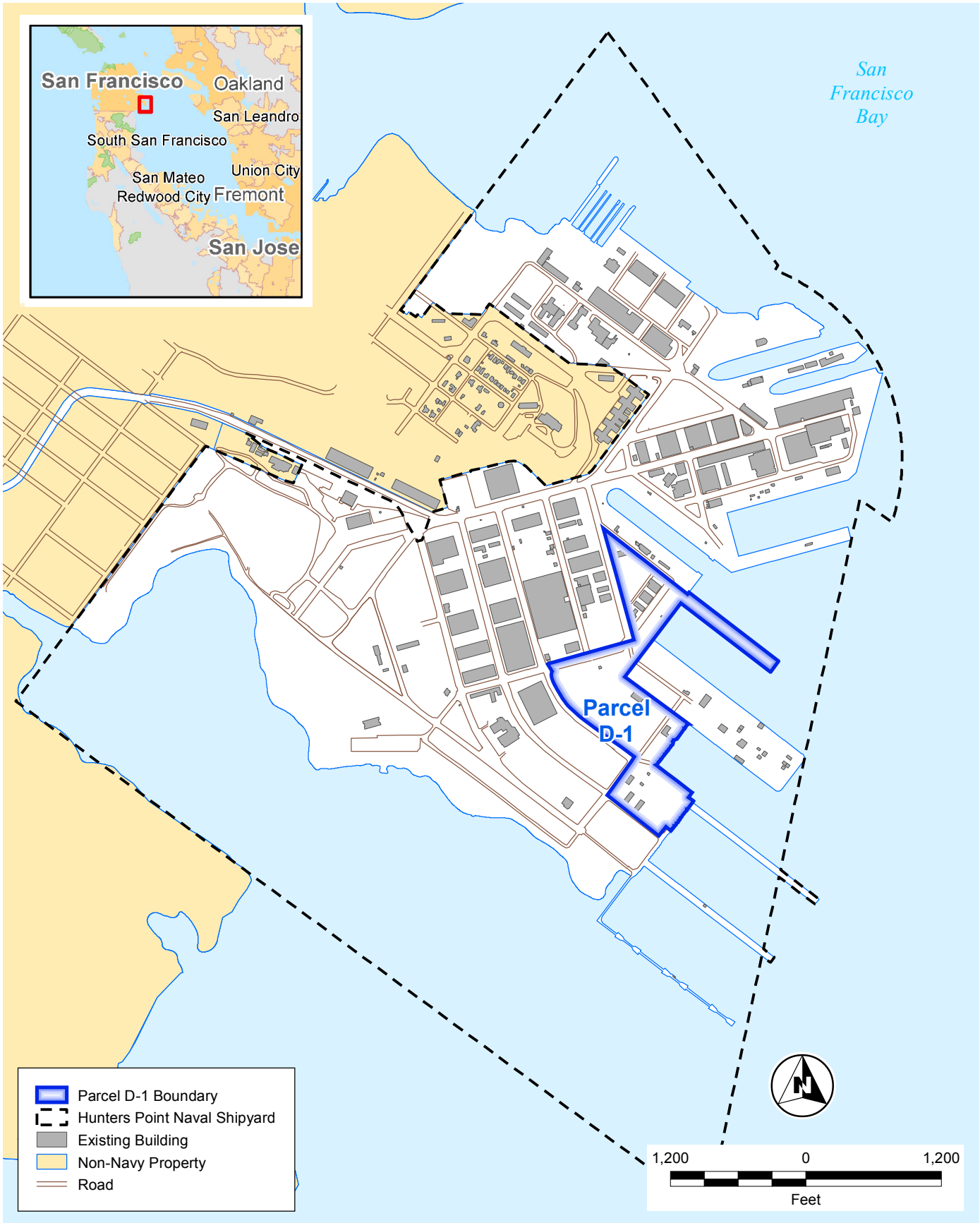
FIGURES



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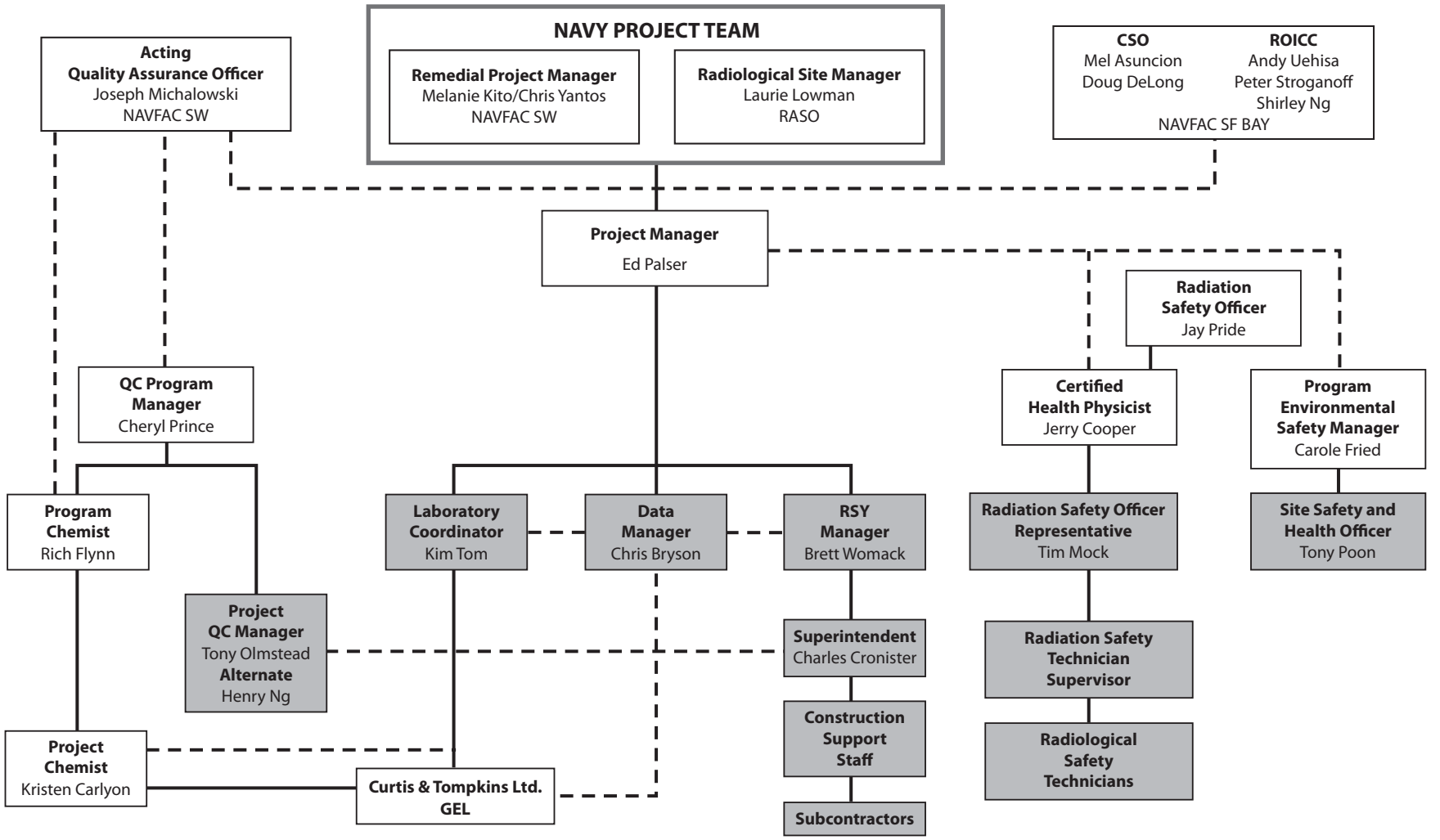
ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1-1
Parcel D-1 Vicinity Map



Abbreviations and Acronyms:

CSO - Contractor Site Officer
NAVFAC SW - Naval Facilities Engineering Command Southwest
RASO - Radiological Affairs Support Office
ROICC - Resident Officer in Charge of Consturction
RSO - Radiation Safety Officer
RSY - Radiological Screening Yard
QC - Quality Control
SF - San Francisco

Formal reporting relationship
Supporting relationship

Staff in shaded boxes are on-site and responsible for field implementation of activities under the Execution Plan.

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 1-2
Project Organization Chart

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FIGURE 1-3 PROJECT SCHEDULE
Parcel D-1 Phase II Radiological Remediation and Support
Hunter's Point Naval Shipyard, San Francisco, CA
Contract N62473-09-D-2614 X003

ID	Task Name	Duration	Start	Finish
1	Project Award	0 days	Fri 8/3/12	Fri 8/3/12
2	Project Closeout	6 days	Mon 6/2/14	Mon 6/9/14
3	**WE1 Project Management Work Element**	**460 days**	**Fri 8/24/12**	**Thu 5/29/14**
4	Project Management Activities (scoping, planning, estimation, execution, tracking)	460 days	Fri 8/24/12	Thu 5/29/14
5	**WE2 Project Meetings**	**460 days**	**Fri 8/24/12**	**Thu 5/29/14**
6	2.2.1 Kick-off Meeting	1 day	Wed 1/30/13	Wed 1/30/13
7	2.2.2 BRAC Cleanup Team (BCT) meetings	460 days	Fri 8/24/12	Thu 5/29/14
8	2.2.3 Contractor Coordination Meetings	460 days	Fri 8/24/12	Thu 5/29/14
9	**WE4 Planning Documents**	**299 days**	**Mon 8/13/12**	**Thu 10/3/13**
10	**Internal Draft**	**243 days**	**Mon 8/13/12**	**Wed 7/17/13**
39	**Regulatory Review of Draft Plans**	**10 days**	**Thu 7/18/13**	**Wed 7/31/13**
40	RTCs for Regulatory Comments for Draft	10 days	Thu 7/18/13	Wed 7/31/13
41	**Submit Final to Regulators**	**46 days**	**Thu 8/1/13**	**Thu 10/3/13**
42	2.4.3 Prepare, review, revise, re-review and approve the Task Specific Plans for Parcel (NRDL & Ship Berths)	45 days	Thu 8/1/13	Wed 10/2/13
43	NTP for Field Work	1 day	Thu 10/3/13	Thu 10/3/13
44	**WE3 Project Infrastructure**	**264 days**	**Mon 5/20/13**	**Thu 5/22/14**
45	2.3.1 Procurement	28 days	Mon 5/20/13	Wed 6/26/13
46	2.3.2 Mobilization	5 days	Fri 10/4/13	Thu 10/10/13
47	2.3.3 Site Cleanup & Demobilization	10 days	Wed 3/5/14	Tue 3/18/14
48	2.3.4 Logistical Support	166 days	Thu 10/3/13	Thu 5/22/14
49	Logisitical Support affter Field Acitivities	57 days	Wed 3/5/14	Thu 5/22/14
50	**WE5 Removal Actions & Radiological Surveys**	**103 days**	**Fri 10/11/13**	**Tue 3/4/14**
51	**2.5.1 Sewer and Storm Drain Removal**	**103 days**	**Fri 10/11/13**	**Tue 3/4/14**
52	**Sewer & Storm Drain System**	**10 days**	**Fri 10/11/13**	**Thu 10/24/13**
53	2.5.1.1 Prepare Work Area	10 days	Fri 10/11/13	Thu 10/24/13
54	**2.5.1.2 Excavate & Remove SS/SD System**	**90 days**	**Fri 10/25/13**	**Thu 2/27/14**
55	Excavate & Remove SS/SD under RSY & NRDL	90 days	Fri 10/25/13	Thu 2/27/14
56	Excavate & Remove SS/SD System 2.5.1.2	90 days	Fri 10/25/13	Thu 2/27/14
57	**2.5.1.3 Sample, Jsurvey & Remediate**	**90 days**	**Fri 10/25/13**	**Thu 2/27/14**
58	Survey of Trench SUs	90 days	Fri 10/25/13	Thu 2/27/14
59	Trench survey sample analysis returned	90 days	Fri 10/25/13	Thu 2/27/14
60	Trench SUs RASO approval process	90 days	Fri 10/25/13	Thu 2/27/14
61	RSY pads survey, remediate and sample	90 days	Fri 10/25/13	Thu 2/27/14
62	RSY pads (12 removed)	90 days	Fri 10/25/13	Thu 2/27/14
63	RSY pads sample analysis returned	90 days	Fri 10/25/13	Thu 2/27/14
64	RSY pads RASO approval process	90 days	Fri 10/25/13	Thu 2/27/14

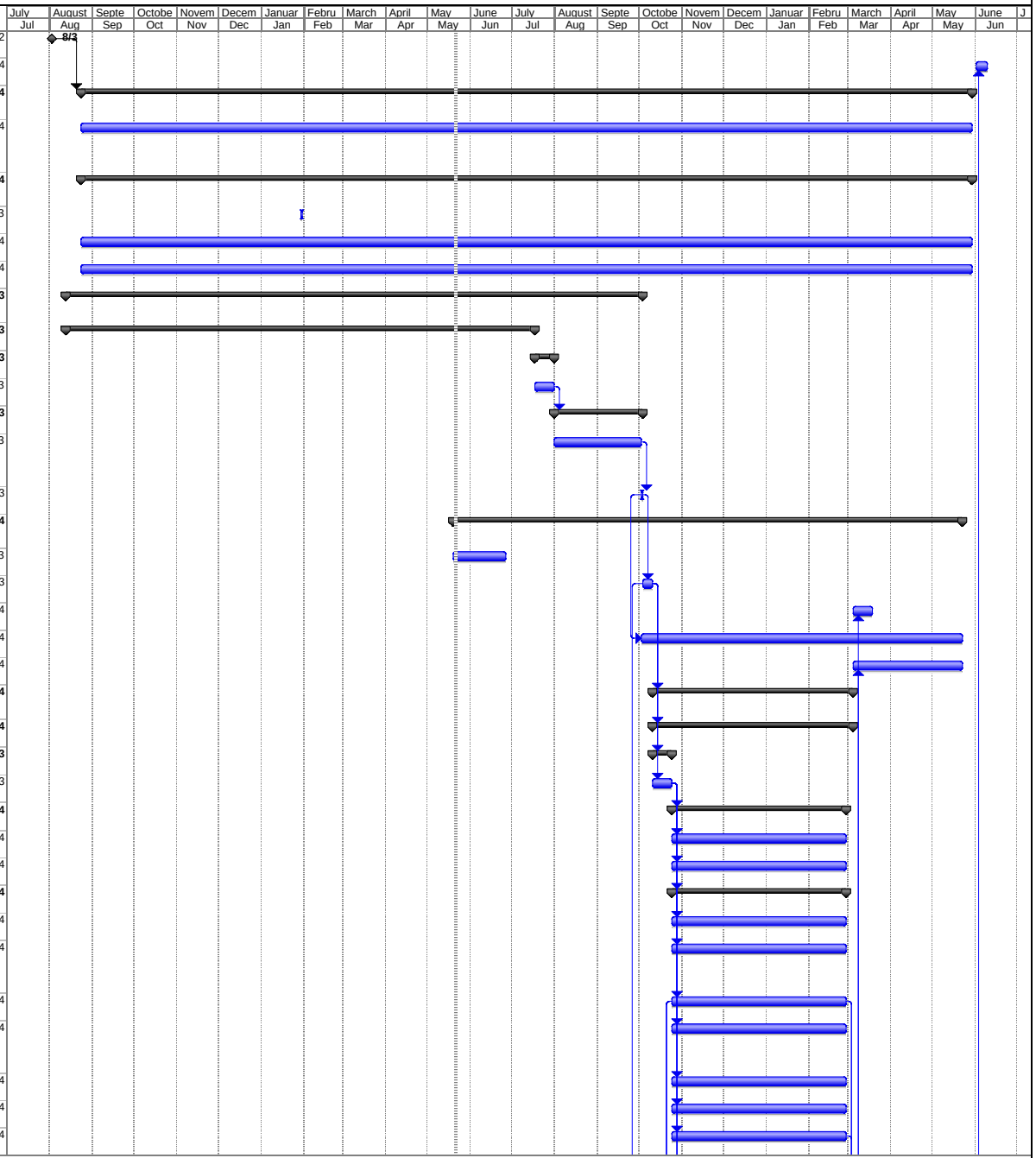
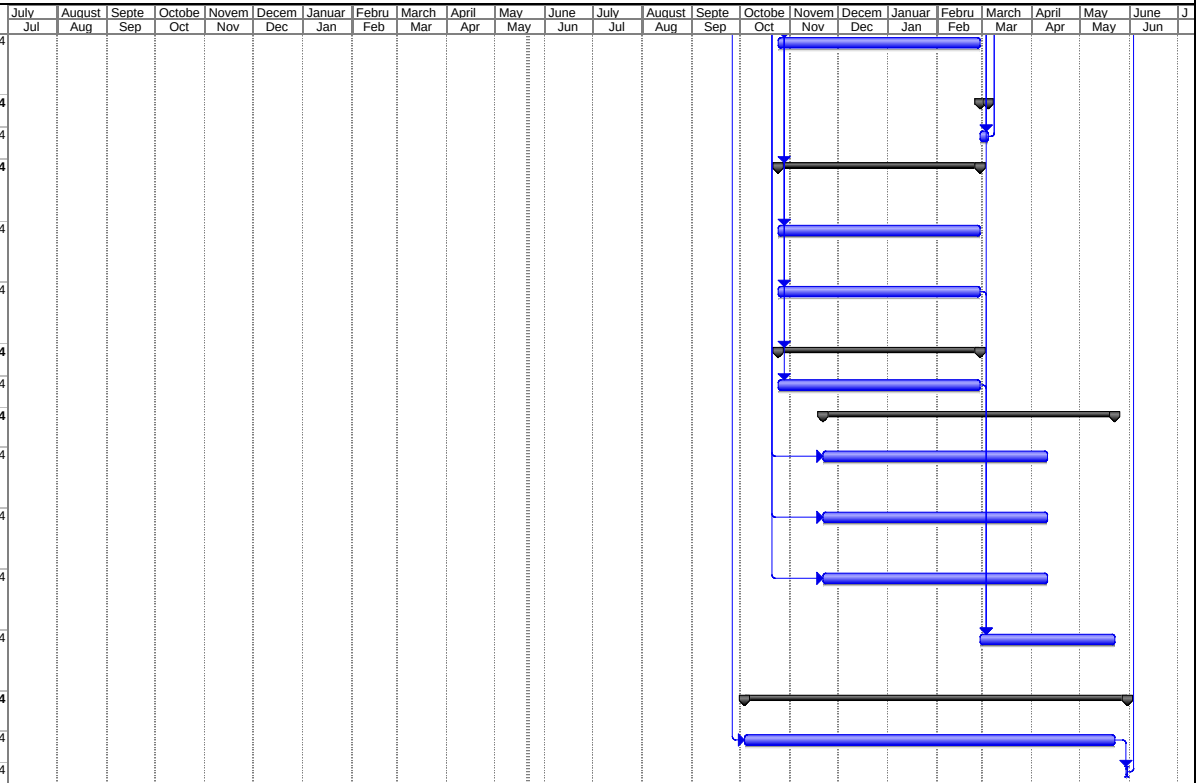
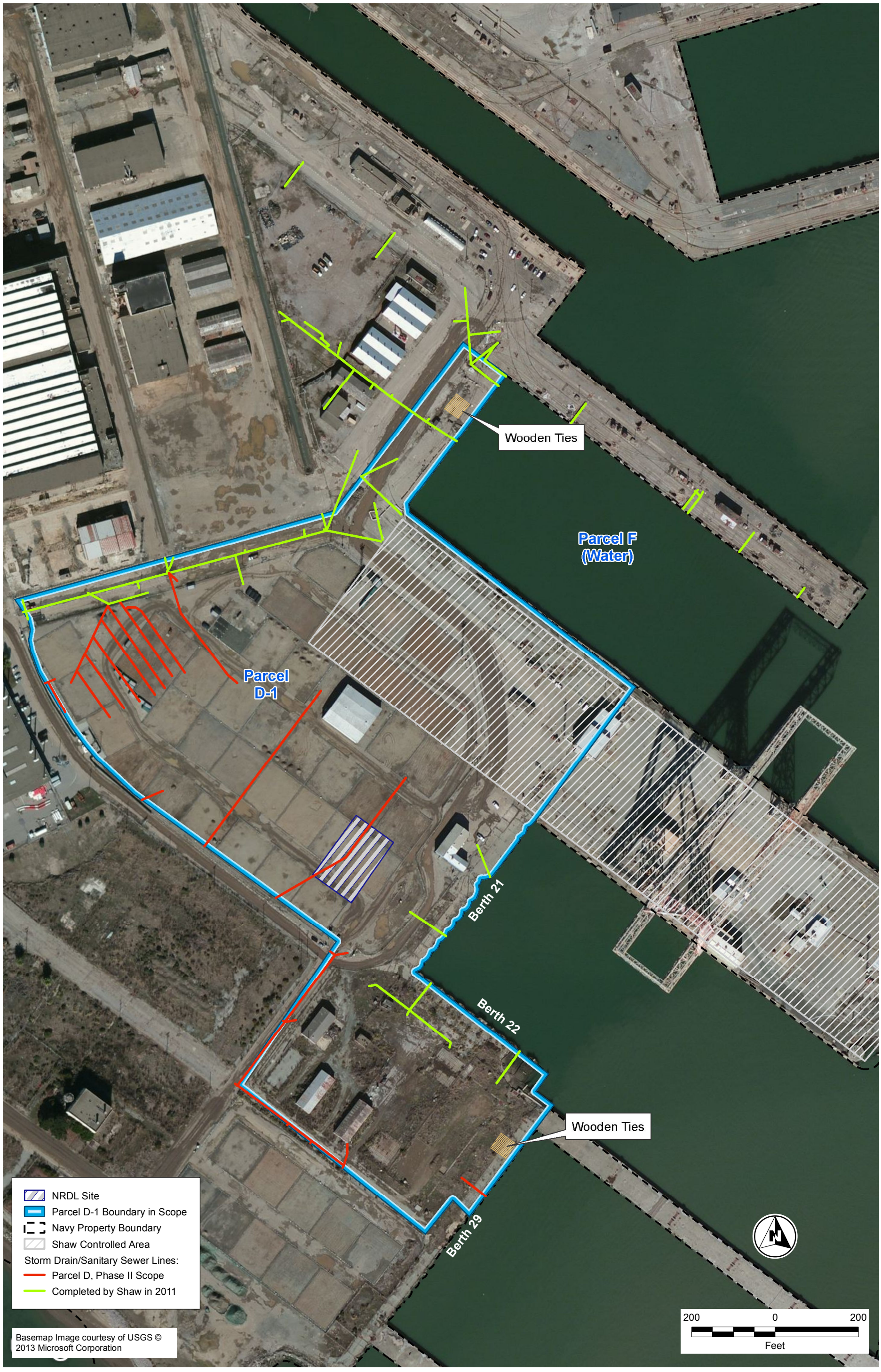


FIGURE 1-3 PROJECT SCHEDULE
Parcel D-1 Phase II Radiological Remediation and Support
Hunter's Point Naval Shipyard, San Francisco, CA
Contract N62473-09-D-2614 X003

ID	Task Name	Duration	Start	Finish
65	Sample, survey and remediate complete 2.5.1.3	90 days	Fri 10/25/13	Thu 2/27/14
66	**2.5.1.4 Backfill Restore**	**3 days**	**Fri 2/28/14**	**Tue 3/4/14**
67	2.5.1.4 Backfill Restore	3 days	Fri 2/28/14	Tue 3/4/14
68	**2.5.2 Area Investigation & Remediation, and Final Status Survey**	**90 days**	**Fri 10/25/13**	**Thu 2/27/14**
69	Investigate, remediate, survey, and RASO approval NRDL area 2.5.2.1	90 days	Fri 10/25/13	Thu 2/27/14
70	Investigate, remediate, survey, and RASO approval ship berths 2.5.2.2	90 days	Fri 10/25/13	Thu 2/27/14
71	**2.5.3 Rail Tie Survey & Disposal**	**90 days**	**Fri 10/25/13**	**Thu 2/27/14**
72	Survey and dispose of Parcel D1 rail ties 2.5.3	90 days	Fri 10/25/13	Thu 2/27/14
73	**WE6 Completion Reports**	**130 days**	**Fri 11/22/13**	**Thu 5/22/14**
74	Prepare, review, revise, and approve survey unit ipackage soils completion reports 2.6.2	100 days	Fri 11/22/13	Thu 4/10/14
75	Prepare, review, revise, and approveFSS ship berthds reports 2.6.2 A	100 days	Fri 11/22/13	Thu 4/10/14
76	Prepare, review, revise and appprove FSS NRDL reports 2.6.2 B	100 days	Fri 11/22/13	Thu 4/10/14
77	Prepare, review, revise, and approve survey Removal Action Completion reports 2.6.3	60 days	Fri 2/28/14	Thu 5/22/14
78	**WE7 Site Support Activities**	**171 days**	**Fri 10/4/13**	**Fri 5/30/14**
79	Waste management activities	165 days	Fri 10/4/13	Thu 5/22/14
80	Project Complete	1 day	Fri 5/30/14	Fri 5/30/14





ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2-1
Removal Areas within
Parcel D-1, Phase II

G:\ArcGIS\Navy\HPS\PROJECTS\Parcel_D\Parcel_D1_Removal_Areas.mxd 5/21/2013 [11:15 AM] EANDERSON, ITSI

ATTACHMENT 1

SAMPLING AND ANALYSIS PLAN

SAP Worksheet #1 -- Title and Approval Page

FINAL
SAMPLING AND ANALYIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)
Phase II Radiological Remediation and Support, Parcel D-1
Hunters Point Naval Shipyard, San Francisco, California
July 2013

Prepared for:
Base Realignment and Closure Program Management Office West
1455 Frazee Road, Suite 900
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Prepared by:
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Document Control Number: ITSI-0808-0004-0006

Prepared under:
Contract Number N62473-10-D-0808
Contract Task Order CTO 0004

Reviewed by: _____ 29 July 2013
Richard Flynn — Date
Program Chemist, ITSI Gilbane

Reviewed by: _____ July 29, 2013
Cheryl Prince
Quality Assurance Program Manager, ITSI Gilbane

Approved by: SOLOMON.JUDITH.A.1461885000 Digitally signed by SOLOMON.JUDITH.A.1461885000 DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USN, cn=SOLOMON.JUDITH.A.1461885000 Date: 2013.08.01 08:06:18 -04'00'
Judy Solomon — Date
NAVFAC LANT Chemist
U.S. Navy, NAVFAC Atlantic

Approved by: _____ August 1, 2013
Joseph Michalowski — Date
Quality Assurance Officer
U.S. Navy, NAVFAC SW

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EXECUTIVE SUMMARY

INTRODUCTION

This Sampling and Analysis Plan (SAP) provides guidance to the ITSI Gilbane Company (ITSI Gilbane) and its project subcontractors in the performance of sampling and analysis activities to address the recommendations contained in the *Historical Radiological Assessment, Volume II, Use of General Radioactive Materials, 1939-2003, Hunters Point Shipyard, San Francisco, California* (United States Department of the Navy [Navy], 2004) for radiologically impacted sites in Parcel D-1 at the Hunters Point Naval Shipyard (HPNS) in San Francisco, California (Figure 1). ITSI Gilbane prepared this plan for the Navy Base Realignment and Closure (BRAC) Program Management Office (PMO) West under contract (N63473-10-D-0808) to the Naval Facilities Engineering Command Southwest (NAVFAC SW). This work is identified as Parcel D-1 Phase II, as it is a continuation of the Parcel D-1 radiological time-critical removal action (TCRA) that began in 2009. ITSI Gilbane will operate the Radiological Screening Yard located in Parcel D-1, provide radiological laboratory services, and perform other activities described in the Final Parcel D-1 Phase II Execution Plan, Hunters Point Naval Shipyard (HPNS), San Francisco, California (Execution Plan).

This SAP (Attachment 1 to the Execution Plan) addresses critical requirements such as project organization and responsibilities, data quality objectives (DQOs), sampling design, field and analytical procedures, quality control (QC), and quality assurance (QA) for radiological sampling at HPNS. The QA/QC elements in this SAP were prepared in accordance with the U.S, Environmental Protection Agency (EPA) Uniform Federal Policy for Quality Assurance Project Plans (EPA 2005) and Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS (EPA 2006a) to ensure that all data collected are precise, accurate, representative, complete, and comparable to meet their intended use.

ITSI Gilbane will use three laboratories to perform the analyses required for the remediation activities at Parcel D-1. The primary laboratory used to perform gamma spectroscopy analyses for screening as well as for definitive data is Curtis and Tompkins, Ltd. (C&T), of Berkeley, California. GEL Laboratories, LLC (GEL) of Charleston, South Carolina, will be used to perform all other radiological and chemical analyses. C&T has received accreditation by the Department of Defense (DoD) Environmental Laboratory Accreditation Program (DoD-ELAP) and the California Department of Public Health (CDPH) National Environmental Laboratory Accreditation Program (NELAP) for gamma spectroscopy. GEL has received accreditation by the DoD ELAP and the CDPH NELAP for all analyses listed in this SAP. An onsite smear laboratory, Envirachem, will be used for field analyses of swipes for gross alpha and gross beta. As no regulatory decisions are made based on swipe samples, accreditation is not necessary. Further details on each laboratory is provided in SAP Worksheet #30.

SUMMARY OF PROJECT OBJECTIVES

The objectives of this scope of work are to: (1) complete the radiological TCRA of sanitary sewer and storm drain lines in Parcel D-1; (2) achieve radiological release to unrestricted use of the sanitary sewer and storm drain line excavated trenches and soil, as well as the former Naval Radiological Defense Laboratory (NRDL) site, and ship berths 21, 22, and 29 along Parcel D-1; and (3) survey and release from radiological controls the railroad ties stockpiled in Parcel D-1 and dispose of them in a manner that minimizes the generation of low-level radioactive waste (LLRW).

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Appendix C: Laboratory Standard Operating Procedures
Appendix D: Example Chain-of Custody
Appendix E: Laboratory DOD ELAP Certificates

Acronyms

dpm/100cm^2	disintegrations per minute per one hundred square centimeters
pCi/g	picocurie per gram
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
AEC	Atomic Energy Commission
bgs	below ground surface
BRAC	Base Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CA	corrective action
CAS	Chemical Abstract Service
CCV	continuing calibration verification
CD	compact disc
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CHP	Certified Health Physicist
cm	centimeter(s)
Cs-137	cesium-137
CSO `	Caretaker Site Office
C&T	Curtis and Tompkins, LTD.
CTO	Contract Task Order
CV	calibration verification
CVAA	cold vapor atomic absorption
D	difference
DoD	Department of Defense
DQO	data quality objective
DTSC	California Department of Toxic Substances Control
ECD	electron capture detector
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency Region 9
EWI	Environmental Work Instruction
FCR	Field Change Request
FID	flame ionizing detector
FSS	final status survey
ft	foot, feet
ft^2	square feet

Acronyms (Continued)

GC	gas chromatograph
GEL	GEL Laboratories, LLC.
GIS	Geographic Information System
GPS	Global Positioning System
HPNS	Hunters Point Naval Shipyard
ICAL	initial calibration
ICP	inductively coupled plasma spectrophotometer
ICP-AES	inductively coupled plasma/atomic emission spectrophotometry
ICV	initial calibration verification
IR	Installation Restoration
ITSI Gilbane	ITSI Gilbane Company
keV	kilo-electron volt(s)
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LLRW	low-level radioactive waste
LOD	limit of detection
LOQ	limit of quantitation
m	meter(s)
m^2	square meters
MB	method blank
MDA	minimum detectable activity
MDC	minimum detectable concentration
MDL	Method Detection Limit
MS	mass spectrometer
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MSL	mean sea level
NA	not applicable
NAVFAC SW	Naval Facilities Engineering Command Southwest
Navy	United States Department of the Navy
NCR	Nonconformance Report
NEDD	Navy Electronic Data Deliverable
NELAP	National Environmental Laboratory Accreditation Program
NIRIS	Naval Installation Restoration Information Solution
NIST	National Institute of Standards and Technology
NRDL	Naval Radiological Defense Laboratory

Acronyms (Continued)

PAL	Project Action Limit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCB	polychlorinated biphenyls
PDF	portable document format
PM	Project Manager
PMO	Project Management Office
POC	point of contact
PQCM	Project Quality Control Manager
PT	performance testing
Pu-239	plutonium-239
QA	quality assurance
QAO	Quality Assurance Officer
QC	quality control
QCPM	Quality Control Program Manager
QL	quantitation limit
QSM	Quality Systems Manual
Ra-226	radium-226
RASO	Radiological Affairs Support Office
RER	relative error ratio
ROC	radionuclide of concern
ROD	record of decision
ROICC	Resident Officer in Charge of Construction
RPD	relative percent difference
RPM	Remedial Project Manager
RSD	relative standard deviation
RSL	regional screening level
RSO	Radiation Safety Officer
RSOR	Radiation Safety Officer Representative
RSY	radiological screening yard
RWQCB	California Regional Water Quality Control Board - San Francisco Bay Region
SAP	Sampling and Analysis Plan
SDG	sample delivery group
Shaw	Shaw Environmental & Infrastructure, Inc.
SOP	standard operating procedure
Sr-90	strontium-90
SVOC	semivolatile organic compounds
TBD	to be determined
TCRA	time-critical removal action
TPH	total petroleum hydrocarbons
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans

Acronyms (Continued)

VOA	volatile organic analyte
VOC	volatile organic compounds

SAP Worksheet #2 -- SAP Identifying Information

(UFP-QAPP Manual Section 2.2.4)

	Hunters Point Naval Shipyard
Site Name/Number:	
Operable Unit:	**Parcel D-1**
Contractor Name:	**ITSI Gilbane Company**
Contract Number:	**N62473-10-D-0808**
Contract Title:	**Indefinite Delivery/Indefinite Quantity (ID/IQ)**
Work Assignment Number (optional):	**CTO 0004**

1. This SAP was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP)* (U.S. EPA, 2005) and *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, QAMS (U.S. EPA, 2002)*.

2. Identify regulatory program: Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA)

3. This SAP is a: Project-Specific SAP.

4. List dates of scoping sessions that were held:

Scoping Session	**Date**
Scoping/kickoff meeting held by teleconference	2/12/2013

5. List dates and titles of any SAP documents written for previous site work that are relevant to the current investigation.

Title	**Date**
None	NA

6. List organizational partners (stakeholders) and connection with lead organization:
United States Environmental Protection Agency Region 9 (EPA); California Environmental Protection Agency (Cal/EPA); California Department of Public Health (CDPH); California Department of Toxic Substances Control (DTSC); California Regional Water Quality Control Board-San Francisco Bay Region (RWQCB); and Radiological Affairs Support Office (RASO) will provide regulatory oversight and guidance.

7. Lead organization: Navy

8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below: None.

SAP Worksheet #2 -- SAP Identifying Information (Continued)

SAP elements and required information that are not applicable to the project.

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management		
Documentation		
1	Title and Approval Page	
2	Table of Contents SAP Identifying Information	
3	Distribution List	
4	Project Personnel Sign-Off Sheet	
Project Organization		
5	Project Organizational Chart	
6	Communication Pathways	
7	Personnel Responsibilities and Qualifications Table	
8	Special Personnel Training Requirements Table	
Project Planning/ Problem Definition		
9	Project Planning Session Documentation (including Data Needs tables) Project Scoping Session Participants Sheet	
10	Problem Definition, Site History, and Background. Site Maps (historical and present)	
11	Site-Specific Project Quality Objectives	
12	Measurement Performance Criteria Table	
13	Sources of Secondary Data and Information Secondary Data Criteria and Limitations Table	
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Table	
16	Project Schedule/Timeline Table	
B. Measurement Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	
18	Sampling Locations and Methods/ SOP Requirements Table Sample Location Map(s)	
19	Analytical Methods/SOP Requirements Table	
20	Field Quality Control Sample Summary Table	
21	Project Sampling SOP References Table Sampling SOPs	
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	
Analytical Tasks		
23	Analytical SOPs Analytical SOP References Table	
24	Analytical Instrument Calibration Table	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	

SAP Worksheet #2 -- SAP Identifying Information (Continued)

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
Sample Collection		
26	Sample Handling System, Documentation Collection, Tracking, Archiving and Disposal Sample Handling Flow Diagram	
27	Sample Custody Requirements, Procedures/SOPs Sample Container Identification Example Chain-of-Custody Form and Seal	
Quality Control Samples		
28	QC Samples Table Screening/Confirmatory Analysis Decision Tree	
Data Management Tasks		
29	Project Documents and Records Table	
30	Analytical Services Table Analytical and Data Management SOPs	
C. Assessment Oversight		
31	Planned Project Assessments Table Audit Checklists	
32	Assessment Findings and Corrective Action Responses Table	
33	QA Management Reports Table	
D. Data Review		
34	Verification (Step I) Process Table	
35	Validation (Steps IIa and IIb) Process Table	
36	Validation (Steps IIa and IIb) Summary Table	
37	Usability Assessment	

SAP Worksheet #3 -- Distribution List

(UFP-QAPP Manual Section 2.3.1)

Name of SAP Recipient	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address
Chris Yantos	Navy Remedial Project Manager (RPM)	Base Realignment and Closure (BRAC) Program Management Office (PMO)	619-532-0912	christopher.yantos.ctr@navy.mil 1455 Frazee Road, Suite 900 San Diego, CA 92108
Melanie Kito	Navy Lead Remedial Project Manager	BRAC PMO	619-532-0787	melanie.kito.ctr@navy.mil 1455 Frazee Road, Suite 900 San Diego, CA 92108
Joseph Michalowski	Navy Quality Assurance Officer (QAO)	NAVFAC SW	619-532-4125	joseph.michalowski@navy.mil 1220 Pacific Highway, Blg 127 San Diego, CA 92132-5190
Laurie Lowman	Radiological Environmental Protection Manager	RASO	757-887-4692	laurie.lowman@navy.mil Building1971, NWS P.O. Drawer 260 Yorktown, VA 23691-0260
Peter Stroganoff	Navy Resident Officer in Charge of Construction (ROICC)	Navy San Francisco Bay Area	510-521-8626 (office) 510-755-6828 (mobile)	peter.stroganoff@navy.mil 2450 Saratoga St.,Suite 200 Alameda, CA 94501-7545

SAP Worksheet #3 -- Distribution List

(UFP-QAPP Manual Section 2.3.1)

Name of SAP Recipient	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address
Keith Forman	BRAC Environmental Coordinator	BRAC PMO	619-532-0913	keith.s.forman@navy.mil 1230 Columbia Street, Suite 1100 San Diego, CA 92101
Doug DeLong	Environmental Compliance Manager; Navy Technical Representative	Navy Caretaker Site Office (CSO)	415-743-4713	doug.delong@navy.mil 410 Palm Ave., Bldg 1, Suite 161 San Francisco, CA 94130
Ross Steenson	Regional Project Manager	RWQCB	510-622-2445	rsteenson@waterboards.ca.gov 1515 Clay Street, Suite 1400 Oakland, California 94612
Craig Cooper	Regional Project Manager	EPA	415-947-4148	cooper.craig@epa.gov 75 Hawthorne Street San Francisco, CA. 94105
Ryan Miya	DTSC Lead Regional Project Manager	DTSC	510-540-3775	rmiya@dtsc.ca.gov 700 Heinz Avenue, Suite 200 Berkeley, 94710-2721
Robert Wilson	Project Manager	CDPH	916-449-5688	robert.wilson@cdph.ca.gov Environmental Management Branch 1616 Capital Avenue; MS 7405 Sacramento, CA 95899-7377
Ed Palser	Project Manager (PM)	ITSI Gilbane	505-400-4076	epalser@itsi.com
Cheryl Prince	Quality Assurance Program Manager	ITSI Gilbane	925-946-3334	cprince@itsi.com

SAP Worksheet #3 -- Distribution List

(UFP-QAPP Manual Section 2.3.1)

Name of SAP Recipient	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address
Jay Pride	Radiation Safety Officer (RSO)	ITSI Gilbane	865-389-8048	jpride@itsi.com
Jerry Cooper	Certified Health Physicist (CHP)	ITSI Gilbane	360-751-4172	[redacted]
Tim Mock	RSO Representative (RSOR)	ITSI Gilbane	865-740-6870	[redacted]
Tony Olmstead	Project Quality Control Manager (PQCM)	ITSI Gilbane	925-250-7875	tolmstead@itsi.com
Chris Bryson	Data Manager	ITSI Gilbane	925-784-7719	chris.bryson@envirachem.com
Richard Flynn	Program Chemist	ITSI Gilbane	925-946-3103	rflynn@itsi.com
Kristen Carlyon	Project Chemist	ITSI Gilbane	925-946-3180	kcarlyon@itsi.com
Kimberly Tom	Laboratory Coordinator	ITSI Gilbane	925-250-6097	ktom@itsi.com

SAP Worksheet #4 – Project Personnel Sign-Off Sheet
(UFP-QAPP Manual Section 2.3.2)

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
Ed Palser	ITSI Gilbane/PM	505-400-4076		All	
Jerry Cooper	ITSI Gilbane/CHP	360-751-4172		All	
Tim Mock	ITSI Gilbane/ RSOR	865-760-6870		All	
Tony Olmstead	ITSI Gilbane/PQCM	925-250-7875		All	
Chris Bryson	Envirachem/Data Manager	925-784-7719		All	
Richard Flynn	ITSI Gilbane/Program Chemist	925-946-3103		All	
Kristen Carlyon	ITSI Gilbane/Project Chemist	925-946-3180		All	
Chris Bryson	Envirachem/Onsite Smear Laboratory PM	925-784-7719		All	
Mike Dahlquist	Curtis and Tompkins (C&T)/Offsite Laboratory PM	510-204-2225		All	
Heather Shaffer	GEL Laboratories, LLC (GEL)/Offsite Laboratory PM	843-769-7386		All	
Evin McKinney	Synectics, Inc./Data Validator (3rd Party)	916-561-3180 X 230		All	
[1]	ITSI Gilbane/Field Crews	Various		All	

SAP Worksheet #4 – Project Personnel Sign-Off Sheet

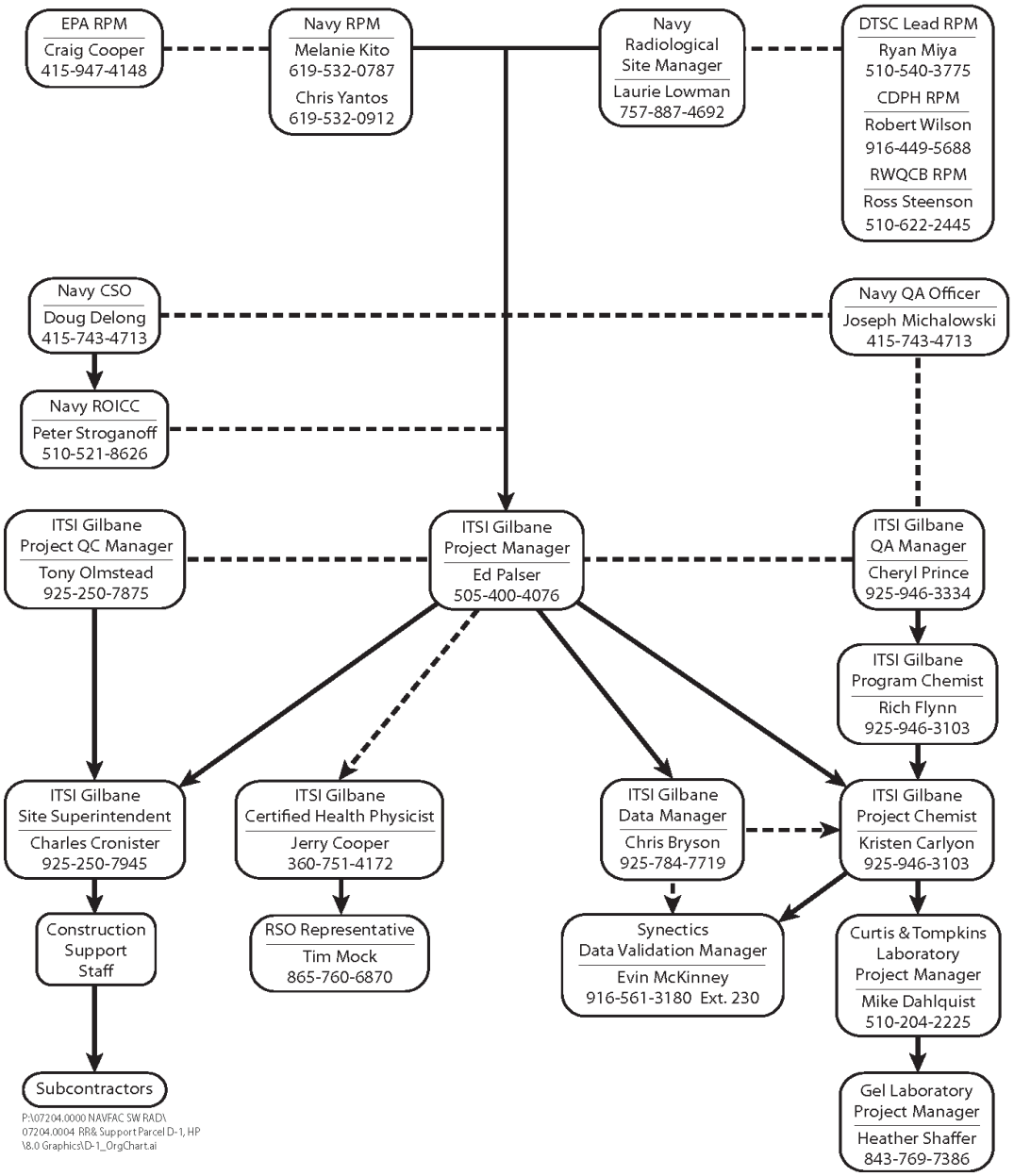
(UFP-QAPP Manual Section 2.3.2)

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Read
[1]	ITSI Gilbane/Field Crews	Various		All	
[1]	ITSI Gilbane/Field Crews	Various		All	
[1]	ITSI Gilbane/Field Crews	Various		All	

Note:

[1] Field crew members will be selected at task startup. Persons identified by the PQCM will read the SAP and sign this worksheet as required. Their identities and the number of required personnel have not been determined at the time of publication.

SAP Worksheet #5 – Project Organizational Chart
(UFP-QAPP Manual Section 2.4.1)



SAP Worksheet #6 – Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
Approvals	Navy QAO BRAC RPM RASO	Joseph Michalowski Chris Yantos Laurie Lowman	joseph.michalowski @navy.mil christopher.yantos.ctr @navy.mil laurie.lowman @navy.mil	ITSI Gilbane PM to request approval of SAP from QAO and BRAC RPM with radiological review and concurrence to be obtained from RASO. PM to acquire approval to initiate field work from BRAC RPM and QAO after appropriate agency approval has been obtained.
Corrective Actions	ITSI Gilbane PQCM ITSI Gilbane Program Chemist ITSI Gilbane Superintendent	Tony Olmstead Richard Flynn Charles Cronister	tolmstead@itsi.com rflynn@itsi.com ccronister@itsi.com	Initiator of needed corrective action notifies responsible party, documents need for action, and forwards documentation to PM and PQCM for concurrence or rejection; responsible party documents action taken and forwards to PM for review.
Project management	ITSI Gilbane PM	Ed Palser	epalser@itsi.com	If changes are necessary, the PM communicates the changes via phone and/or email to the project staff and is authorized to stop work, if necessary.
SAP review	ITSI Gilbane Project Chemist ITSI Gilbane Program Chemist	Kristen Carlyon Rich Flynn	kcarlyon@itsi.com rflynn@itsi.com	The SAP is written by the Project Chemist and reviewed by the Program Chemist prior to submittal to the Navy QAO for review.

SAP Worksheet #6 – Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
Notification of Non-Usable Analytical Data	ITSI Gilbane Project Chemist	Kristen Carlyon	kcarlyon@itsi.com	If significant problems are identified by the laboratory or the project team that impact the usability of the data (i.e. the data is rejected or the DQOs are not met), the Project Chemist will notify the PM; Navy RPM and Navy QAO will be notified within 24 hours or the next business day
Coordination of laboratory supplies for field sampling activities	ITSI Gilbane Project Chemist	Kristen Carlyon	kcarlyon@itsi.com	The Project Chemist will contact the subcontract laboratory to provide necessary sample containers and appropriate shipping materials (such as coolers and bubble wrap) to be delivered on-site prior to commencement of field sampling activities and throughout the course of the project.
Reporting laboratory data quality issues or analytical corrective actions	GEL/Offsite Laboratory PM C&T/Offsite Laboratory PM	Heather Shaffer Mike Dahlquist	heather.shaffer @gel.com mike.dahlquist@ctberk .com	C&T gamma screening data quality issues will be reported to the RSOR and Project Chemist within 24 hours. GEL and definitive C&T data quality issues will be reported to the Project Chemist within 24 hours. Any corrective actions will be documented and verified by the Project Chemist who will notify in writing the PQCM, RSOR, and the PM. The PM will notify the BRAC RPM and RASO.

SAP Worksheet #6 – Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
Field Corrective Actions	ITSI Gilbane PQCM	Tony Olmstead	tolmstead@itsi.com	Field corrective actions will be documented in writing by the PQCM who will notify in writing the RSOR and PM. The PM will notify the BRAC RPM and RASO.
Release of C&T analytical results	ITSI Gilbane RSOR	Tim Mock	[redacted]	The RSOR (or designee) will review C&T analytical results to verify that the requirements in this SAP have been met prior to releasing the data to the project team for evaluation.
Release of GEL analytical results	ITSI Gilbane Project Chemist	Kristen Carlyon	kcarlyon@itsi.com	The Project Chemist will review GEL analytical results to verify that the requirements in this SAP have been met prior to releasing the data to the project team for evaluation.
Review of radiological data and concurrence on radiological actions	RASO	Laurie Lowman	laurie.lowman @navy.mil	The RASO will review radiological data provided by the RSOR (or designee) and will provide concurrence with actions proposed.
SAP procedure revision during field activities	ITSI Gilbane Project Chemist	Kristen Carlyon	kcarlyon@itsi.com	The Project Chemist (or designee) will prepare a Field Change Request (FCR) for any minor changes in sampling procedures that occur due to conditions in the field.

SAP Worksheet #6 – Communication Pathways

(UFP-QAPP Manual Section 2.4.2)

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
SAP amendments	ITSI Gilbane Project Chemist	Kristen Carlyon	kcarlyon@itsi.com	Significant changes to the SAP such as the addition of sampling locations or analyses will require that the Project Chemist prepare an addendum, which will be reviewed and approved by the Navy QAO prior to initiating the affected field activities.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table
(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities
Chris Yantos	Navy Project Manager	BRAC PMO	Oversees project execution and coordination with site representatives, regulatory agencies, and Navy management. Actively participates in the DQO process, and provides management and technical oversight during data collection. Is notified of delays in or changes to field work and has authority to stop work and initiate corrective action at any time.
Joseph Michalowski	Navy QAO	NAVFAC SW	Responsible for QA issues for all Navy work; provides government oversight of the QA program for contractors. Reviews and approves the SAP and any significant SAP modifications or amendments; has the authority to suspend project activities if Navy quality requirements are not met.
Cheryl Prince	QC Program Manager (QCPM)	ITSI Gilbane	Reviews QC processes, issues corrective action orders; assures adherence to requirements of the QC program, including the QA/QC Plan, and SAP, as appropriate. Can receive communication from the PM, Program Chemist, PQCM, and field staff. Has the authority to stop work and initiate corrective action.
Tony Olmstead	PQCM	ITSI Gilbane	Implements field-related quality control activities, issues nonconformance reports (NCRs), initiates necessary rework and/or corrective actions, and communicates with the PM, QCPM, Superintendent, and Project Chemist.
Ed Palser	Project Manager	ITSI Gilbane	Develops and implements all Task Order documents and activities. Assures overall project quality, implementation of three-phase quality control activities, and compliance with project schedule; and performs contract management, technical oversight, and report generation. Responsible for notifying the RPM of significant project information, including (but not limited to) project progress, schedule compliance, modifications to work, delays, analytical data quality issues, and safety-related issues.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities
Richard Flynn	Program Chemist	ITSI Gilbane	Assists the QC Program Manager and assesses the propriety of the proposed analytical methodology; assists in the preparation of the SAP and with management of project tasks associated with sampling; reviews preservation requirements; coordinates SAP review/approval and other QA issues with the Navy QAO; conducts general oversight of and communication with Project Chemist and field personnel in relation to sampling activities; coordinates sample collection and analysis with the analytical laboratory; implements appropriate quality control activities and corrective actions; coordinates data validation activities and the uploading of data to appropriate databases.
Laurie Lowman	Project Manager	RASO	Reviews radiological laboratory on a routine basis. Performs reviews of radiological site operations. Reviews and approves final reports. Provides review and concurrence on data for proposed radiological actions. Ensures that necessary sample results are provided and are consistent with proposed radiological actions.
Jerry Cooper	Certified Health Physicist	ITSI Gilbane	Acts as a technical resource for radiological data collection for analysis, and technical discussions with stakeholders. Reviews radiological data to ensure the DQOs have been met. Provides critical analysis and interpretation of radiological data.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities
Tim Mock	RSOR	ITSI Gilbane	Oversees onsite radiological operations and documentation for project. Supports project and is onsite technical lead for radiological data collection and analysis. Ensures that field sampling personnel have adequate training in radiological sample collection. Receives and reviews radiological data from the field and laboratories to ensure the DQOs have been met. Oversees the performance of remedial activities when sampling activities indicate the presence of radioactive materials at levels above the release criteria; recommends radiological activities to the RASO for concurrence including additional sampling, backfilling of trenches, identification of material that can be used as backfill, etc.; identifies samples to be forwarded to GEL for additional radiological testing not performed by C&T.
Chris Bryson	Data Manager	Envirachem	Collects and maintains records of instrument calibration and maintenance. Collects and maintains completed survey forms, chain of custody records, field log sheets, and other field data. Integrates field, graphical information system (GIS), and global positioning system (GPS) data and plot data on maps.
Charles Chronister	Superintendent	ITSI Gilbane	Conducts oversight of all field activities; ensures implementation of individual elements of site or task-specific work plans; oversees the work of subcontractors performing field-related tasks; Oversees the collection of samples and coordinates shipments with laboratories. Ensures that the sampling protocol is followed per the SAP.
Kristen Carlyon	Project Chemist	ITSI Gilbane	Coordinates sample collection and analysis with the offsite laboratories, reviews analytical data as it is reported, and implements appropriate QC activities and corrective actions. Coordinates upload of electronic data to database. Coordinates third-party data validation of all definitive laboratory data. Reviews data validation reports.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

(UFP-QAPP Manual Section 2.4.3)

Name	Title/Role	Organizational Affiliation	Responsibilities
Chris Bryson	Data Manager	Envirachem (Onsite)	Performs chemical analyses; assures compliance with project requirements regarding performance of analytical procedures; supplies sample containers; handles and preserve samples in accordance with project-specified protocols.
Heather Shaffer	Laboratory PM	GEL (Offsite)	
Mike Dahlquist	Laboratory PM	C&T (Offsite)	
Evin McKinney	Data Validator	Synectics, Inc.	Performs data validation on analytical data used for project decisions.

SAP Worksheet #8 -- Special Personnel Training Requirements Table

(UFP-QAPP Manual Section 2.4.4)

Special personnel training is not required for this project.

SAP Worksheet #9 -- Project Scoping Session Participants Sheet
(UFP-QAPP Manual Section 2.5.1)

Project Name: Parcel D-1 Phase II Radiological Remediation and Support

Site Name: Hunters Point Naval Shipyard

Site Location: San Francisco, California

Projected Date(s) of Sampling: June 2013 through November 2013

Project Manager: Ed Palser, ITSI Gilbane

Date of Scoping Session: February 12, 2013

Scoping Session Purpose: Describe scope of work

Scoping Session Participants:

Name	Title	Affiliation	Phone #	E-mail Address	Project Role
Chris Yantos	Remedial Project Manager (RPM)	Navy BRAC	619-532-0912	christopher.yantos@navy.mil	RPM
Peter Stroganoff	ROICC	Navy	510-521-8626	peter.stroganoff@navy.mil	ROICC
Matt Slack	RASO	Navy BRAC RASO	757-887-4692	matthew.slack@navy.mil	RASO
Doug Delong	CSO	Navy	415-743-4713	douglas.delong@navy.mil	CSO
Ed Palser	Project Manager	ITSI Gilbane	505-400-4076	epalser@itsi.com	Project Manager
Arvind Archarya	Program Manager	ITSI Gilbane	925-946-3206	aacharya@itsi.com	Program Manager
Tony Olmstead	Superintendent	ITSI Gilbane	925-250-7875	tolmstead@itsi.com	PQCM

Comments/Decisions:

No decisions were made at the scoping meeting. The following scopes of work were discussed:

- Storm drains/sewers;
- NRDL site;
- Ship berth surveys, and
- Railroad ties.

Action Items:

Immediate action items were the submission of the work plans and technical memorandums to obtain approval of handling of the railroad ties.

SAP Worksheet #9 -- Project Scoping Session Participants Sheet (Continued)

Consensus Decisions:

No consensus decisions were reached at the meeting.

SAP Worksheet #10 -- Problem Definition
(UFP-QAPP Manual Section 2.5.2)

The Navy has determined (based on its radiological operational history and site-specific investigative data) that sanitary sewer and storm drain lines in Parcel D-1 may contain radioactive material and that the former NRDL site and Ship Berths 21, 22, and 29 along Parcel D-1 may also be radiologically impacted as a result of OPERATIONS CROSSROADS ship decontamination and material testing. The *Historical Radiological Assessment* (Navy, 2004) identifies four radionuclides of concern (ROCs) for Parcel D-1 Phase II work areas. They are strontium-90 (Sr-90), cesium-137 (Cs-137), radium-226 (Ra-226), and plutonium-239 (Pu-239). Table 1 identifies the work areas and their associated ROCs.

Table 1 – Parcel D-1 Work Areas and Associated Radionuclides of Concern

Work Site	Sr-90	Cs-137	Ra-226	Pu-239
Sanitary Sewers and Storm Drains	✓	✓	✓	
Former NRDL Site	✓	✓	✓	✓
Ship Berths 21, 22, and 29	✓	✓	✓	✓
Rail Ties		✓	✓	

Chemical contamination at HPNS will be addressed through the Installation Restoration (IR) Program process, consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan. Table 2 identifies the IR sites located within the sanitary sewer and storm drain line removal activities for this contract task order (CTO) and their associated chemicals of concern as presented in Table 3 of the *Final Record of Decision for Parcels D-1 and UC-1* (Navy, 2009). Chemical analyses discussed in the SAP from this point forward are applicable only to the following: 1) characterization of excavated soil from an IR site for potential use as backfill material; or 2) characterization of import backfill material prior to use.

Table 2- IR Sites Associated with Sanitary Sewers/Storm Drain Line Removal Activities and Associated COCs

IR Site	Chemical of Concern	Remediation Goal (mg/kg)
IR-22, IR-35, IR-48, IR-70	Arsenic	11.1
	Benzo(a)pyrene	0.33
	Benzo(b)fluoranthene	1.76
	Manganese	6,889

There are four impacted sites or removal areas addressed within this Phase II scope of work. They are shown in Figure 2 and briefly discussed in the following subsections.

Sanitary Sewer and Storm Drain Lines

The sanitary sewer and storm drain lines remaining in Parcel D-1 are located within the areas designated as Work Areas 13 and 25. There are approximately 5,700 lineal feet (ft) (1,740 lineal

SAP Worksheet #10 -- Problem Definition (Continued)

meters [m]) of sanitary sewer and storm drain line remaining. The general depth of excavation for these lines is between 3 to 16 ft (1 to 5 m) below ground surface (bgs). The lines shown in Figure 2 draining into Berths 21 and 22 have already been removed or do not exist due to aging infrastructure and erosion events.

Former Naval Radiological Defense Laboratory

The former NRDL site is approximately 300 ft (100 m) north-northwest of Berth 21. The NRDL was established with the original mission of supporting the decontamination efforts on OPERATION CROSSROADS ships. Consequently, it is a potential storage site of OPERATION CROSSROADS material. Currently, the site is an open area.

Ship Berths 21, 22, and 29

Berths 21, 22, and 29 (to the Parcel D-1 boundary) make up the entire perimeter of the Phase II area of focus. The *Historical Radiological Assessment* (Navy, 2004) identified the ship berths as radiologically impacted. Although the ship berths are identified as part of Parcel F, the portion of land that is to be included in this work scope is considered Parcel D-1 Some of the ships that participated in atomic weapons testing, including OPERATION CROSSROADS, were brought to HPNS for decontamination. Berths 21, 22, and 29 may have berthed OPERATION CROSSROADS ships, a radioactive waste disposal barge, and been subjected to use by the NRDL. Currently, the berths are unused.

Railroad Tie Stockpiles

Several large stockpiles of creosote railroad ties in the southern portion of Parcel D-1 are located near Berths 22 and 29, and at the head of Gun Mole Pier adjacent to Berth 14 (shown in Figure 2). The railroad ties were recently removed from radiologically contaminated areas on the Gun Mole Pier and the South Pier. The railroad ties are considered radiologically impacted.

Objectives

The objectives of this scope of work are to: (1) complete the radiological time-critical removal action (TCRA) of sanitary sewer and storm drain lines in Parcel D-1; (2) achieve radiological release to unrestricted use of the sanitary sewer and storm drain line excavated trenches and soil, as well as the former NRDL site, and ship berths 21, 22, and 29 along Parcel D-1; and (3) survey and release the railroad ties from radiological controls and dispose of them in a manner that minimizes the generation of low-level radioactive waste (LLRW).

Radiological release will be attained by either: (1) surveying, remediating, appropriately disposing of impacted material above the release criteria, and performing a final status survey (FSS); and/or (2) providing sample analysis, survey results, and conceptual site model justification, with corresponding Navy and regulatory approval, to justify that material left in place and reused as backfill meets applicable release criteria and regulatory requirements.

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements

U.S. EPA's seven-step DQO process was used during the planning stages for this project. The DQOs are presented in Tables 11-1 through 11-4.

To complete the U.S. EPA's seven-step DQO process, the following critical questions were answered:

Who will use the data? The data will be used by the Project Team, the Navy, EPA, DTSC, and RWQCB to determine if the data are suitable for the intended use and address the recommendations contained in the *Historical Radiological Assessment* (Navy, 2004) for radiologically impacted sites in Parcel D-1 at the HPNS in San Francisco, California.

What are the Project Action Limits? The release criteria are listed in Table 3 below. Release criteria selected as project action limits (PALs) for the radionuclides are provided in SAP Worksheet # 15.

Table 3 – Release Criteria

Radionuclide of Concern	Structure Surface Radioactivity[a] (dpm/100 cm^2)	Soil (or Volumetric) Radioactivity[b] (pCi/g)
Sr-90	1,000	0.331
Cs-137	5,000	0.113
Ra-226	100	1.0
Pu-239	100	2.59

Notes:
[a] Values are net (i.e., above background) concentrations and apply to the release of structures only; release of material and equipment is in accordance with the RPP.
[b] Values are net (i.e., above background) concentrations based on the more limiting residential use scenario.
cm^2 = square centimeter
dpm = disintegrations per minute
pCi/g = picocuries per gram

What will the data be used for? The data will be used to answer the following question:

Are radionuclides of concern (ROCs) present in concentrations exceeding the release criteria?

What further action, if any, will be necessary to radiologically release for unrestricted use?

What types of data are needed? Field and laboratory analytical data are needed. Samples will be collected and analyzed for ROCs. The specific target analytes can be found on SAP Worksheet #15.

SAP Worksheet #11 - Project Quality Objectives/Systematic Planning Process Statements (Continued)

How "good" do the data need to be in order to support the environmental decision? SAP Worksheet #37 describes the usability assessment of the data.

How much data should be collected? SAP Worksheet #17 describes the rules to be used to determine the number and location of samples required.

Where, when, and how should the data be collected? See SAP Worksheet #17.

Who will collect and generate the data? ITSI Gilbane will collect the samples with the support of contractor personnel, as necessary. Samples will be transferred to the on-site smear laboratory (Envirachem) for alpha and beta screening (smear samples only); couriered to the local off-site laboratory (C&T) for both screening and for definitive gamma spectroscopy analyses; and sent to the off-site laboratory via FedEx (GEL) for the balance of the definitive analyses.

How will the data be reported? Data will be incorporated into tables, graphics, or other visual representations. A Final Status Survey Report and a Removal Action Completion Report will be prepared summarizing the work performed and documenting conclusions made.

How will the data be archived? Field observations, field audits, and analytical data (both hard copy and electronic copy) will be stored by ITSI Gilbane in accordance with the CTO.

Table 11-1. Project Quality Objectives – Radiological Release to Unrestricted Use of Sanitary Sewer and Storm Drain Line Excavated Trenches and Soil

STEP 1 State the Problem	STEP 2 Identify the Goals of the Study	STEP 3 Identify Information Inputs	STEP 4 Define the Boundaries of the Study	STEP 5 Develop the Analytic Approach	STEP 6 Specify Performance or Acceptance Criteria	STEP 7 Develop the Plan for Obtaining Data
The Navy would like to radiologically release to unrestricted use the sanitary sewer and storm drain line excavated trenches and soil. The *Historical Radiological Assessment* (Navy, 2004) identified the sanitary sewer and storm drains as radiologically impacted. Radiological data are needed to determine whether the excavated trenches and backfill soil are suitable for release to unrestricted use.	The principal study question is: "Do the levels of residual radioactivity meet the release criteria? The following alternative actions will result from resolution of the principle study question: • If the levels of residual radioactivity meet the release criteria, then the excavated trenches and soil are suitable for radiological release to unrestricted use. • If the levels of residual radioactivity do not meet the release criteria, then the excavated trenches and soil are not suitable for radiological release to unrestricted use. Based on the principal study question and the alternative actions listed above, the decision statement is: "Determine whether or not the levels of residual radioactivity meet the release criteria." The decision is formulated into statistical hypotheses. The state that is presumed to exist in reality is expressed as the null hypothesis (denoted by H_o): • H_o: The levels of residual radioactivity do not meet the release criteria. For the given null hypothesis, the alternative hypothesis (denoted as H_a), which is an expression of what is believed to be the state of reality if the null hypothesis is not true, is: • H_a: The levels of residual radioactivity meet the release criteria. As the null and alternative hypotheses are applied here, the excavated trenches and soil will not be considered suitable for release to unrestricted use unless the survey data show that the levels of residual radioactivity meet the release criteria.	The ROCs are strontium-90 (Sr-90), cesium-137 (Cs-137), and radium-226 (Ra-226). The chemicals of concern are arsenic, benzo(a)pyrene, benzo(b) fluoranthene, and manganese. The impacted media are the exposed trench surfaces and the backfill soil. Soil samples analyzed by gamma and/or alpha spectroscopy (and chemical analytical methods) will be used as quantitative inputs. Gross gamma scan measurements may be used as qualitative inputs. Measurements above the release criteria will trigger further evaluation of identified areas of elevated residual radioactivity (or chemical contamination).	The target population is the volumetric residual radioactivity concentrations of the ROCs in the excavated trenches and soil and the chemicals of concern. The spatial boundaries include exposed surface soil to a depth of 6 inches (15 cm). Decisions will be made on two fundamental scales: • Localized areas - the decision to collect additional data will be made for discrete areas with measurement results that exceed the release criteria. • Survey unit – the sanitary sewer and storm drain lines will be divided into survey units based on similar physical characteristics and potential for residual radioactivity (and chemical contamination). A decision will be made for each survey unit as to its acceptability for release or, alternatively, its need for remediation or additional data collection.	The following decision rules will be used to collect data. Parameter of Interest: <u>Scan Measurements</u> Perform gross gamma scan measurements over 100% of surface area. **IF** scan measurements identify areas with measured radioactivity above mean + 3σ: **THEN** collect biased soil samples at each identified location; **ELSE** collect random-start, systematically distributed soil samples measurements. Parameter of Interest: <u>Soil Samples</u> Collect soil samples from random-start, systematically distributed locations. **IF** soil samples exceed release criteria: **THEN** investigate to determine area of elevated residual radioactivity (or chemical contamination), remediate, and resurvey; **ELSE** perform statistical test. Parameter of Interest: <u>Statistical Test</u> Perform statistical test if one or more static measurements exceed the release criteria. **IF** null hypothesis rejected: **THEN** conclude survey unit is acceptable for release to unrestricted use; **ELSE** investigate failure, remediate, and resurvey.	To ensure quality, data will be reviewed, verified, and validated in accordance with the SAP. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits. The two principal decision errors, based on the principal study question, are: • deciding that the levels of residual radioactivity meet the release criteria when, in fact, they do not (referred to as a false negative or Type I decision error); and • deciding the levels of residual radioactivity do not meet the release criteria when, in fact, they do (referred to as a false positive or Type II decision error). Neither type of decision error is desirable. A Type I decision error is defined as the probability of passing a survey unit that should fail. The consequence of a Type I decision error is that material with elevated residual radioactivity is not properly remediated. A Type II decision error is defined as the probability of failing a survey unit that should pass. The consequences of a Type II decision error are the collection of additional data and/or unnecessary remediation. A decision error rate of 0.05 (5%) will be applied for both Type I and Type II errors for the statistical test. Decision error rates associated with the calculation of instrument minimum detectable concentrations (MDCs) and the number of static measurements will also be set at 0.05 (5%).	A resource-effective design for collecting data sufficient to fulfill study objectives developed in Steps 1 through 6 of the DQO process is described in SAP Worksheet #17.

Table 11-2. Project Quality Objectives – Radiological Release to Unrestricted Use of Former NRDL Site

STEP 1 State the Problem	STEP 2 Identify the Goals of the Study	STEP 3 Identify Information Inputs	STEP 4 Define the Boundaries of the Study	STEP 5 Develop the Analytic Approach	STEP 6 Specify Performance or Acceptance Criteria	STEP 7 Develop the Plan for Obtaining Data
The Navy would like to radiologically release to unrestricted use the former NRDL site. The NRDL was established with the original mission of supporting the decontamination efforts on OPERATION CROSSROADS ships. Consequently, it is a potential storage site of OPERATION CROSSROADS material. Radiological data are needed to determine whether the ship berths are suitable for release to unrestricted use.	The principal study question is: "Do the levels of residual radioactivity meet the release criteria? The following alternative actions will result from resolution of the principle study question: • If the levels of residual radioactivity meet the release criteria, then the former NRDL site is suitable for radiological release to unrestricted use. • If the levels of residual radioactivity do not meet the release criteria, then the former NRDL site is not suitable for radiological release to unrestricted use. Based on the principal study question and the alternative actions listed above, the decision statement is: "Determine whether or not the levels of residual radioactivity meet the release criteria." The decision is formulated into statistical hypotheses. The state that is presumed to exist in reality is expressed as the null hypothesis (denoted by H_o): • H_o: The levels of residual radioactivity do not meet the release criteria. For the given null hypothesis, the alternative hypothesis (denoted as H_a), which is an expression of what is believed to be the state of reality if the null hypothesis is not true, is: • H_a: The levels of residual radioactivity meet the release criteria. As the null and alternative hypotheses are applied here, the former NRDL site will not be considered suitable for release to unrestricted use unless the survey data show that the levels of residual radioactivity meet the release criteria.	The ROCs are Sr-90, Cs-137, Ra-226, and plutonium-239 (Pu-239). There are no chemicals of concern. The impacted media are the exposed surface materials which include asphalt, concrete, and soil. For material surfaces, beta/gamma surface scan measurements and alpha/beta static measurements will be used as quantitative inputs. Samples of removable surface residual radioactivity (swipes) analyzed for gross alpha/beta radioactivity may be used as qualitative inputs. For material volumes, volumetric samples analyzed by gamma and/or alpha spectroscopy will be used as quantitative inputs. Gross gamma scan measurements may be used as qualitative inputs. Measurements above the release criteria will trigger further evaluation of identified areas of elevated residual radioactivity.	The target population is surface and volumetric residual radioactivity concentrations of the ROCs in the exposed material. The spatial boundaries include exposed surface materials. Decisions will be made on three fundamental scales: • Localized areas - the decision to collect additional data will be made for discrete areas with measurement results that exceed the release criteria. • Survey unit – the former NRDL site will be divided into survey units based on similar physical characteristics and potential for residual radioactivity. A decision will be made for each survey unit as to its acceptability for release or, alternatively, its need for remediation or additional data collection. • Entire site – Survey data will be evaluated on a site -wide basis and used to support decisions made by the primary decision maker regarding the site's suitability for release to unrestricted use.	The following decision rules will be used to collect data. Parameter of Interest: <u>Scan Measurements</u> Perform scan measurements (gross gamma or beta/gamma) over 100% of surface area. **IF** areas identified with measured radioactivity above mean + 3σ: **THEN** collect biased measurements at each location, either: (1) alpha/beta static measurement, and (2) swipe sample, or (3) volumetric material sample; **ELSE** collect random-start, systematically distributed static measurements. Parameter of Interest: <u>Static Measurements</u> Collect static measurements (alpha/beta surface measurements, or volumetric material samples) from random-start, systematically distributed locations. **IF** static measurements exceed release criteria: **THEN** investigate to determine area of elevated residual radioactivity, remediate, and resurvey; **ELSE** perform statistical test. Parameter of Interest: <u>Statistical Test</u> Perform statistical test if one or more static measurements exceed the release criteria. **IF** null hypothesis rejected: **THEN** conclude survey unit is acceptable for release to unrestricted use; **ELSE** remediate and resurvey.	To ensure its quality, data will be reviewed, verified, and validated in accordance with the SAP. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits. The two principal decision errors, based on the principal study question, are: • deciding that the levels of residual radioactivity meet the release criteria when, in fact, they do not (referred to as a false negative or Type I decision error); and • deciding the levels of residual radioactivity do not meet the release criteria when, in fact, they do (referred to as a false positive or Type II decision error). Neither type of decision error is desirable. A Type I decision error is defined as the probability of passing a survey unit that should fail. The consequence of a Type I decision error is that material with elevated residual radioactivity is not properly remediated. A Type II decision error is defined as the probability of failing a survey unit that should pass. The consequences of a Type II decision error are the collection of additional data and/or unnecessary remediation. A decision error rate of 0.05 (5%) will be applied for both Type I and Type II errors for the statistical test. Decision error rates associated with the calculation of instrument minimum detectable concentrations (MDCs) and the number of static measurements will also be set at 0.05 (5%).	A resource-effective design for collecting data sufficient to fulfill study objectives developed in Steps 1 through 6 of the DQO process is described in SAP Worksheet #17.

Table 11-3. Project Quality Objectives – Radiological Release to Unrestricted Use of Ship Berths 21, 22, and 29

STEP 1 **State the Problem**	**STEP 2** **Identify the Goals of the Study**	**STEP 3** **Identify Information Inputs**	**STEP 4** **Define the Boundaries of the Study**	**STEP 5** **Develop the Analytic Approach**	**STEP 6** **Specify Performance or Acceptance Criteria**	**STEP 7** **Develop the Plan for Obtaining Data**
The Navy would like to radiologically release to unrestricted use Ship Berths 21, 22, and 29 (to the Parcel D-1 boundary). The HRA (Navy, 2004) identified the ship berths as radiologically impacted as they may have berthed ships that participated in atomic weapons testing, including OPERATION CROSSROADS; berthed a radioactive waste disposal barge; and been subjected to use by the NRDL. Radiological data are needed to determine whether the ship berths are suitable for release to unrestricted use.	The principal study question is: "Do the levels of residual radioactivity meet the release criteria? The following alternative actions will result from resolution of the principle study question: • If the levels of residual radioactivity meet the release criteria, then the ship berths are suitable for radiological release to unrestricted use. • If the levels of residual radioactivity do not meet the release criteria, then the ship berths are not suitable for radiological release to unrestricted use. Based on the principal study question and the alternative actions listed above, the decision statement is: "Determine whether or not the levels of residual radioactivity meet the release criteria." The decision is formulated into statistical hypotheses. The state that is presumed to exist in reality is expressed as the null hypothesis (denoted by H_o): • H_o: The levels of residual radioactivity do not meet the release criteria. For the given null hypothesis, the alternative hypothesis (denoted as H_a), which is an expression of what is believed to be the state of reality if the null hypothesis is not true, is: • H_a: The levels of residual radioactivity meet the release criteria. As the null and alternative hypotheses are applied here, the ship berths will not be considered suitable for release to unrestricted use unless the survey data show that the levels of residual radioactivity meet the release criteria.	The ROCs are Sr-90, Cs-137, Ra-226, and Pu-239. There are no chemicals of concern. The impacted media are the exposed material surfaces and, in some cases based on the integrity, permeability, and other characteristics of the material surface, the volume of the exposed material. Exposed materials include concrete, asphalt, metal, and soil. For material surfaces, beta/gamma surface scan measurements and alpha/beta static measurements will be used as quantitative inputs. Samples of removable surface residual radioactivity (swipes) analyzed for gross alpha/beta radioactivity may be used as qualitative inputs. For material volumes, volumetric samples analyzed by gamma and/or alpha spectroscopy will be used as quantitative inputs. Gross gamma scan measurements may be used as qualitative inputs. Measurements above the release criteria will trigger further evaluation of identified areas of elevated residual radioactivity.	The target population is surface and volumetric residual radioactivity concentrations of the ROCs in the exposed material. The spatial boundaries include exposed surfaces, including structures, utility pads, vaults, piping, or other infrastructure that exists from the mean low low water line to a point 50 ft (15 m) inland from the edge of the original berth. The berths have deteriorated significantly and in some areas, all that remains of the edge of the berth are pilings and other structures surrounded by water. Dewatering in any manner is not planned. Decisions will be made on three fundamental scales: • Localized areas - the decision to collect additional data will be made for discrete areas with measurement results that exceed the release criteria. • Survey unit – the ship berths will be divided into survey units based on similar physical characteristics and potential for residual radioactivity. A decision will be made for each survey unit as to its acceptability for release or, alternatively, its need for remediation or additional data collection. • Entire ship berth – Survey data will be evaluated on a ship berth-wide basis and used to support decisions made by the primary decision maker regarding the ship berth's suitability for release to unrestricted use.	The following decision rules will be used to collect data. Parameter of Interest: <u>Scan Measurements</u> Perform scan measurements (gross gamma or beta/gamma) over 100% of surface area. **IF** areas identified with measured radioactivity above mean + 3σ: **THEN** collect biased measurements at each location, either: (1) alpha/beta static measurement, and (2) swipe sample, or (3) volumetric material sample; **ELSE** collect random-start, systematically distributed static measurements. Parameter of Interest: <u>Static Measurements</u> Collect static measurements (alpha/beta surface measurements, or volumetric material samples) from random-start, systematically distributed locations. **IF** static measurements exceed release criteria: **THEN** investigate to determine area of elevated residual radioactivity, remediate, and resurvey; **ELSE** perform statistical test. Parameter of Interest: <u>Statistical Test</u> Perform statistical test if one or more static measurements exceed the release criteria. **IF** null hypothesis rejected: **THEN** conclude survey unit is acceptable for release to unrestricted use; **ELSE** investigate failure, remediate, and resurvey.	To ensure its quality, data will be reviewed, verified, and validated in accordance with the SAP. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits. The two principal decision errors, based on the principal study question, are: • deciding that the levels of residual radioactivity meet the release criteria when, in fact, they do not (referred to as a false negative or Type I decision error); and • deciding the levels of residual radioactivity do not meet the release criteria when, in fact, they do (referred to as a false positive or Type II decision error). Neither type of decision error is desirable. A Type I decision error is defined as the probability of passing a survey unit that should fail. The consequence of a Type I decision error is that material with elevated residual radioactivity is not properly remediated. A Type II decision error is defined as the probability of failing a survey unit that should pass. The consequences of a Type II decision error are the collection of additional data and/or unnecessary remediation. A decision error rate of 0.05 (5%) will be applied for both Type I and Type II errors for the statistical test. Decision error rates associated with the calculation of instrument minimum detectable concentrations (MDCs) and the number of static measurements will also be set at 0.05 (5%).	A resource-effective design for collecting data sufficient to fulfill study objectives developed in Steps 1 through 6 of the DQO process is described in SAP Worksheet #17.

Table 11-4. Project Quality Objectives – Release of Rail Ties from Radiological Controls

STEP 1 State the Problem	STEP 2 Identify the Goals of the Study	STEP 3 Identify Information Inputs	STEP 4 Define the Boundaries of the Study	STEP 5 Develop the Analytic Approach	STEP 6 Specify Performance or Acceptance Criteria	STEP 7 Develop the Plan for Obtaining Data
The Navy would like to dispose of several large stockpiles of creosote railroad ties at a State of California permitted Class I landfill. In order to do this, the railroad ties must be radiologically surveyed and released from radiological controls. The stockpiles exist in the southern portion of Parcel D-1 near Berths 22 and 29, and at the head of Gun Mole Pier adjacent to Berth 14. The railroad ties were removed from radiologically contaminated areas on the Gun Mole Pier and the South Pier.	The principal study question is: "Is residual radioactivity present that exceeds the release criteria?" Release criteria contained in the *Hunters Point Naval Shipyard Basewide Radiological Removal Action, Action Memorandum* (Navy, 2006), Table 1, will be used to quantitatively answer the question. The following alternative actions will result from resolution of the principle study question: • If residual radioactivity is less than the release criteria, then the railroad ties are suitable for release from radiological controls. • If residual radioactivity is greater than the release criteria, then the railroad ties are not suitable for release from radiological controls and will be remediated or disposed as LLRW. Based on the principal study question and the alternative actions listed above, the decision statement is: Determine whether or not residual radioactivity is present above the release criteria.	The ROCs are Cs-137, and Ra-226. There are no chemicals of concern. The impacted media are the railroad ties, specifically the surfaces that have been exposed to the airborne environment or that have come into contact with the surrounding soil, which are the possible sources of contamination. Total and removable residual radioactivity measurements will be collected from exposed surfaces of the railroad tie. Where the railroad tie is degraded and those surfaces are not suitable to yield representative measurements, the degraded railroad ties will be spread out over an area the same size as an RSY screening pad and the material surveyed and volumetrically sampled in a manner similar to a screening pad of soil. Residual radioactivity measurements will be compared to the release criteria. For simplicity in execution, gross beta activity will be assumed to be Cs-137 and gross alpha activity will be assumed to be Ra-226 unless isotopic analysis is performed or a technical basis for an alternate approach is documented and approved for use by the Navy. Removable surface residual radioactivity measurements (i.e., swipes) will be compared to an arbitrary value of 20% of the release criteria. Measurements above the release criteria will trigger investigation and/or remediation of the railroad ties. Samples and static measurements of alpha- and beta/gamma-emitting surface residual radioactivity and swipe samples analyzed for alpha/beta radioactivity will be used as quantitative inputs to the principal study question. Qualitative inputs to the principal study question will include gross gamma and beta surface scan measurements.	The target population of interest is the residual radioactivity concentrations of the ROCs on the surface of the railroad tie or, for degraded railroad ties, the volumetric concentration of residual radioactivity. A decision regarding suitability for release from radiological controls will be made for each railroad tie and for each 1,000 m^2 (15 to 23 cm thick) of railroad tie material.	The following decision rules will be used to collect data. Parameter of Interest: Suitability for Scanning **IF** railroad tie is intact with surfaces suitable for scanning: **THEN** (1) perform beta/gamma scan over 100% of surface area and at location of highest measured radioactivity; (2) obtain alpha/beta static measurement, and (3) collect and analyze swipe sample; **ELSE** (1) spread out degraded railroad ties, and (2) collect and analyze sample of railroad tie material. Parameter of Interest: Surface Residual Radioactivity **IF** alpha/beta static measurement and/or swipe sample results exceed release criteria: **THEN** (1) investigate to determine area of elevated residual radioactivity, (2) physically cut out elevated area from railroad tie and dispose as LLRW, and (3) resurvey (i.e., repeat scan, static, and swipe measurements); or, in the alternative, dispose of entire railroad tie as LLRW; **ELSE** release railroad tie from radiological controls. Parameter of Interest: Volumetric Residual Radioactivity **IF** degraded railroad tie material sample exceeds release criteria: **THEN** dispose of railroad tie material as LLRW; **ELSE** release railroad tie material from radiological controls.	To ensure its quality, data will be reviewed, verified, and validated in accordance with the SAP. To ensure usability of laboratory data, appropriate laboratory methods have been selected to provide the necessary laboratory detection limits.	The survey/sampling design is based on judgmental (biased) methods to data collection to achieve the project DQOs. The design is such that if residual radioactivity above the release criteria is not identified, the collected data set becomes the based for releasing the railroad tie or degraded railroad tie material from radiological controls.

SAP Worksheet #12 -- Measurement Performance Criteria Table

(UFP-QAPP Manual Section 2.6.2)

Field QC samples are not required for this project because samples will be collected using disposable equipment (and thus blank samples are not required). Variability associated with field duplicate samples is not required to meet the project objectives. Therefore, measurement performance criteria for field QC sample collection are not applicable.

SAP Worksheet #13 -- Secondary Data Criteria and Limitations Table

(UFP-QAPP Manual Section 2.7)

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation / collection dates)	How Data Will Be Used	Limitations on Data Use
Historical Radiological Data	*Historical Radiological Assessment, Volume II, Use of General Radioactive Materials, 1939-2003, Hunters Point Shipyard, San Francisco, California* (Navy, 2004)	Various	Background information for site and to identify site ROCs.	None
Design Plans	*Design Plan for the Parcel D-1 Sanitary Sewer and Storm Drain Removal, Hunters Point Shipyard, San Francisco, California* (Shaw Environmental & Infrastructure, Inc. [Shaw], 2010)	Shaw E&I	To identify work that has yet to be completed.	None.

SAP Worksheet #14 -- Summary of Project Tasks
(UFP-QAPP Manual Section 2.8.1)

Tasks applicable to radiological activities performed by ITSI Gilbane for this project at HPNS will include the following:

- Preparation of site-specific plans
- Preparatory activities and meetings
- Conduct of geophysical surveys as required
- Excavation of radiologically impacted soils and associated materials
- Operation of radiological screening yard (RSY)
- Storm water, sediment, and erosion control
- Radiological survey and sampling
- Material and equipment surveys
- Radiologically cleared soil stockpile management
- Backfill placement and compaction
- Site restoration
- Survey and decontamination of equipment
- Waste classification and storage
- Preparation of closure reports

Sampling design and rationale are detailed in SAP Worksheet #17. Sample collection, decontamination, and data management procedures are described in this worksheet (SAP Worksheet #14).

SAMPLE COLLECTION PROCEDURES
The following sections provide the sampling procedures for collection of samples associated with remediation activities for this project. Samples will be labeled, documented, and packaged according to procedures in SAP Worksheets #27 and 29.

Reference (Background) Area Sampling
Reference (background) area sample results from prior projects in Parcel D-1 may be used for this project. However, if required for this project, reference area samples for radiological analyses will be collected in accordance with Standard Operating Procedure (SOP) ITSI-RSOP-09.01 in Appendix A of this SAP.

Soil/Sediment/Swipe Sampling
Soil/sediment samples for radiological analyses will be collected in accordance with SOP ITSI-RSOP-09.01 in Appendix A of this SAP. Swipe samples for radiological analyses will be collected in accordance with SOP ITSI-RSOP-05.01 in Appendix A of this SAP.

Excavated Soil Sampling
Excavated soil will be screened and sampled for radiological analysis in accordance with SOP ITSI-RSOP-09.01 in Appendix A of this SAP.

SAP Worksheet #14 -- Summary of Project Tasks (Continued)

After radiological analyses are completed on IR site excavated soils, soil samples will be collected for chemical analyses at a rate of one sample for each RSY pad of material (approximately 150 cubic meters) to determine suitability for reuse using the following procedure:

1. The sample will be collected at a random location on the RSY pad. The sample location will be chosen using a suitable random selection method.

2. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.

3. A hand auger, disposable scoop, or equivalent will be used to access each location and collect the sample. Soil will be placed into sample containers that will be filled completely. Sample containers are listed in SAP Worksheet #19.

Import Backfill Material Sampling

For verification sampling of any necessary import backfill material sources, unless already certified, samples will be collected in accordance with SOP ITSI-RSOP-09-01 in Appendix A of this SAP for radiological analyses and as follows for chemical analyses:

1. Only soil and fine materials will be sampled. A minimum of four samples per source will be collected for chemical analyses.

2. Random sample locations will be chosen.

3. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.

4. A hand auger, disposable scoop, or equivalent will be used to access each location and collect the sample. Soil will be placed into sample containers that will be filled completely. Sample containers are listed in SAP Worksheet #19. For volatile organic compounds (VOCs) or total petroleum hydrocarbon (TPH) purgeable analysis, En Core samples will be collected as described in SOP PR-TC-02.02.01.05.

Waste Sampling

Excavated soil that is not suitable for reuse will be disposed by the Navy's hazardous and/or LLRW disposal contractor. Wastewater will be generated during various field activities and stored on-site in appropriate containers labeled as nonhazardous pending waste characterization and profiling. Sampling procedures are as follows:

SAP Worksheet #14 -- Summary of Project Tasks (Continued)

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting wastewater samples.

2. Wastewater samples will be collected using a disposable bailer or equivalent as needed. Samples will be transferred into certified clean containers provided by the laboratory.

3. Vials for VOC (or TPH-purgeable) analysis will be filled as follows:
   a. The water samples will be carefully collected into 40-milliliter volatile organic analysis (VOA) vials using techniques to minimize aeration.
   b. The vial will be filled up to the lid until a positive meniscus is formed.
   c. The vial will be capped immediately, but slowly.
   d. The sample will be checked for the presence of air bubbles.
   e. If an air bubble is present, the collected sample will be discarded and the wastewater resampled using a new vial.
   f. The previous steps will be repeated until an air bubble-free sample is collected.

Analytical criteria for waste characterization will depend on the requirements of the receiving facility, but will likely include the following typical analyses:

- VOCs
- Semivolatile organic compounds (SVOCs)
- Total petroleum hydrocarbons
- Polychlorinated biphenyls (PCBs)
- Heavy metals
- ROCs

Once analytical results are received, disposition of the wastewater will be determined in accordance with state and federal regulations.

DATA MANAGEMENT PROCEDURES

Field surveying data, logbooks/field forms, and chain-of-custody records will be maintained in the ITSI Gilbane project file in accordance with ITSI Gilbane SOP PR-TC-01.04.01.00 *Field Documentation*.

The RSOR (or designee) will e-mail a copy of the chain-of-custody records to the Project Chemist the day any samples are shipped to GEL or couriered C&T. The Project Chemist will maintain a copy of the chain-of-custody record until submitted to the Navy Administrative Record along with the hard-copy packages as described in SAP Worksheet #29. C&T will provide screening results to the RSOR (or designee) for review. GEL and C&T will e-mail definitive analytical results within the turnaround time to the Project Chemist. This submittal will include surrogates, and matrix spike/matrix spike duplicates [MS/MSDs]). The Project Chemist will review prior to distribution to the project team. Following this submittal, GEL and C&T will be required to submit an EPA Level III- or IV-equivalent data package within 30

SAP Worksheet #14 -- Summary of Project Tasks (Continued)

business days of the sample collection date as described in SAP Worksheet #29.

Information from the chain-of-custody records for samples analyzed by GEL or C&T will be uploaded into a database per the procedures outlined in ITSI Gilbane SOP PC-TR-02.12.02.00 *Sample Tracking and Electronic Data Management*. The laboratories will provide electronic data deliverables (EDD) in order to upload analytical results into the ITSI Gilbane database. The EDD will be checked for required values and project-specific requirements. Any discrepancies in the EDD will be corrected by the laboratory. The database will be backed up on electronic media or an independent server.

Analytical results that represent definitive data will be validated by a third-party data validation service provider. The validation report is described in SAP Worksheet #29, and the validation qualifiers will be entered electronically in the ITSI Gilbane project database by the validator to the EDDs loaded by the laboratory. Survey data will be recorded by on-site personnel for all samples locations. Horizontal control information for upload into the database will be captured in the State Plane Coordinate System in feet and vertical control standards will be in mean sea level. Survey data for upload into the Naval Installation Restoration Information Solution (NIRIS) will be in accordance with Environmental Work Instruction (EWI) EVR.6, *Environmental Data Management and Required Electronic Delivery Standards* (SWDIV2005).

EPA Level III-equivalent and Level IV-equivalent hard-copy data packages will be stored until subsequent submittal to the Navy Administrative Record as described in SAP Worksheet #29.

SAP Worksheet #15.1 -- Reference Limits and Evaluation Table
(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil
Analytical Group: Gamma Spectroscopy (for initial screening of samples) (C&T)

Analyte[1,2]	Chemical Abstract Service (CAS) Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project Quantitation Limit Goal (pCi/g)	Laboratory-specific	
					MDA (pCi/g)	MDL (pCi/g)
Cesium-137	10045-97-3	0.113	Residential Soil Remediation Goal [3]	0.07	0.07	NA
Radium-226	13982-63-3	1.0 pCi/g above background	Residential Soil Remediation Goal [3]	0.2	1.3	NA

Notes:
[1]The isotope list above will be used for initial screening of samples collected for gamma spectroscopy. Initial screening implies that the samples have not undergone any in-growth period, and therefore radium-226 will be reported based on the 186 kilo-electron volt (keV) radium-226 gamma energy peak.
[2] All detected radionuclides will be reported. Sample count time will be based on counting time necessary to achieve Cs-137 project quantitation limit goal.
[3] *Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2009)

MDA = minimum detectable activity
NA = not applicable
MDL = method detection limit
pCi/g = picocurie per gram

SAP Worksheet #15.2 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil
Analytical Group: Gamma Spectroscopy (for definitive samples) (C&T)

Analyte[1,2]	**CAS Number**	**Project Action Limit** (pCi/g)	**Project Action Limit Reference**	**Project Quantitation Limit Goal** (pCi/g)	**Laboratory-specific**	
					MDA (pCi/g)	**MDL** (pCi/g)
Cesium-137	10045-97-3	0.113	Residential Soil Remediation Goal [2]	0.07	0.7	NA
Radium-226	13982-63-3	1.0 pCi/g above background	Residential Soil Remediation Goal [2]	0.2	0.2	NA

Notes:
[1]The isotope list above will be used for samples that have undergone an in-growth period and wherein the results will be used as definitive data to decide a site is not contaminated and can be backfilled or that a material to be used as backfill is not contaminated. For in-growth samples, radium-226 will be reported based on the 609 keV bismuth-214 gamma energy peak.
[2] All detected radionuclides will be reported. Sample count time will be based on counting time necessary to achieve Cs-137 project quantitation limit goal.
[3] Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California (Navy, 2009)

MDA = minimum detectable activity
NA = not applicable
MDL = method detection limit
pCi/g = picocurie per gram

SAP Worksheet #15.3 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil
Analytical Group: Strontium (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project Quantitation Limit Goal (pCi/g)	Laboratory-specific	
					MDA (pCi/g)	MDL (pCi/g)
Total Strontium[1]	7440-24-6	0.331	Residential Soil Remediation Goal [2]	0.0166	0.0166	NA
Strontium-90	10098-97-2	0.331	Residential Soil Remediation Goal [2]	0.0166	0.0166	NA

Notes:
[1]Total strontium analysis may be performed first by the laboratory if a quick turnaround time for results is needed. If the total strontium result is less than the release criterion, Sr-90 specific analysis is not required. However, if the total strontium result is above the release criterion, then Sr-90 specific analysis will be performed.
[2] *Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2009)

MDA = minimum detectable activity
MDL = method detection limit
NA = not established
pCi/g = picocurie per gram

SAP Worksheet #15.4 -- Reference Limits and Evaluation Table (Continued)
(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil
Analytical Group: Alpha Spectroscopy (GEL Laboratories)

Analyte[1]	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project Quantitation Limit Goal (pCi/g)	Laboratory-specific	
					MDA (pCi/g)	MDL (pCi/g)
Plutonium-239/240	10-12-8	2.59	Residential Soil Remediation Goal [2]	0.10	0.10	NA

Notes:
[1]Pu-239 is listed in above table as plutonium-239/240 because the alpha energy peaks for that isotope of plutonium cannot be separated in alpha spectroscopy. Therefore, the laboratory will report it as listed above in the table.
[2] *Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco,* California (Navy, 2009)

MDL = method detection limit
MDA= minimum detectable activity
NA= not applicable
pCi/g = picocuries per gram

SAP Worksheet #15.5 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: VOCs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (ug/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
1,1,1,2-Tetrachloroethane	630-20-6	9,300	Industrial RSL[1]	5	1	0.6
1,1,1-Trichloroethane	71-55-6	38,000,000	Industrial RSL[1]	5	1	0.6
1,1,2,2-Tetrachloroethane	79-34-5	2,800	Industrial RSL[1]	5	1	0.6
1,1,2-Trichloroethane	79-00-5	5,300	Industrial RSL[1]	5	1	0.6
1,1-Dichloroethane	75-34-3	17,000	Industrial RSL[1]	5	1	0.6
1,1-Dichloroethylene	75-35-4	1,100,000	Industrial RSL[1]	5	1	0.6
1,2,3-Trichloropropane	96-18-4	180,000	Industrial RSL[1]	5	1	0.6
1,2,4-Trimethylbenzene	95-63-6	260,000	Industrial RSL[1]	5	1	0.6
1,2-Dibromo-3-chloropropane	96-12-8	69	Industrial RSL[1]	5	1	0.6
1,2-Dibromoethane	106-93-4	170	Industrial RSL[1]	5	1	0.6
1,2-Dichloroethane	107-06-2	2,200	Industrial RSL[1]	5	1	0.6
1,2-Dichloropropane	78-87-5	4,700	Industrial RSL[1]	5	1	0.6
1,3,5-Trimethylbenzene	108-67-8	10,000,000	Industrial RSL[1]	5	1	0.6
1,3-Dichloropropane	142-28-9	20,000,000	Industrial RSL[1]	5	1	0.6
2-Butanone	78-93-3	200,000,000	Industrial RSL[1]	5	1	0.6
2-Hexanone	591-78-6	1,400,000	Industrial RSL[1]	25	5	3
4-Methyl-2-pentanone	108-10-1	53,000,000	Industrial RSL[1]	25	5	2.5
Acetone	67-64-1	630,000,000	Industrial RSL[1]	25	5	3.32
Benzene	71-43-2	5,400	Industrial RSL[1]	5	1	0.6
Benzyl chloride	100-44-7	4,900	Industrial RSL[1]	25	5	2
Bromobenzene	108-86-1	1,800,000	Industrial RSL[1]	5	1	0.6
Bromochloromethane	74-97-5	680,000	Industrial RSL[1]	5	1	0.66
Bromodichloromethane	75-27-4	1,400	Industrial RSL[1]	5	1	0.6
Bromoform	75-25-2	220,000	Industrial RSL[1]	5	1	0.6
Bromomethane	74-83-9	32,000	Industrial RSL[1]	5	1	0.6
Carbon disulfide	75-15-0	3,700,000	Industrial RSL[1]	5	1	0.6

SAP Worksheet #15.5 -- Reference Limits and Evaluation Table (Continued)
(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: VOCs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (ug/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
Carbon tetrachloride	56-23-5	3,000	Industrial RSL[1]	5	1	0.6
Chlorobenzene	108-90-7	1,400,000	Industrial RSL[1]	5	1	0.6
Chloroethane	75-00-3	61,000,000	Industrial RSL[1]	5	1	0.6
Chloroform	67-66-3	1,500	Industrial RSL[1]	5	1	0.6
Chloromethane	74-87-3	500,000	Industrial RSL[1]	5	1	0.6
Cyclohexane	110-82-7	29,000,000	Industrial RSL[1]	5	1	0.6
Cyclohexanone	108-94-1	310,000,000	Industrial RSL[1]	250	50	30
Cyclohexene	110-83-8	2,800,000	Industrial RSL[1]	5	1	0.6
Dibromochloromethane	124-48-1	3,300	Industrial RSL[1]	5	1	0.6
Dibromomethane	74-95-3	110,000	Industrial RSL[1]	5	1	0.6
Dichlorodifluoromethane	75-71-8	400,000	Industrial RSL[1]	5	1	0.68
Ethylbenzene	100-41-4	27,000	Industrial RSL[1]	5	1	0.6
Hexachlorobutadiene	87-68-3	22,000	Industrial RSL[1]	5	1	0.6
Isopropylbenzene	98-82-8	11,000,000	Industrial RSL[1]	5	1	0.6
Methyl acetate	79-20-9	1,000,000,000	Industrial RSL[1]	25	5	3.32
Methylene chloride	75-09-2	960,000	Industrial RSL[1]	25	5	4
Styrene	100-42-5	36,000,000	Industrial RSL[1]	5	1	0.6
Tetrachloroethylene	127-18-4	110,000	Industrial RSL[1]	5	1	0.6
Tetrahydrofuran	109-99-9	95,000,000	Industrial RSL[1]	25	5	3.4
Toluene	108-88-3	45,000,000	Industrial RSL[1]	5	1	0.6
Trichloroethylene	79-01-6	6,400	Industrial RSL[1]	5	1	0.6
Trichlorofluoromethane	75-69-4	3,400,000	Industrial RSL[1]	5	1	0.6
Trichlorotrifluoroethane	76-13-1	180,000,000	Industrial RSL[1]	25	5	3.2
Vinyl acetate	108-05-4	4,100,000	Industrial RSL[1]	25	5	2.5
Vinyl chloride	75-01-4	1,700	Industrial RSL[1]	5	1	0.6
Xylenes (total)	1330-20-7	2,700,000	Industrial RSL[1]	5	1	0.6
bis(2-Chloroisopropyl)ether	108-60-1	22,000	Industrial RSL[1]	25	5	3

SAP Worksheet #15.5 -- Reference Limits and Evaluation Table (Continued)
(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: VOCs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (ug/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
cis-1,2-Dichloroethylene	156-59-2	2,000,000	Industrial RSL[1]	5	1	0.6
m,p-Xylenes	179601-23-1	2,500,000	Industrial RSL[1]	10	2	0.6
n-Butylbenzene	104-51-8	51,000,000	Industrial RSL[1]	5	1	0.6
n-Propylbenzene	103-65-1	21,000,000	Industrial RSL[1]	5	1	0.6
o-Xylene	95-47-6	3,000,000	Industrial RSL[1]	5	1	0.6
tert-Butyl methyl ether	1634-04-4	220,000	Industrial RSL[1]	5	1	0.6
trans-1,2-Dichloroethylene	156-60-5	690,000	Industrial RSL[1]	5	1	0.6

Notes:

[1]Values are from the EPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites for industrial use, dated November 2012
LOD=limit of detection
LOQ=limit of quantitation
ug/kg = microgram per kilogram

SAP Worksheet #15.6 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: SVOCs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
Acenaphthene	83-32-9	33.000,000	Industrial RSL[1]	330	33	20
Anthracene	120-12-7	170,000,000	Industrial RSL[1]	330	33	20
Benzo(a)anthracene	56-55-3	2,100	Industrial RSL[1]	330	33	20
Benzo(a)pyrene	50-32-8	330	ROD[2]	330	33	20
Benzo(b)fluoranthene	205-99-2	1,760	ROD[2]	330	33	20
Benzo(k)fluoranthene	207-08-9	21,000	Industrial RSL[1]	330	33	20
bis(2-Chloroethoxy)methane	111-91-1	1,800,000	Industrial RSL[1]	330	333	200
bis(2-Chloroethyl)ether	111-44-4	1,000	Industrial RSL[1]	330	333	200
bis(2-Chloroisopropyl)ether	108-60-1	22,000	Industrial RSL[1]	330	333	200
bis(2-Ethylhexyl)phthalate	117-81-7	1.0	Industrial RSL[1]	330	333	200
Butylbenzylphthalate	85-86-7	910,000	Industrial RSL[1]	330	333	200
4-Chloroaniline	106-47-8	8.6	Industrial RSL[1]	330	333	200
4-Chloro-3-methylphenol	59-50-7	62,000,000	Industrial RSL[1]	330	333	266
2-Chloronaphthalene	91-58-7	82,000,000	Industrial RSL[1]	330	333	200
2-Chlorophenol	95-57-8	5,100,000	Industrial RSL[1]	330	333	200
Chrysene	218-01-9	210,000	Industrial RSL[1]	330	33	20
Dibenz(a,h)anthracene	53-70-3	210	Industrial RSL[1]	330	33	20
Dibenzofuran	132-64-9	1,000,000	Industrial RSL[1]	330	333	200
1,2-Dichlorobenzene	95-50-1	9,800,000	Industrial RSL[1]	330	333	200
1,4-Dichlorobenzene	106-46-7	12,000	Industrial RSL[1]	330	333	200
3,3'-Dichlorobenzidine	91-94-1	3,800	Industrial RSL[1]	1,600	333	200
2,4-Dichlorophenol	120-83-2	1,800,000	Industrial RSL[1]	330	666	200
Diethylphthalate	84-66-2	490,000,000	Industrial RSL[1]	330	333	200
2,4-Dimethylphenol	105-67-9	12,000,000	Industrial RSL[1]	330	333	200
Di-n-butylphthalate	84-74-2	62,000,000	Industrial RSL[1]	330	333	200
4,6-Dinitro-2-methylphenol	534-52-1	49,000	Industrial RSL[1]	1,600	333	200
2,4-Dinitrophenol	51-28-5	1,200,000	Industrial RSL[1]	1,600	666	200

SAP Worksheet #15.6 -- Reference Limits and Evaluation Table (Continued)
(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: SVOCs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
2,4-Dinitrotoluene	121-14-2	5,500	Industrial RSL[1]	330	333	200
2,6-Dinitrotoluene	606-20-2	620,000	Industrial RSL[1]	330	333	200
Fluoranthene	206-44-0	22,000,000	Industrial RSL[1]	330	33	20
Fluorene	86-73-7	22,000,000	Industrial RSL[1]	330	33	20
Hexachlorobenzene	118-74-1	1,100	Industrial RSL[1]	330	333	200
Hexachlorobutadiene	87-68-3	22,000	Industrial RSL[1]	330	333	200
Hexachlorocyclopentadiene	77-47-4	3,700,000	Industrial RSL[1]	1,600	333	200
Hexachloroethane	67-72-1	43,000	Industrial RSL[1]	330	333	200
Indeno(1,2,3-cd)pyrene	193-39-5	2,100	Industrial RSL[1]	330	33	20
1-Methylnapthalene	90-12-0	53,000	Industrial RSL[1]	330	33	20
2-Methylnapthalene	91-57-6	2,200,000	Industrial RSL[1]	330	33	20
2-Methylphenol (o-cresol)	95-48-7	31,000,000	Industrial RSL[1]	330	333	200
3- and 4-Methylphenol (m/p-cresol)	108-39-4/106-44-5	62,000	Industrial RSL[1]	660	333	200
Napththalene	91-20-3	18,000	Industrial RSL[1]	330	33	20
2-Nitroaniline	88-74-4	6,000,000	Industrial RSL[1]	1,600	333	220
4-Nitroaniline	100-01-6	86,000	Industrial RSL[1]	1,600	333	200
Nitrobenzene	98-95-3	24,000	Industrial RSL[1]	330	333	200
n-Nitrosodiphenylamine	86-30-6	350,000	Industrial RSL[1]	330	333	200
n-Nitrosodi-n-propylamine	621-64-7	250	Industrial RSL[1]	330	333	200
Pentachlorophenol	87-75-4	2,700	Industrial RSL[1]	1,600	333	200
Phenol	108-95-2	180,000,000	Industrial RSL[1]	330	333	200
Pyrene	129-00-0	17,000,000	Industrial RSL[1]	330	33	20
Pyridine	110-86-1	1,000,000	Industrial RSL[1]	660	333	200
1,2,4-Trichlorobenzene	120-82-1	99,000	Industrial RSL[1]	330	333	200
2,4,5-Trichlorophenol	95-95-4	62,000,000	Industrial RSL[1]	330	333	200
2,4,6-Trichlorophenol	88-06-2	160,000	Industrial RSL[1]	330	333	200

SAP Worksheet #15.6 -- Reference Limits and Evaluation Table (Continued)

Notes:

[1] Values listed are from the RSLs for Chemical Contaminants at Superfund Sites for industrial use, dated November 2012.
[2] Values listed are from the *Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2009)

SAP Worksheet #15.7 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: PCBs (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					LOQ (µg/kg)	LOD (µg/kg)
Aroclor 1016	12674-11-2	21,000	Industrial RSL[1]	33	3.33	2.2
Aroclor 1221	11104-28-2	540	Industrial RSL[1]	33	3.33	2.2
Aroclor 1232	11141-16-5	540	Industrial RSL[1]	33	3.33	2.2
Aroclor 1242	53469-21-9	740	Industrial RSL[1]	33	3.33	2.2
Aroclor 1248	12672-29-6	740	Industrial RSL[1]	33	3.33	2.2
Aroclor 1254	11097-69-1	740	Industrial RSL[1]	33	3.33	2.2
Aroclor 1260	11096-82-5	740	Industrial RSL[1]	33	3.33	2.2

Notes:

[1] Values listed are from the RSLs for Chemical Contaminants at Superfund Sites for industrial use, dated November 2012.

SAP Worksheet #15.8 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)

Analytical Group: TPH-purgeable (gasoline) and TPH-extractable (diesel and motor oil) (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					LOQ (mg/kg)	LOD (mg/kg)
TPH-gasoline	-3534[1]	Not Applicable	Not Applicable	0.1	0.05	0.0224
TPH-diesel	-3527[1]	Not Applicable	Not Applicable	25	6.66	4.29
TPH-motor oil	-3528[1]	Not Applicable	Not Applicable	25	6.6	4.2

Notes:
[1]CAS number listed is from the Navy Electronic Data Deliverable (NEDD) valid value list since a CAS number is not available for this analyte.
LOD=limit of detection
LOQ=limit of quantitation
TPH= total petroleum hydrocarbons
mg/kg = milligram per kilogram

SAP Worksheet #15.9 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: Metals (GEL Laboratories)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					LOQ (mg/kg)	LOD (mg/kg)
Antimony	7440-36-0	410	Industrial RSL[1]	5	1	0.66
Arsenic	7440-38-2	11.1	ROD[2]	5	3	1
Barium	7440-39-3	190,000	Industrial RSL[1]	5	0.5	0.2
Beryllium	7440-41-7	2,000	Industrial RSL[1]	5	0.5	0.2
Cadmium	7440-43-9	800	Industrial RSL[1]	5	0.5	0.2
Chromium	7440-47-3	1,500,000	Industrial RSL[1]	5	0.5	0.3
Cobalt	7440-48-4	300	Industrial RSL[1]	5	0.5	0.3
Copper	7440-50-8	41,000	Industrial RSL[1]	5	1	0.6
Lead	7439-92-1	800	Industrial RSL[1]	5	1	0.66
Manganese	7439-96-5	6,889	ROD[2]	5	1	0.4
Mercury	7439-97-6	43	Industrial RSL[1]	0.1	0.01	0.004
Molybdenum	7439-98-7	5,100	Industrial RSL[1]	5	1	0.4
Nickel	7440-02-0	20,000	Industrial RSL[1]	5	0.5	0.3
Selenium	7782-49-2	5,100	Industrial RSL[1]	5	3	1
Silver	7440-22-4	5,100	Industrial RSL[1]	5	0.5	0.2
Thallium	7440-28-0	10	Industrial RSL[1]	5	2	1
Vanadium	7440-62-2	5,200	Industrial RSL[1]	5	0.5	0.2
Zinc	7440-66-6	310,000	Industrial RSL[1]	5	1	0.8

Notes:
[1] Values listed are from the RSLs for Chemical Contaminants at Superfund Sites for industrial use, dated November 2012.
[2] Values listed are from the *Final Record of Decision for Parcels D-1 and UC-1, Hunters Point Shipyard, San Francisco, California* (Navy, 2009)
LOD=limit of detection
LOQ=limit of quantitation
mg/kg = milligram per kilogram

SAP Worksheet #15.10 -- Reference Limits and Evaluation Table (Continued)

(UFP-QAPP Manual Section 2.8.1)

Matrix: Soil (testing of backfill material)
Analytical Group: Asbestos (Forensic Analytical)

Analyte	CAS Number	Project Action Limit (percent)	Project Action Limit Reference	Project Quantitation Limit Goal (percent)	Laboratory-specific	
					QL (percent)	MDL (percent)
Asbestos	132207-33-1	0.25	Bay Area Quality Management District	0.25	0.25	Not Applicable

Notes:
QL =quantitation limit
MDL = method detection limit

SAP Worksheet #15.11 -- Reference Limits and Evaluation Table

(UFP-QAPP Manual Section 2.8.1)

Matrix: Swipe
Analytical Group: Gross Alpha/Gross Beta (Envirachem)

Analyte	CAS Number	Project Action Limit (dpm/100cm^2)	Project Action Limit Reference	Project Quantitation Limit Goal (dpm/100cm^2)	Laboratory-specific	
					MDA (dpm/100cm^2)	MDL (dpm/100cm^2)
Gross Alpha	12587-46-1	20	Regulatory Guide 1.86[1]	20	10[2]	Not Applicable
Gross Beta	12587-47-2	200	Regulatory Guide 1.86[1]	200	20[2]	Not Applicable

Notes:
[1]Value listed is from the U.S. Atomic Energy Commission (AEC) Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors (AEC 1974).
[2]Values based on use of a Protean WPC-9550 with background response less than 0.1 cpm alpha and 0.5 cpm beta, respectively. Sample count time will be based on counting time necessary to achieve project MDA goals.

cpm = counts per minute
dpm/100 cm^2 = disintegrations per minute per 100 square centimeters
MDA = minimum detectable activity
MDL = minimum detection limit

SAP Worksheet #16 -- Project Schedule /Timeline Table

(UFP-QAPP Manual Section 2.8.2)

The project schedule is included as Attachment 1 of the Execution Plan for this project (to which this SAP is an appendix).

SAP Worksheet #17 -- Sampling Design and Rationale
(UFP-QAPP Manual Section 3.1.1)

The following sections provide a rationale for types of sampling that may be performed for this project.

REFERENCE (BACKGROUND) AREA SAMPLING
Background reference results from prior projects at HPNS may be used for this project. Otherwise, an average background level will be determined by performing measurements within a designated background area. The soil samples will be collected in the background area at 20 random locations, as determined using a suitable random selection method.

PIPE REMOVAL SURVEYING AND SAMPLING
Excavated piping and system components, debris having any dimension greater than 6 inches (15 centimeters [cm]), and miscellaneous items obtained during trench excavation will not be transported to the RSY. These non-soil materials will be surveyed at temporary laydown areas near the excavation trenches.

The piping and other items will be individually surveyed. A beta/gamma surface scan will be performed over 100% of the accessible surface area. An alpha/beta static measurement will be performed and a swipe sample collected at the location of highest measured level of radioactivity. The static measurement results will be compared to the surface residual radioactivity criteria in Table 3 of this SAP to determine whether the item is suitable for release from radiological controls. An arbitrary value of 20% of the Table 3 release criteria will be used to compare swipe sample results.

If sufficient sediment is present, a representative sample will be collected for analysis from each section of pipe. Curtis and Tompkins will analyze these samples by gamma spectroscopy. Curtis and Tompkins will analyze all soil samples by gamma spectroscopy using a five-day in-growth (screening) and again after a 21-day in-growth (definitive). No operational decisions will be made using screening data without prior RASO approval. If the gamma spectroscopy results indicate concentrations of Cs-137 above its release criterion, GEL will perform total strontium or Sr-90 analysis. (Total strontium analysis is requested when a quick turnaround time is needed for strontium results. If the total strontium result exceeds the release criterion, then Sr-90 analysis will be performed. If the total strontium result does not exceed the release criterion, then no further action will be required.) When results indicate concentrations of Sr-90 above the release criterion, GEL will perform alpha spectroscopy for Pu-239 only. In addition, if the sediment samples are found to have concentrations of any isotopes above their respective release criterion, further trench soil sampling every 10 feet from manhole to manhole under the piping run will be conducted to characterize the extent of contamination. Curtis and Tompkins will analyze these characterization samples by gamma spectroscopy, and GEL will perform additional analyses (total strontium, Sr-90, or alpha spectroscopy for Pu-239) based on the same reasoning described for initial sediment samples from piping.

Piping or components that do not contain sediments will be radiologically surveyed. These surveys will consist of a manual 100 percent surface scan for alpha and beta/gamma emitters, two static measurements at the location of the highest reading, and the collection of two swipe samples to identify the presence of removable contamination. One swipe sample will be collected from the interior and one from the exterior and analyzed for gross alpha/gross beta by Envirachem. If the gross alpha or gross beta

SAP Worksheet #17 -- Sampling Design and Rationale (Continued)

exceeds the criteria for swipe samples listed in SAP Worksheet #15.11, then the material will be segregated and disposed of according to the DON's LLRW disposal program as directed by the RASO.

Sediment samples and the associated piping will be tracked until final disposition. If the item (or a related sediment sample) exceeds the release criteria, it will be placed directly into an LLRW bin pending off-site disposal by the Navy's waste contractor. Items that do not exceed the release criteria will be staged pending transfer to the Navy's waste contractor for off-site disposal as non-LLRW.

EXCAVATED SOIL SURVEYING AND SAMPLING

Excavated soil will be transported to the RSY for radiological survey and sampling in order to clear the soil for either reuse or disposal. The material will be spread out onto the screening pads in lifts approximately 6 inches (15 cm) deep. Each screening pad is approximately 10,770 square feet (ft^2) (1,000 square meters [m^2]) in size. Throughout processing, the material will be visually inspected for staining or odors. Material that emits odors or is stained will be segregated for further sampling and analysis.

As necessary, the material spread on the screening pads will be allowed to dewater before screening is performed. Water collected from the screening pads will be characterized for chemical and radiological constituents, prior to proper disposal. Wastewater sampling will be conducted according to procedures detailed in SAP Worksheet #14.

A gamma scan will be performed over 100% of the surface area of each screening pad. Collected field data will be logged and survey points plotted on maps to document survey results. Areas where surface radiation levels appear to be greater than 3-sigma of the population mean (or other Navy-approved investigation level) will be noted on a grid map and flagged in the field for verification. Manual scans using a hand-held instrument will be performed to further delineate suspected contaminated areas on the screening pads. Radioactive material, such as point sources, identified during surface scans will be collected, segregated, and stored in appropriate containers.

Twenty random-start systematic and up to 10 biased samples per screening pad will be collected and analyzed in accordance with SAP Worksheet #18. Curtis and Tompkins will initially analyze all soil samples by gamma spectroscopy. Curtis and Tompkins will analyze all soil samples by gamma spectroscopy using a five-day in-growth (screening) and again after a 21-day in-growth (definitive). No operational decisions will be made using screening data without prior RASO approval. If gamma spectroscopy results indicate concentrations of Cs-137 above its release criterion in Table 3 of this SAP, GEL will perform total strontium or Sr-90 analysis. (Total strontium analysis is requested when a quick turnaround time is needed for strontium results. If the total strontium result exceeds the release criterion, then Sr-90 analysis is performed. If the total strontium result does not exceed the release criterion, then no further action is required.) If these results indicate concentrations of Sr-90 above its Table 3 release criterion, GEL will perform alpha spectroscopy for Pu-239 only. In addition, 10 percent of the samples will be randomly chosen for total strontium or Sr-90 analysis to be performed by GEL.

The biased samples will be collected at locations suspected to have the highest radioactivity concentrations. Should residual radioactivity exceeding the release criteria be detected, the area will

SAP Worksheet #17 -- Sampling Design and Rationale (Continued)

investigated and remediated, as necessary, and additional survey and sampling will be performed to verify release criteria are met. The material will be removed the screening pad and stockpiled until it is cleared by the Navy for use as backfill. Stockpiled material will remain separate and segregated (i.e., each stockpile will consist of the material on a given RSY pad from a single screening) from other screened material to retain data integrity and ensure there is no cross-contamination. Environmental protection measures (e.g., runoff/erosion control) will be implemented and maintained while the material is stockpiled.

Excavated soil generated from an IR Program site will require chemical sampling to determine re-use or disposition. Excavated soil that does not exceed the IR Program site chemical clean-up goals (Table 2 of this SAP) and does not exceed the radiological release criteria may be used as backfill pending Navy concurrence. Excavated soil from non-IR Program sites will be radiologically screened and, if cleared, used to backfill the excavations without additional chemical testing.

TRENCH SURVEYING AND SAMPLING

Survey and sampling of the excavated trench surfaces (bottom and sidewalls) will be performed once soil excavation and pipe removal are complete. The characterization survey will be designed using the same design criteria as an FSS. In the event no residual radioactivity above the release criteria is identified, the survey data may be used for the FSS.

Trench survey units will not exceed 1,000 m^2 in total surface area (trench bottom and sidewalls). A gamma scan will be performed over 100% of the surface area. Twenty random-start systematic and up to 10 biased samples will be collected over the exposed surfaces. The biased samples will be collected at locations suspected to have the highest radioactivity concentrations. The samples will be collected and analyzed in accordance with SAP Worksheet #18. Curtis and Tompkins will initially analyze all soil samples by gamma spectroscopy. Curtis and Tompkins will analyze all soil samples by gamma spectroscopy using a five-day in-growth (screening) and again after a 21-day in-growth (definitive). No operational decisions will be made using screening data without prior RASO approval. If gamma spectroscopy results indicate concentrations of Cs-137 above its release criterion in Table 3 of this SAP, GEL will perform total strontium or Sr-90 analysis. (Total strontium analysis is requested when a quick turnaround time is needed for strontium results. If the total strontium result exceeds the release criterion, then Sr-90 analysis is performed. If the total strontium result does not exceed the release criterion, then no further action is required.) If these results indicate concentrations of Sr-90 above its Table 3 release criterion, GEL will perform alpha spectroscopy for Pu-239 only. In addition, 10 percent of the samples will be randomly chosen for total strontium or Sr-90 analysis to be performed by GEL. Should residual radioactivity exceeding the release criteria be detected within the trench, the area will remediated (i.e., excavated) and additional survey and sampling will be performed to verify release criteria are met.

FORMER NRDL SITE AND SHIP BERTH SURVEYING AND SAMPLING

Radiological survey and remediation (if needed) of the former NRDL site and Ship Berths 21, 22, and 29 will be performed. Each site will be cleared of debris and vegetation to facilitate survey activities. A

SAP Worksheet #17 -- Sampling Design and Rationale (Continued)

scoping survey will be performed to identify areas of potentially elevated residual radioactivity. If any such areas are identified, they will be investigated and remediated, as appropriate. Remediation may include removal of existing asphalt applied over soil, concrete, piping, and other materials. If soil contamination extends deeper than 6 inches (15 cm) below the surface, the Navy will be notified and, following Navy direction, the contamination will be remediated. Materials that require removal will be tracked and staged in separate areas based on the survey unit of origin. The material will be considered impacted until the final determination of the specific survey unit has been established.

Survey measurements will include 100% gamma scan, and direct surface measurements in the form of beta/gamma scan measurements and alpha/beta static measurements. Volumetric samples of asphalt, concrete, and/or soil, including sediment from ship berth areas that are likely accumulation points in which water transported-sediment may have deposited, will be collected at selected locations to verify residual radioactivity constituents and concentrations.

RAILROAD TIE SURVEY AND SAMPLING

Several large stockpiles of creosote railroad ties in Parcel D-1 will be radiologically surveyed, released from radiological controls, if possible; and disposed as non-LLRW. Material unsuitable for disposal as non-LLRW will be turned over to the Navy's waste contractor for disposal as LLRW. The used railroad ties exist in various deteriorated states and will be sorted based on their physical condition, i.e., whether or not their surfaces are flat, smooth, and adequate for a standard surface contamination survey. Heavy equipment, such as an excavator with a hydraulic bucket thumb and a forklift, will be used to sort and segregate the railroad ties. Intact railroad ties with surfaces suitable for surveying will be stacked and moved to survey stands. Degraded railroad ties whose surfaces cannot be reasonably surveyed will be staged for further processing.

The degraded railroad ties will be surveyed and sampled in a manner similar to soil on an RSY screening pad; however, no constructed pad will be used. An area of suitable size, no larger than 1,000 m^2, adjacent to the stockpile will be used as the screening area. A gamma scan will be performed over the surface of the screening area prior to use to establish a baseline or reference background. The degraded railroad tie material will be spread out over the area to a depth of approximately 6 to 9 inches (15 to 23 cm). The depth equates to the nominal width of a railroad tie. A gamma scan will be performed over 100% of the surface area. Collected data will be logged and survey points plotted on maps to document survey results. Areas where surface radiation levels appear to be greater than 3-sigma of the mean reference (background) level (or other DON-approved investigation level) will be noted on a grid map and flagged in the field for verification. Manual scans using a handheld instrument will be performed to further delineate suspected contaminated material. Contaminated material identified during surface scans will be collected, segregated, and stored in appropriate containers.

Twenty random-start systematic and up to 10 biased samples of railroad tie material will be collected and analyzed in accordance with this SAP. Curtis and Tompkins will initially analyze all samples by gamma spectroscopy. Curtis and Tompkins will analyze all soil samples by gamma spectroscopy using a five-day in-growth (screening) and again after a 21-day in-growth (definitive). No operational decisions will be made using screening data without prior RASO approval. If gamma spectroscopy results indicate concentrations of Cs-137 above its release criterion in Table 3 of this SAP, GEL will

SAP Worksheet #17 -- Sampling Design and Rationale (Continued)

perform total strontium or Sr-90 analysis. (Total strontium analysis is requested when a quick turnaround time is needed for strontium results. If the total strontium result exceeds the release criterion, then Sr-90 analysis is performed. If the total strontium result does not exceed the release criterion, then no further action is required.) If these results indicate concentrations of Sr-90 above its Table 3 release criterion, GEL will perform alpha spectroscopy for Pu-239 only. In addition, 10 percent of the samples will be randomly chosen for total strontium or Sr-90 analysis to be performed by GEL. The biased samples will be collected at locations suspected to have the highest concentrations of radioactivity. Samples will also be collected from railroad ties found in non-impacted areas at HPNS to establish representative material background concentrations. Residual radioactivity exceeding the release criteria will be investigated and remediated, as necessary, and additional survey and sampling will be performed to verify release criteria are met. The soil (or volumetric) residual radioactivity release criteria in Table 3 of this SAP will be used to determine whether the railroad tie material is suitable for release from radiological controls.

The intact railroad ties will be placed on survey stands (i.e., metal saw horses) and individually surveyed. A beta/gamma surface scan will be performed over 100% of the exposed surfaces of each railroad tie. Measurements of total and removable residual radioactivity will be collected at the location of highest measured radioactivity. An alpha/beta static surface measurement will be performed and a swipe sample collected. The static measurement results will be compared to the surface residual radioactivity criteria in Table 3 of this SAP to determine whether the tie is suitable for release from radiological controls. An arbitrary value of 20% of the Table 3 release criteria will be used to compare swipe sample results. For simplicity in execution, gross beta activity will be assumed to be Cs-137 and gross alpha activity will be assumed to be Ra-226 unless isotopic analysis is performed or a technical basis for an alternate approach is documented and approved by the Navy.

IMPORT BACKFILL MATERIAL SAMPLING

Imported backfill material from sources outside the site will be sampled and analyzed following the *Information Advisory Clean Imported Fill Material* (DTSC, 2001) for acceptable commercial land with the addition of project ROCs. Imported backfill material from the site will be sampled and analyzed in accordance with SAP Worksheet #14.

WASTE SAMPLING

Waste sampling will be performed in accordance with SAP Worksheet #14.

SAP Worksheet #18 -- Sampling Locations and Methods/SOP Requirements Table

(UFP-QAPP Manual Section 3.1.1)

Sampling Location/ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference
Reference (background) area/See SAP Worksheet #27 for Sample ID	Soil	Surface	Gamma Spectroscopy	20 random samples per reference (background) area	SAP Worksheet #14
Piping or manholes/ See SAP Worksheet #27 for Sample ID	Sediment	Not Applicable	Gamma Spectroscopy, Strontium and Alpha Spectroscopy for Pu-239, as necessary	TBD[a]	SAP Worksheet #14
Interior and exterior of piping or manholes/ See SAP Worksheet #27 for Sample ID	Swipe	Not Applicable	Gross Alpha/Gross Beta	2 samples per component or piece of pipe	SAP Worksheet #14
Exterior of railroad ties/See SAP Worksheet #27 for Sample ID	Swipe	Not Applicable	Gross Alpha/Gross Beta	1 sample per railroad tie[b]	SAP Worksheet #14
Degraded railroad tie material/See SAP Worksheet #27 for Sample ID	Chipped Wood	Not Applicable	Gamma Spectroscopy, Strontium and Alpha Spectroscopy for Pu-239 as necessary	20 systematic samples per 1,000 m^2 of material[b]	SAP Worksheet #14
Excavated soil on RSY pads/See SAP Worksheet #27 for Sample ID	Soil	Not Applicable	Gamma Spectroscopy, Strontium and Alpha Spectroscopy for Pu-239 as necessary	20 random-start systematic samples (for FSS) per pad (defined as an area not to exceed 1,000 m^2)	SAP Worksheet #14
Ship Berths/See SAP WS #27 for Sample ID	Soil; may also include bulk materials such as concrete and asphalt	Random	Gamma Spectroscopy, Strontium and Alpha Spectroscopy for Pu-239 as necessary	20 random-start systematic samples (for FSS) per survey unit	SAP Worksheet #14

SAP Worksheet #18 -- Sampling Locations and Methods/SOP Requirements Table

(UFP-QAPP Manual Section 3.1.1)

Sampling Location/ID Number	Matrix	Depth (feet bgs)	Analytical Group	Number of Samples	Sampling SOP Reference
Excavated soil chemical samples (not radioactive) / See SAP WS #27 for Sample ID	Soil	Random	Per each IR site chemicals of concern as listed in Table 2 of this SAP (and in conjunction with SAP Worksheet #15.1)	One sample per RSY pad of soil from each IR site will be collected (averages to be 1 sample per 150 cubic meters of soil)[c].	SAP Worksheet #14
Post-excavation samples from trench units / See SAP Worksheet #27 for Sample ID	Soil	TBD[c]	Gamma Spectroscopy, Strontium and Alpha Spectroscopy for Pu-239, as necessary	20 random-start systematic samples (for FSS) per trench survey unit[c]	SAP Worksheet #14
Import backfill material/See SAP Worksheet #27 for Sample ID	Soil	Random	Gamma Spectroscopy (10 percent for Strontium), VOCs, SVOCs, PCBs, TPH-purgeable, TPH-extractable, Metals, and Asbestos	TBD[d]	SAP Worksheet #14

Notes:

[a]The number of locations cannot be determined until the length and size of piping are determined. Sediment samples may be collected from inside the piping and associated manholes. The purpose of this sampling is to determine the final disposition of the piping and associated components.

[b]The number of railroad ties and the amount of railroad tie material have not yet been determined.

[c]The depth, number of trench survey units, as well as the amount of excavated soil on RSY pads cannot be determined until excavation of piping and thus the length and size of piping and trench are determined.

[d]The number of import backfill samples will be determined in the field based on the number of import material sources sampled, if any.

SAP Worksheet #19 -- Analytical SOP Requirements Table

(UFP-QAPP Manual Section 3.1.1)

Matrix	Analytical Group	Analytical and Preparation Method // SOP Reference	Containers (number, size, and type)	Sample volume[1] (units)	Preservation Requirements[2] (chemical, temperature, light protected)	Maximum Holding Time (preparation / analysis)
Soil	Gamma Spectroscopy (C&T)	EPA 901.1Mod// Radiation Chemistry Section 3.1 and HPS SOPs Section 3.3	Gallon ziplock bag then 250-mL tuna can	~1000g (bag) ~300g (can)	None	Not Applicable
Soil	Strontium (GEL)	EPA 905.0Mod //GL-RAD-A-004	250-mL poly jar	5g	None	Not Applicable
Soil	Alpha Spectroscopy (GEL)	DOE HASL A-01-R Iso-Pu //GL-RAD-A-011	250-mL poly jar	5g	None	Not Applicable
Soil	VOCs (GEL)	EPA 5035/8260B //GL-OA-E-038	Three 5-g En Core Samplers[4]	15 g	4±2°C	48 hours/14 days
Soil	SVOCs (GEL)	EPA 3541/8270C //GL-OA-E-009	1 X 8-oz Jar	8 oz.	4±2°C	14 days/40 days
Soil	PCBs (GEL)	EPA 3541/8082 //GL-OA-E-040	1 X 8-oz Jar	8 oz.	4±2°C	14 days/40 days
Soil	TPH-purgeable (GEL)	EPA 5035/8015B //GL-OA-E-004	Three 5-g En Core Samplers[4]	15 g	4±2°C	48 hours/14 days
Soil	TPH-extractable (GEL)	EPA 3541/8015B //GL-OA-E-003	1 X 8-oz Jar	8 oz.	4±2°C	14 days/40 days
Soil	Metals (GEL)	EPA 3050B/6010B //GL-MA-E-013	1 X 4-oz Jar	4 oz.	None	180 days[3]
Soil	Mercury (GEL)	EPA 7471A //GL-MA-E-010	1 X 4-oz Jar	4 oz.	4±2°C	28 days[3]
Soil	Asbestos (Forensic Analytical)	CARB 435 or equivalent //PLM 102	1 X 8-oz Jar	8 oz.	None	Not Applicable
Swipe	Gross Alpha/Gross Beta (Envirachem)	EPA 9310//REC-231-23.3	Envelope with paper swipe	Not Applicable	None	Not Applicable

SAP Worksheet #19 -- Analytical SOP Requirements Table (Continued)

[1] Minimum sample volume or mass requirement if different from the container volume.

[2]Temperature compliance will be measured using temperature blanks included in the coolers used to ship the samples to the laboratory.

[3] The time listed is the maximum holding time for the analysis. Preparation time is included in the analytical method holding time.

[4] If En Core samplers cannot be used due to saturated soil, then only the 8-ounce jar will be used, and VOC analysis will be conducted from the jar sample.

SAP Worksheet #20 -- Field Quality Control Sample Summary Table

(UFP-QAPP Manual Section 3.1.1)

The following table applies only to chemical analyses of excavated soil from an IR site or import backfill samples. (Field QC samples are not applicable to radiological analyses.) The only field QC samples required are MS/MSDs. (Field duplicates and blanks are not applicable as described on SAP Worksheet #12.)

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks	No. of Equipment Blanks	No. of VOA Trip Blanks	No. of PT Samples	Total No. of Samples to Lab
Soil	VOCs	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD
Soil	SVOCs	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD
Soil	PCBs	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD
Soil	TPH-purgeable	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD
Soil	TPH-extractable	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD
Soil	Metals	TBD	Not Applicable	1 per 20 samples	Not Applicable	Not Applicable	Not Applicable	Not Applicable	TBD

TBD = To be determined. The number of sample locations (and thus the number of total samples to the laboratory) will be determined in the field based on the amount of excavated soil and the number of import backfill sources sampled.
PCB = polychlorinated biphenyls
PT = performance testing
TPH = total petroleum hydrocarbons
SVOCs = semivolatile organic compounds
VOA = volatile organic analyte
VOCs = volatile organic compounds

SAP Worksheet #21 -- Project Sampling SOP References Table

(UFP-QAPP Manual Section 3.1.2)

Reference Number	Title, Revision Date and / or Number	Originating Organization	Equipment Type	Modified for Project Work? (Y/N)	Comments
ITSI-RSOP-05.01	Contamination Monitoring Requirements	ITSI Gilbane	Various	N	Appendix A of SAP
ITSI-RSOP-09.01	Effluents and Environmental Monitoring	ITSI Gilbane	Various	N	Appendix A of SAP
ITSI-RSOP-03.01	Radiation Safety Instrumentation	ITSI Gilbane	Various	N	Appendix A of SAP
PR-TC-01.04.04.00	Field Documentation	ITSI Gilbane	Not Applicable	N	Appendix A of SAP
PR-TC-02.12.02.00	Sample Tracking and Electronic Data Management	ITSI Gilbane	Not Applicable	N	Appendix A of SAP
PR-TC-01.01.01.01	Sample Handling, Packaging and Shipping	ITSI Gilbane	Not Applicable	N	Appendix A of SAP
PR-TC-02.02.01.05	Volatile Organic Compound (VOC) Sampling	ITSI Gilbane	Per EPA 5035	N	Appendix A of SAP

SAP Worksheet #22 -- Field Equipment Calibration, Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.1.2.4)

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Resp. Person	SOP Reference	Comments
Portable Gas Analyzers	Calibration with standard calibration gas	Daily	± 10% of known standard value	Recalibrate instrument, if still out, return instrument	Superintendent	See Comments	Calibration procedure stated in the instrument manufacturer's operational instructions will be followed.
Global Positioning System (GPS)	• No calibration Required • Charge batteries • Clean of dust, dirt, and grease • Store instrument in case when not in use	• Daily	Instrument has digital readout that verifies connection to satellites and the strength of the signal	If the instrument can not connect to satellites, then the secondary unit will be used to verify that there are no connections	Superintendent	See Comments	Calibration procedure stated in the instrument manufacturer's operational instructions will be followed.

SAP Worksheet #22 -- Field Equipment Calibration, Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.1.2.4)

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Resp. Person	SOP Reference	Comments
Radiation count rate, dose rate, and scaler instruments	• Calibrate at lab featuring National Institute of Standards and Technology (NIST) traceable standards • Operational checks and verifications	• Annually • Daily	• Pass/Fail ± 20% of baseline response criteria (± 2 sigma for scaler instruments)	• If recalibration fails, then instrument combo is retained /exchanged by instument vendor • If checks and verifications fail, then instrument combo is placed out of service/ returned to instrument vendor for repair/exchange. Subsequently, data collected with instrument since previous QC check will be reviewed.	Radiological Safety Technician (RST) under direction of RST Supervisor	ITSI-RSOP-03.01	None

SAP Worksheet #23 -- Analytical SOP References Table

(UFP-QAPP Manual Section 3.2.1)

Lab SOP Number	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
REC-231-22	Survey Smear Calibration Procedure for Protean WPC 9550 Gas Proportional Alpha/Beta Counting System	Screening	Smear/Swipe Gross Alpha/Gross Beta	Protean WPC 9550 Gas Proportional Alpha/Beta Counting Sysyem	Envirachem	No
REC-231-23.3	Survey Smear Measurement Procedure for Protean WPC 9550 Gas Proportional Alpha/Beta Counting System	Screening	Smear/Swipe Gross Alpha/Gross Beta	Protean WPC 9550 Gas Proportional Alpha/Beta Counting System	Envirachem	No
Radiation Chemistry Section 3.1	Determination of Gamma-Ray Radioactivity in Soil Samples (GS186) DOE HASL 4.5.2.3/EPA 901.1 Modified	Screening	Soil/ Gamma Spectroscopy	EG&G Ortec Gamma Spectrometer	C&T	N
HPS SOPs Section 3.3	Determination of Radium 226 by Gamma-Ray Spectroscopy (21 day ingrowth) DOEHASL 4.5.2.3	Definitive	Soil/ Gamma Spectroscopy	EG&G Ortec Gamma Spectrometer	C&T	N

SAP Worksheet #23 -- Analytical SOP References Table

(UFP-QAPP Manual Section 3.2.1)

Lab SOP Number	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
GL-RAD-A-004	SOP for the Determination of Strontium 89/90 in Water, Soil, Milk, Filters, Vegetation and Tissues, Rev. 16	Definitive	Soil/Swipe/ Strontium	Gas Flow Proportion Counting System	GEL	N
GL-RAD-A-011	SOP for the Isotopic Determination of Americium, Curium, Plutonium, and Uranium	Definitive	Soil/Swipe /Alpha Spectroscopy	Alpha Spectrometer	GEL	N
GL-OA-E-038	SOP for Volatile Organic Compounds (VOC) by Gas Chromatograph/Mass Spectrometer, Rev. 18	Definitive	Soil/VOC	Gas Chromatograph/Mass Spectrometer	GEL	N
GL-OA-E-009	SOP for Analysis of Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry, Rev. 30	Definitive	Soil/SVOCs	Gas Chromatograph/Mass Spectrometer	GEL	N
GL-OA-E-040	SOP for the Analysis of Polychlorinated Biphenyls by GC/ECD, Rev. 19	Definitive	Soil/PCBs	Gas Chromatograph/Electron Capture Detector	GEL	N

SAP Worksheet #23 -- Analytical SOP References Table

(UFP-QAPP Manual Section 3.2.1)

Lab SOP Number	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
GL-OA-E-004	SOP for Volatile Total Petroleum Hydrocarbons by Flame Ionization Detector, Rev. 21	Definitive	Soil/TPH-purgeable	Gas Chromatograph/Flame Ionizing Detector	GEL	N
GL-OA-E-003	SOP for Nonvolatile Total Petroleum Hydrocarbons by Gas Chromatography and Flame Ionization, Rev. 22	Definitive	Soil/TPH-extractable	Gas Chromatograph/Flame Ionizing Detector	GEL	N
GL-OA-E-066	SOP for Automated Soxhlet Extraction, Rev. 5	Definitive	Soil/PCB, TPH, SVOCs	Automated Soxhlet Extraction Apparatus	GEL	N
GL-MA-E-013	SOP for Determination of Metals by ICP, Rev. 21	Definitive	Soil/Metals	Inductively Coupled Plasma Spectrophotometer	GEL	N
GL-MA-E-010	SOP for Mercury Analysis Using the Perkin Elmer Automated Mercury Analyzer, Rev. 25	Definitive	Soil/Metals (Mercury)	Cold Vapor Atomic Absorption	GEL	N
PLM 102	Determination of Asbestos Content in Serpentine Aggregate (Carb 435), Rev. 2.2	Definitive	Asbestos	Polarized Light Microscopy	Forensic Analytical	N

Laboratory-specific analytical SOPs will be included as an attachment to this document, on the CD copy provided for the Navy administrative record. Also, a copy of each analytical SOP will be included as attachments in the final version of the SAP uploaded to NIRIS.

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
Protean WPC 9550 Low Level Alpha/Beta Counting System	REC-231-22 Survey Smear Calibration	• Annual • After maintenance • By request of lab manager	Calculated activity within 10% for nuclide in NIST traceable calibration sources	• Recalibration • Instrument maintenance • Notification of lab manager	Envirachem/ Onsite Smear Laboratory PM	REC-231-23.3
EG&G Ortec Gamma Ray Spectrometer	Ortec Gamma Vision-32 A66-B32 Operations Manual	Annual, after maintenance and at the request of the lab manager	The result of each verification source when calculated with the new efficiency must be + 10% of the known value.	(1) Evaluate system (2) Recalibrate	GEL Group Leader or Designee	Radiation Chemistry Section 3.1 and HPS SOPs Section 3.3
Gas Flow Proportional Counter	Initial Calibration	Annual	The result of each verification source when calculated with the new efficiency must be + 25% of the known value.	(1) Evaluate system (2) Recalibrate	GEL Analyst	GEL-RAD-I-006 and I-016

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
Alpha Spectrometer	Calibration	Monthly	Energy Calibration Offset Boundary (2300-2450 keV) Energy Calibration Slope Boundary (4.7-5.3 keV/channel) Constant FWHM Boundary (3-25 channels) Average Efficiency 3 Sigma std. deviation Boundary (±.01 of initial average) Energy of 3 isotopes Boundary (±40 keV of actual energy) Resolution of 3 isotopes Boundary (5-100 keV) Peak Area of 3 isotopes Boundary (minimum 10,000 counts) Peak Activity of 3 isotopes 3 Sigma std. deviation Boundary (±1% of initial average)	Recount calibration (two subsequent passed checks required to place detector in service). Remove detector from service.	GEL Group Leader or Designee	GL-RAD-I-009
GC/MS (Volatiles)	Initial calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	%RSD<20% all compounds, Relative Response Factor meet method criteria	Repeat calibration	GEL Analyst	GL-OA-E-038

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
GC/MS (Volatiles)	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ±30% of expected	Rerun ICV one time, second failure requires recalibration	GEL Analyst	GL-OA-E-038
GC/MS (Volatiles)	Calibration Verification (CV)	Daily, before sample analysis, and every 12 hours of analysis time	+/- 20%D criteria for all analytes	Re-inject CV; if passes rerun previous 10 samples and continue run; if 2nd CV fails, recalibrate	GEL Analyst	GL-OA-E-038
GC/MS (Semivolatiles)	Initial calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	%RSD<20% all compounds, Relative Response Factor meet method criteria	Repeat calibration	GEL Analyst	GL-OA-E-009
GC/MS (Semivolatiles)	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ±30% of expected	Rerun ICV one time, second failure requires recalibration	GEL Analyst	GL-OA-E-009
GC/MS (Semivolatiles)	Calibration Verification (CV)	Daily, before sample analysis, and every 12 hours of analysis time	+/- 20%D criteria for all analytes	Re-inject CV; if passes rerun previous 10 samples and continue run; if 2nd CV fails, recalibrate	GEL Analyst	GL-OA-E-009
GC/ECD	Initial calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Mean RSD for each PCB ≤ 20%	Repeat calibration	GEL Analyst	GL-OA-E-040
GC/ECD	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ± 20% of expected value (initial source)	Rerun ICV one time, second failure requires recalibration	GEL Analyst	GL-OA-E-040

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
GC/ECD	Calibration Verification (Initial [ICV] and continuing [CCV])	ICV: Daily, before sample analysis CCV: After every 12 hours of analysis time and at the end of the analysis sequence	All analytes within ± 20% of expected value from the ICAL	Re-inject CV; if passes rerun previous 10 samples and continue run; if 2nd CV fails, recalibrate	GEL Analyst	GL-OA-E-040
GC/FID	Initial calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Linear mean RSD ≤ 20%	Repeat calibration	GEL Analyst	GL-OA-E-003/GL-OA-E-
GC/FID	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ± 25% of expected value (initial source)	Rerun ICV one time, second failure requires recalibration	GEL Analyst	GL-OA-E-003/GL-OA-E-
GC/FID	Calibration Verification (Initial [ICV] and continuing [CCV])	ICV: Daily, before sample analysis CCV: After every 12 hours of analysis time and at the end of the analysis sequence	All analytes within ± 15% of expected value from the ICAL	Re-inject CV; if passes rerun previous 10 samples and continue run; if 2nd CV fails, recalibrate	GEL Analyst	GL-OA-E-003/GL-OA-E-
ICP	Initial Calibration (ICAL) – minimum one high standard and a calibration blank	Daily initial calibration prior to sample analysis	3 standards and a blank. Correlation Coefficient of ≥ 0.998	Recalibrate	GEL Analyst	GL-MA-E-013

SAP Worksheet #24 -- Analytical Instrument Calibration Table

(UFP-QAPP Manual Section 3.2.2)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference[1,2]
ICP	Second Source Calibration Verification (ICV)	Once after each initial calibration, prior to sample analysis	Value of second source for all analyte(s) within ± 10% of expected	Recalibrate	GEL Analyst	GL-MA-E-013
ICP	Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence	All analytes within + 10% of expected value	Recalibrate – rerun 10 samples previous to failed CCV.	GEL Analyst	GL-MA-E-013
CVAA	Initial Calibration (ICAL)	Daily initial calibration prior to sample analysis	Correlation coefficient R>=0.995for linear regression	Recalibrate	GEL Analyst	GL-MA-E-010
CVAA	Second Source Calibration Verification (ICV)	Once after each initial calibration, prior to sample analysis	Value of second source for all analyte(s) within ± 10% of expected value (second source)	Recalibrate	GEL Analyst	GL-MA-E-010
CVAA	Continuing Calibration Verification (CCV)	After every 10 samples and at the end of the analysis sequence	All analytes within + 20% of expected value	Recalibrate – rerun 10 samples previous to failed CCV.	GEL Analyst	GL-MA-E-010

Notes:
[1]Analytical SOPs (revision numbers listed on SAP WS # 23) are current as of the date this SAP was published.
[2]Analytical SOPs for are provided in Appendix C of this SAP.

CV = calibration verification
CVAA = cold vapor atomic absorption
D = difference
GC/ECD = gas chromatograph with electron capture detector
GC/FID = gas chromatograph with flame ionizing detector
GC/MS = gas chromatography/ mass spectrometer
ICP = inductively coupled plasma spectrophotometer
PCB = polychlorinated biphenyls
RSD = relative standard deviation
VOC = volatile organic compounds

SAP Worksheet #25 -- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.2.3)

Instrument / Equipment	Activity (Maintenance / Testing / Inspection)	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Protean WPC 9550 Low Level Alpha/Beta Counting System (Envirachem)	1. Alpha source check/check deviation 2. Beta source check/check deviation 3. Background blank check/check deviation 4. P10 gas supply	1. prior to use and at minimum daily 2. prior to use and at minimum daily 3. prior to use and at minimum daily 4.Daily	1.Within 3 sigma of measured population 1. Within 3 sigma of measured population 2. Within 3 sigma of measured population 3. Adequate	• Recalibrate • Instrument Maintenance • Consult lab manager	Envirachem/ Onsite Smear Laboratory PM	REC-231-23.3
EG&G Ortec Gamma Spectrophotometer (C&T)	1. Maintenance: Liquid Nitrogen Fill 2. Background Check 3. Calibration Check	1. Weekly 2. Monthly long count and Prior to use and at Minimum daily short check 3. Prior to use and at minimum daily	1. None 2. Within 3 sigma of measured population 3. Within 3 sigma of measured population	1. None 2.Recount • Recalibrate • Instrument Maintenance • Consult lab manager 3.Recount • Recalibrate • Instrument Maintenance • Consult lab manager	C&T Analyst	Radiation Chemistry Section 3.1 and HPS SOPs Section 3.3
Gas Flow Proportional Counter (GEL)	1. Efficiency Check 2. Background Check	1. Daily 2. Weekly long count and daily short count	1. ±3sigma 2. >±3sigma	Recount	GEL Analyst	GL-RAD-I-016, GL-RAD-I-006,GL-RAD-I-012

SAP Worksheet #25 -- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.2.3)

Instrument / Equipment	Activity (Maintenance / Testing / Inspection)	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
Alpha Spectrometer (GEL)	1. Pulser check 2. Background check 3. Calibration check	1. Daily 2. Weekly 3. Monthly	1. +/-3 Sigma 2. +/-3 Sigma 3. +/-3 Sigma	Recount/instrument maintenance	GEL Analyst	GEL-RAD-I-009, GEL-RAD-I-010, GL-RAD-I-012
GC/MS (Volatile) GC/MS (Semivolatile) GC/ECD GC/FID ICP Cold Vapor AA	Physical Check of Parameter Setup	Initially; prior to daily calibration check	Predetermined optimum parameter settings	Reset if incorrect	GEL Analyst	GL-OA-E-38/GL-OA-E-009/GL-OA-E-040/GL-OA-E-003/GL-MA-E-013/GL-MA-E-010
GC/MS (Volatile) GC/MS (Semivolatile)	Tune Check	Initially; prior to daily calibration check	Compliance to ion abundance criteria	Repeat tune check to rule out standard degradation or inaccurate injection. If problem persists, perform retune the instrument and repeat tune check.	GEL Analyst	GL-OA-E-038/GL-OA-E-009

SAP Worksheet #25 -- Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table

(UFP-QAPP Manual Section 3.2.3)

Instrument / Equipment	Activity (Maintenance / Testing / Inspection)	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
ICP	Interference Check Standard	Prior to sample analysis	Within + 20% of expected value	Terminate analysis, reanalyze ICS to rule out standard degradation or inaccurate injection. If problem persists, perform instrument maintenance, repeat calibrations and reanalyze all associated samples.	GEL Analyst	GL-MA-E-013
ICP	Instrument Contamination Check – ICB/CCB	After every calibration verification	ICB: No analytes detected > LOD; CCB: no analyte detected > LOD	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	GEL Analyst	GL-MA-E-013
CVAA	Instrument Contamination Check – ICB/CCB	After every calibration verification	ICB: No analytes detected > LOD; CCB: no analyte detected > LOD	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	GEL Analyst	GL-MA-E-010

SAP Worksheet #26 -- Sample Handling System
(UFP-QAPP Manual Appendix A)

SAMPLE HANDLING SYSTEM

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Sampler / ITSI Gilbane
Sample Packaging (Personnel/Organization): Sampler / ITSI Gilbane
Coordination of Shipment (Personnel/Organization): Sampler / ITSI Gilbane
Type of Shipment/Carrier: Overnight shipping service such as FedEx or Laboratory Courier
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Laboratory receipt clerk /GEL/C&T/Forensic Analytical
Sample Custody and Storage (Personnel/Organization): Laboratory technician or custodian /GEL/C&T/Forensic Analytical
Sample Preparation (Personnel/Organization): Laboratory technician /GEL/C&T/Forensic Analytical
Sample Determinative Analysis (Personnel/Organization): Analyst /GEL/C&T/Forensic Analytical
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 90 calendar days
Sample Extract/Digestate Storage (Number of days from extraction/digestion): Up to 40 calendar days depending on method holding times
Biological Sample Storage (Number of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Sample Custodian /GEL/C&T/ Forensic Analytical
Number of Days from Analysis: 90 calendar days

Notes:
NA = Not applicable

SAP Worksheet #27 -- Sample Custody Requirements Table
(UFP-QAPP Manual Section 3.3.3)

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):
Standardized sample custody procedures will be followed from sample collection, through transfer, storage, and analysis, to ultimate disposal. Sample custody begins with shipment of the empty sample containers from the laboratory to the office or site. Sample containers will be shipped from the laboratory in sealed containers with appropriate seals and custody information. Sample containers will be properly labeled, and collected samples will be monitored for temperature control, as required, in the field and during laboratory transport and storage. Temperature blanks will be used in coolers containing samples requiring preservation at reduced temperature. Samples will be accompanied by a chain-of-custody record. When samples are transferred, both the individual relinquishing and the individual receiving the samples will sign, date, and note the transfer time on the chain-of-custody record. Samples will be packaged for shipment with completed sample labels for each sample container, sample containers carefully packed upright and on ice (as required), and with a chain–of-custody record in a Ziploc™ bag.

Custody seals will be used when samples are shipped via commercial courier service, and will be placed on the cooler so that the seals have to be broken before the cooler can be opened. The seals will be signed and dated by the field personnel. Samples may be hand-delivered to the laboratory, transported by commercial or laboratory couriers, or shipped to the laboratory using an overnight shipper.

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal):
A designated laboratory sample custodian will accept custody of the samples and verify that the information on the sample labels matches that on the chain-of-custody form(s). Pertinent information as to sample condition, shipment, pickup, and courier will also be checked on the chain-of-custody form. The temperature inside the cooler and of the temperature blank will be measured immediately after the cooler is opened (as required), and the results will be recorded. Information on the date and time of receipt, method of shipment, and sample condition will also be recorded. The custodian will then enter the appropriate data into the laboratory sample tracking system. The sample custodian will use the sample numbers on the sample labels for tracking and also assign a unique laboratory number to each sample. The custodian will then transfer the samples to the proper analyst(s) or store the samples in the appropriate secure area. Data sheets and laboratory records will be retained by the laboratory as part of the permanent documentation for a period of at least 3 years. Samples and extracts will be retained by the analytical laboratory for a minimum of 90 days after the laboratory reports the data. Unless notified otherwise , samples may be disposed of by the laboratory in a manner consistent with local government regulations.

Chain-of-Custody Procedures:
A chain-of-custody form will be completed for every group of samples sent to the analytical laboratory, to document sample possession from the time of collection to sample receipt by the laboratory; and a copy of the form will accompany the shipment. Each completed chain-of-custody

SAP Worksheet #27 -- Sample Custody Requirements Table (Continued)

form will contain the following information: sample identification number(s); name(s) and signature(s) of collectors, samplers, or recorders; ITSI Gilbane project number, project name, and location of project; the project manager's name and contact information; the date and time of collection; sample type(s) and analyses requested; and signatures of persons relinquishing and receiving the samples. When samples are transferred, the individuals relinquishing and receiving the samples will sign, date, and note the transfer time on the chain-of-custody form. An example chain-of-custody is provided in Appendix D.

In addition to providing a custody exchange record for the samples, the chain-of-custody record serves as a formal request for sample analyses. The chain-of-custody records will be completed, signed, and distributed as described in SOP PR-TC-02.12.02.00 Sample Handling and Electronic Data Management.

Sample Numbering
The sample number will be recorded in the field logbook, on the labels, and on the chain-of-custody record at the time of sample collection. A complete description of the sample and sampling conditions will be recorded in the field logbook and referenced using the unique sample identification number. Samples will be uniquely designated using a numbering system that identifies the CTO number, location/type of sample, and a sequential number as follows:

For radiological samples, numbering schemes for reference (background) areas, RSY survey pads, pipe sediment, manhole sediment, pipe/manhole swipes, extraneous pipe sediment and swipes, and trench survey units will be used. The typical radiological sample numbering schemes are as follows:

- Reference Area: **WW-PX-RA-UU**, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X - Parcel designation (e.g. D1 for Parcel D-1)
  RA – Identifier to indicate that the sample is reference area sample
  UU – Two-character consecutive sample number starting with 01 (number of samples collected from each reference area)

- RSY Survey Pads: **WW-PX-DQQQQ-UU**, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X - Parcel designation (e.g. D1 for Parcel D-1)
  D – Identifier to indicate that the location of RSY is in Parcel D
  QQQQ – Four-character consecutive pad number 0001; continues consecutively throughout the CTO with no repeated numbers
  UU – Two-character consecutive sample number starting with 01 (number of samples collected from each reference area)

- Pipe/Component (e.g., manhole) Sediment: **WW-PXPC-QQQQ-UU**, where:
  WW – CTO number
  P – Abbreviation for Parcel

SAP Worksheet #27 -- Sample Custody Requirements Table (Continued)

X - Parcel designation (e.g. D1 for Parcel D-1)
PC – Abbreviation to indicate a pipe/component sediment sample
QQQQ – Four-character consecutive sample number that begins with 0001 to designate number of sediment samples collected from piping; continues consecutively throughout the CTO with no repeated numbers
UU – Two-character consecutive sample number starting with 01 (number of samples collected from each reference area)

- Pipe/Manhole Swipes: WW-PXS-PCAABBCC-SS/SSS-UU, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X - Parcel designation (e.g. D1 for Parcel D-1)
  S – Identifier to indicate a swipe sample
  PC – Two-character pipe/component identifier
  AA - Two-character work area number (e.g., 06 for Area 6, 10 for Area 10, etc.); the Parcels are broken down in to work area numbers to enable easier tracking of samples
  BB – Two-character identifier for IR site or "00" for non-IR site
  CC – Two-character trench identification number (4A, 8C, 1G, etc.)
  SS/SSSS – Two-character pipe component number or four-character manhole number
  UU – Two-character consecutive sample number starting with 01 for this project (number of swipes performed for each pipe or manhole)

- Extraneous Pipe Sediment and Swipes: **WW-PXS/P-EPYYY-UU**, where:

  WW – CTO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., C for Parcel C)
  S/P – Use "S" to indicate a swipe sample and use "P" to indicate a pipe sediment sample
  EP – Identifier to indicate an extraneous pipe sample
  YYY – Three-character unique extraneous pipe identifier
  UU – Two-character consecutive sample number starting with 01 for this project (number of extraneous swipes performed or sediment samples collected from each pipe)

- Railroad Tie Swipes: **WW-PXS-RTAABB-SSSSSS**, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., D for Parcel D-1)
  S – Identifier to indicate a swipe sample
  RT – Two-character component identifier to indicate a railroad tie sample
  AA – Two-character work area number (e.g., 06 for Area 6, 10 for Area 10, etc.); the Parcels are broken down in to work area numbers to enable easier tracking of samples
  BB – Two-character identifier for IR site or "00" for non-IR site
  SSSSSS – Six-character railroad tie number

SAP Worksheet #27 -- Sample Custody Requirements Table (Continued)

- Trench Survey Unit: **WW-PXT-YYY-UUU**, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., D for Parcel D-1)
  T – Indicates a trench sample
  YYY – Three-character trench survey unit number
  UUU – Three-character consecutive sample number starting with 001 (number of samples collected from each survey unit)

- Ship Berth Survey Units: **WWSBX-SYYYY-UUU**, where:
  WW – CTO number
  SB – SB for Ship Berth
  X – Parcel designation (e.g., D for Parcel D-1)
  S – S for Survey Unit
  YYYY – Survey Unit number
  UUU – Three-character consecutive sample number for this survey unit (starting with 001)

For non-radiological samples, samples will be numbered as follows:

- Soil samples collected from IR sites: **WW-PX-IRYY-ZZZ**, where:
  WW – CTO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., D for Parcel D-1)
  IR – Abbreviation for Installation Restoration
  YY – Two-character designation for IR site number
  ZZZ – three-character consecutive number begins with 001 to designate number of samples collected from an IR site; continues consecutively throughout the CTO with no repeated numbers

For non-radiological and radiological samples, samples will be numbered as follows:

- Soil samples collected from import backfill material sources: **WWA-IF-XXX-YYY**, where:
  WW – CTO number
  A – Ancillary sample
  IF – represents Import Fill
  XXX – Three-character designation for import backfill source name
  YYY – three-character consecutive number begins with 001 to designate number of samples collected from a source

SAP Worksheet #27 -- Sample Custody Requirements Table (Continued)

Sample Packaging- Radiological Samples

Samples will be delivered for analysis to the laboratory via cooler, box, or other similar container (ice is not required if only radiological analyses will be performed), along with the completed COC. Samples to be sent off-site will be packaged in accordance with applicable Department of Transportation (DOT) and International Air Transport Association (IATA) procedures. At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage.

For samples transported by an off-site laboratory courier, two custody seals will taped across the lid of the box or cooler: one seal in the front and one seal on the side. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the COC will then be released to the courier for transportation to the laboratory. A copy of the COC will be maintained onsite and a copy will be emailed to the Project Chemist.

For samples transported via commercial carrier, two custody seals will taped across the lid of the box or cooler: one seal in the front and one seal on the side. The COC will include the will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. A copy of the COC will be maintained onsite and a copy will be emailed to the Project Chemist. The box/cooler will be taped shut as necessary. The airbill will be completed for priority overnight delivery and placed in the pouch which is then secured to the box/cooler. If multiple boxes/coolers are being shipped, the original airbill will be placed on the boxes/cooler, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Prepared packages will also be surveyed prior to shipment.

Sample Packaging- Chemical Samples

Sample packaging and shipping will be performed in accordance with the SOP PR-TC-02-04-01.01 Sample Handling, Packaging and Shipping

SAP Worksheet #28.1 -- Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	Gamma Spectroscopy
Analytical Method / SOP Reference[1]	EPA 901.1 / Radiation Chemistry Section 3.1 and HPS SOPs Section 3.3

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank (MB)	Daily	Absolute Value < MDA	See footnote 2	Laboratory technician	Accuracy	Absolute value < MDA
Laboratory Control Sample (LCS)	1 per preparatory batch (defined as ≤ 20 samples)	Recovery percentage +/- 25%.	See footnote 3	Laboratory technician	Accuracy	Recovery percentage +/- 25%.
Sample Duplicate	1 per preparatory batch (defined as ≤ 20 samples)	Relative percent difference (RPD) ≤ 20% if results of the sample *or* duplicate are greater than 5 x MDA and ≤ 100% if results of the sample *and* duplicate are less than 5 x the MDA.	See footnote 4	Laboratory technician	Precision	RPD ≤ 20% if results of the sample *or* duplicate are greater than 5 x MDA and ≤ 100% if results of the sample *and* duplicate are less than 5 x the MDA.

SAP Worksheet #28.1 -- Laboratory QC Samples Table

(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	Strontium
Analytical Method / SOP Reference[1]	EPA 905.0Mod / GL-RAD-A-004

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
(MB)	1 per preparatory batch (defined as ≤ 20 samples)	Analytes < MDA	See footnote 2	Laboratory technician	Accuracy	Analytes < MDA
LCS and/or Laboratory Control Sample Duplicate (LCSD)	1 per preparatory batch (defined as ≤ 20 samples)	75-125%	See footnote 3	Laboratory technician	Accuracy	75-125%
Sample Duplicate	1 per preparatory batch (defined as ≤ 20 samples)	Act <5*MDC, then RPD is 100% or less. If act >5*MDC, then RPD is 20% or less or relative error ratio (RER)</=3	See footnote 4	Laboratory technician	Precision	Act <5*MDC, then RPD is 100% or less. If act >5*MDC, then RPD is 20% or less or RER</=3
Tracers	Every standard and sample	25-125%	See footnote 5	Laboratory technician	Accuracy	25-125%

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	Alpha Spectroscopy
Analytical Method / SOP Reference[1]	DOE HASL A-01-R Iso-Pu / GL-RAD-A-011

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < MDA	See footnote 2	Laboratory technician	Accuracy	All analytes < MDA
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	75-125%	See footnote 3	Laboratory technician	Accuracy	75-125%
Sample Duplicate	1 per preparatory batch (defined as ≤ 20 samples)	Act <5*MDC, then RPD is 100% or less. If act >5*MDC, then RPD is 20% or less or RER</=3	See footnote 4	Laboratory technician	Precision	Act <5*MDC, then RPD is 100% or less. If act >5*MDC, then RPD is 20% or less or RER</=3
Tracer	Every standard and sample	15-125%	See footnote 5	Laboratory technician	Accuracy	15-125%

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	VOCs
Analytical Method / SOP Reference[1]	EPA 8260B/ GL-OA-E-038

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Surrogate	Every standard and sample	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 7	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	SVOCs
Analytical Method / SOP Reference[1]	EPA 8270C/ GL-OA-E-009

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Surrogate	Every standard and sample	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 7	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	PCBs
Analytical Method / SOP Reference[1]	EPA 8082/ GL-OA-E-040

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Surrogate	Every standard and sample	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 7	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	TPH-purgeable
Analytical Method / SOP Reference[1]	EPA 8015B/ GL-OA-E-004

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Surrogate	Every standard and sample	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 7	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	TPH-extractable
Analytical Method / SOP Reference[1]	EPA 8015B/ GL-OA-E-003

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Surrogate	Every standard and sample	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 7	Laboratory technician	Accuracy	Per DoD QSM/laboratory limits listed in Appendix B in this SAP

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Matrix	Soil
Analytical Group	Metals
Analytical Method / SOP Reference[1]	EPA 6010B/7471A/ GL-MA-E-013/GL-MA-E-010

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
MB	1 per preparatory batch (defined as ≤ 20 samples)	All analytes < ½ LOQ	See footnote 2	Laboratory technician	Accuracy	All analytes < ½ LOQ
Calibration Blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence	No analytes detected < LOD	See footnote 2	Laboratory technician	Accuracy	No analytes detected < LOD
LCS and/or LCSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 3	Laboratory technician	Accuracy/ Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
MS/MSD	1 per preparatory batch (defined as ≤ 20 samples)	Per DoD QSM/laboratory limits listed in Appendix B in this SAP	See footnote 6	Laboratory technician	Accuracy/ Precision	Per DoD QSM/laboratory limits listed in Appendix B in this SAP
Serial Dilution	Each new sample matrix	1:5 dilution must agree within ± 10% of original determination	See footnote 8	Laboratory technician	Accuracy	1:5 dilution must agree within ± 10% of original determination
Post-digestion Spike	When serial dilution or matrix spike fails	75-125%	See footnote 9	Laboratory technician	Accuracy	75-125%

SAP Worksheet #28.1 -- Laboratory QC Samples Table (continued)
(UFP-QAPP Manual Section 3.4)

Notes:
[1]Analytical SOPs are provided in Appendix C of this SAP.

[2]Any sample associated with a blank that fails the criteria checks will be reprocessed in a subsequent preparation batch, except when the sample analysis resulted in a non-detect. If no sample volume remains for reprocessing, the results will be reported with appropriate data qualifying codes.

[3]Reprep and reanalyze the LCS and all samples in the associated preparatory batch for failed analytes, if sufficient sample material is available.

[4]Reprep and reanalyze the sample and duplicate in the associated preparatory batch for failed analytes if sufficient sample material is available and the sample is homogeneous. If RPD/RER still out of range, report as matrix interference confirmed and write a nonconformance. If reanalysis is in range, re-extract samples in batch.

[5]Truncate carriers/tracers above 100% recovery to eliminate low biased results. Reprep and reanalyze sample if carrier is low (indicating high biased results) if there is activity in the sample above the reporting limit. No reanalysis if matrix interference is nonconformance during sample preparation.

[6]The data will be evaluated to determine the source of difference and to determine if there is a matrix effect or analytical error.

[7]Reprep and reanalyze all failed samples for failed surrogates in the associated preparatory batch, if sufficient sample material is available.

[8]Perform post-digestion spike addition if serial dilution does not meet criteria.

[9]Reanalyze post-digestion spike.

SAP Worksheet #28.2-- Laboratory QC Samples Table
(UFP-QAPP Manual Section 3.4)

Matrix	Swipe
Analytical Group	Gross Alpha/Gross Beta
Analytical Method / SOP Reference[1]	EPA 9310/ REC-211-23

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Background Determination	Daily	As specified in laboratory SOP	As specified in laboratory SOP	Envirachem/ Onsite Smear Laboratory PM	Accuracy	As specified in Laboratory SOP

SAP Worksheet #29 -- Project Documents and Records Table

(UFP-QAPP Manual Section 3.5.1)

Document	Where Maintained
Execution Plan, which includes this SAP	Project file, NAVFAC SW Administrative Record
Field logbooks	Project file
Field forms	Project file
Chain-of-custody forms	Project file, Laboratories, NAVFAC SW will received a copy of definitive data chain-of-custody records
Shipping Records	Project file
Audit/assessment checklists/reports	Project file and laboratory (if applicable)
Corrective action forms/reports	Project file and laboratory (if applicable)
Field change request forms	Project file
Envirachem laboratory results reports	Laboratory and project file
GEL and C&T laboratory data packages (Level III- or Level IV-equivalent)	Laboratory and project file, NAVFAC SW Administrative Record
Data validation reports	Validator and project file; NAVFAC SW Administrative Record

Field documentation associated with sampling activities includes field logbooks and/or field forms, sample labels, chain-of-custody records, sample shipping records, field surveillance reports, and Field Change Request (FCR) forms. In addition, laboratory and data validator documentation will be generated during this project. These types are described in the following sections.

Field Logbooks/Forms

Field logbooks and/or forms will be handled in accordance with SOP PR-TC-01.04.04.00 Field Documentation in Appendix A of this SAP.

Sample Labels

For radiological sample collection, a resealable plastic bag will be used to collect soil/sediment samples. Sample labels will be generated at the time the chain-of-custody record is prepared and affixed to the resealable plastic bag and the prepared sample container (if one is used) during sample processing. The label will contain the following:

- Sample identification number
- Sample collection date (month/day/year)
- Time of collection
- Sampler's initials

SAP Worksheet #29 -- Project Documents and Records Table (Continued)

If containers are too small to fit the entire above-listed sample information (like for swipe samples), at a minimum the container will be labeled with the sample identification number.

For chemical samples to be sent to GEL, labels will be hand-written using indelible black or blue ink on a water-proof label and affixed to each sample container at the time of sample collection (or labels may be computer generated). The label will contain the following information:

- Sample identification number
- Sample collection date (month/day/year)
- Time of collection (24-hour clock) from the start of sampling
- Sampler's initials
- Preservative (if any)

Chain of Custody

Chain-of-custody record information is described in SAP Worksheet #27.

Sample Shipping Records

Swipe samples will be dropped off directly at the Envirachem laboratory located on-site at HPNS. Radiological samples will be couriered to C&T, who will subcontract the fraction of the radiological analyses they do not perform to GEL as detailed on Worksheet 19. Samples for chemical analyses only will be shipped via FedEx to directly to GEL. For samples shipped via FedEx, the chain-of-custody record will be packaged within the cooler, and the sender's copy of the air bill will serve as custody documentation and will be maintained on-site in the project file. Sample shipping procedures are detailed in SAP Worksheet #27.

Field Surveillance Reports

Field surveillances will be performed in accordance with the three phases of inspection as required by the QC Program. A Preparatory Inspection will be performed by the PQCM prior to the first sampling activities. This will include a general orientation for health and safety. An Initial Inspection will be conducted at the beginning of field sampling activities for this project. Daily field inspections and subsequent surveillances will be performed at the discretion of the PQCM or the QCPM throughout the duration of the project. The PQCM will use the Initial Inspection Checklist during inspection.

Field Change Request

An FCR will be prepared by the Program Chemist, or a designee, if a change to the SAP occurs during sampling activities. These changes will be minor and not result in a change in scope and/or DQOs for this project. The FCR must be approved prior to field implementation.

SAP Worksheet #29 -- Project Documents and Records Table (Continued)

Major changes to work scope affecting the DQOs or meeting criteria described in EWI #2, 3EVR.2, Review, Approval, Revision, and Amendment of Sampling and Analysis Plans (SAPs) (NAVFAC SW 2006) will require preparation of a SAP Addendum. The SAP Addendum must be approved by the Navy QAO prior to conducting sampling and analysis.

Laboratory Documentation
Initial analytical results that are e-mailed to the project team for review will be submitted by the laboratories as follows:

Curtis and Tompkins results report:

- Sample results
- Laboratory duplicate results

The following documentation is maintained by Curtis and Tompkins and is available for review, as required:

- Copy of chain-of-custody record
- Energy control check standard daily for each detector

GEL results report:

- Case narrative
- Laboratory signed review page
- Copy of chain-of-custody record
- Sample receipt and login
- Sample Results
- Batch QC results

For samples that represent FSSs or material to be used on-site as backfill are to be validated in accordance with SAP Worksheet #36. For these types of samples, Curtis and Tompkins and GEL will produce a final data package in hardcopy format and in portable document format (PDF). Both of these formats will be sent to the Project Chemist. Eighty percent of the FSS or backfill samples will be submitted in an EPA Level III-equivalent data package and 20 percent will be submitted in an EPA Level IV-equivalent data package. The EPA Level IV-equivalent samples will be chosen randomly and denoted on the chain-of-custody records.

Any other data generated by GEL or C&T will be submitted as EPA Level III-equivalent data package (except for asbestos data, which will be submitted as EPA Level II-equivalent).

For the EPA Level III- or IV-equivalent data packages, samples will be assigned into a sample delivery group (SDG) number for every batch of 20 samples or less based on as received on a daily basis by the

SAP Worksheet #29 -- Project Documents and Records Table (Continued)

laboratory. The EPA Level III- or IV-equivalent data packages will be page numbered and contain the following information:

- Cover page (with laboratory name, address, phone number, contact person, and SDG number, as well as the project name and project number)
- Table of contents
- Case narrative including resolution of all corrective actions and nonconformance
- Sample management records, including a copy of chain-of-custody record, shipping documents as applicable, and laboratory sample receipt forms
- Cross-reference table for sample identification numbers (IDs) versus laboratory IDs
- Analytical results and QA/QC information by test as follows:
    - Radiological raw data sequence
        - Sample results forms, including method blanks
        - Sample raw data (EPA level IV only)
        - QC summaries
        - Initial calibration (ICAL)
        - Calibration checks, including all related continuing calibration verifications (CCVs)
        - Instrument run log
        - Sample preparation log
    - Organic raw data sequence
        - Sample result forms, including method blanks
        - Sample raw data after each result form (EPA Level IV only)
        - Surrogate summaries (surrogate results may appear on the sample result forms)
        - QC Summaries
        - Tune data (GC/MS only)
        - ICAL
        - Daily calibration checks, including related CCVs
        - QC LCS, MS/MSD raw data (EPA Level IV only)
        - Instrument run log
        - Sample preparation log
    - Inorganic raw data sequence
        - Sample result forms, including method blanks
        - Sample raw data after each result form (EPA Level IV only)

SAP Worksheet #29 -- Project Documents and Records Table (Continued)

- QC Summaries
- ICAL
- Daily calibration checks, including related CCVs
- Calibration blanks, including all related continuing calibration blanks
- Interference check standard A and B for ICP-AES only
- QC raw data (EPA Level IV only)
- Post-digestion spike results
- Analytical spike results
- Method of standard additions (if applicable)
- ICP-AES serial dilutions
- Instrument run log
- Sample preparation log

Relevant laboratory raw data and documentation including, but not limited to, logbook, data sheets, electronic files, and reports, will be maintained by the laboratory for at least 5 years. ITSI Gilbane must be notified 30 days before disposal of any relevant records.

For EPA Level III- or IV-equivalent data, an EDD will be uploaded directly to ITSI Gilbanes's web-based portal at http://edms.itsi.com. The hardcopy data package will also be uploaded in PDF to the portal and a copy of the PDF emailed to the Project Chemist on compact disc (CD). Both the EDDs and the hardcopy data package will present results to two or three significant figures. For radiological results, at least three significant figures will be used. For organic results, at least two significant figures will be used. For inorganic results, at least two significant figures will be used for results less than 10, and at least three significant figures will be used for results greater than 10. Results for QC analyses (method blanks, MS/MSD, LCS, and duplicates) will be reported up to three significant figures.

When revisions to EPA Level III- or IV-equivalent data packages are required, the report will be resubmitted in its entirety with the notation "amended or revised report to both the portal and the Project Chemist If the revisions affect the EDDs, the revised EDD will be re-uploaded to the portal.

Data Validation Reports

Samples are to be validated in accordance with SAP Worksheet #36. The validation report will include the data validation findings worksheets. Each laboratory SDG will have its own data validation report. The validation reports will contain the following information:

- Title page that contains project name, sample collection date, validator subcontractor name, report date, type of analysis, laboratory, SDG, sample identifications (including MS/MSD,

SAP Worksheet #29 -- Project Documents and Records Table (Continued)

duplicate, reanalysis, or dilution samples), sample matrix (e.g., soil, water), and validation level (EPA Level III or IV).

- Introduction page that includes the number of samples per matrix, analytical method reference, validation guideline reference, and section references to summary qualification flags, and denotes QC samples. Statements regarding flag classification (protocol/advisory) and whether raw data check was performed will also be included.
- Evaluation of the following parameters:
    - Technical holding times
    - GC/MS instrument performance check (tune) if applicable
    - Calibration
    - Laboratory blanks
    - Accuracy and precision data for internal laboratory QC associated with each SDG
    - Target compound identification
    - System performance checks
    - Analyte quantitation and quantitation limits (MDA and LOQs)
    - Field QC samples (if not applicable, report will note)
    - Overall assessment of data
- Qualifier classification

The data validator will upload a PDF copy of the validation report to the project portal at http://edms.itsi.com, and enter qualifiers directly to the database using the project portal. A CD of the PDF copy of the validation report will be sent to the Project Chemist.

The data validation subcontractor will maintain validation records for at least 5 years. ITSI Gilbane will be notified 30 days before disposal of any records.

SAP Worksheet #30 -- Analytical Services Table
(UFP-QAPP Manual Section 3.5.2.3)

Matrix	Analytical Group	Sample Locations/ ID Number	Analytical Method	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Swipe	Gross Alpha/Gross Beta	Samples as listed on SAP Worksheet #18	EPA 9310	2 Working Days	Envirachem ITSI Gilbane Field Trailer, Bldg 241 Hunters Point Shipyard San Francisco, CA 94124 Chris Bryson 925-784-7719	Curtis & Tompkins, LTD 2323 Fifth Street Berkeley, CA 94710 Mike Dahlquist 510-204-2225
Soil	Gamma Spectroscopy	Samples as listed on SAP Worksheet #18	EPA 901.1	2 Working Days/30 Working Days	Curtis & Tompkins, LTD 2323 Fifth Street Berkeley, CA 94710 Mike Dahlquist 510-204-2225	GEL Laboratories, LLC. 2040 Savage Road Charleston, SC 29407 Heather Shaffer 843-769-7386
Soil	Asbestos	Samples as listed on SAP Worksheet #18	CARB 435	30 Working Days	Subcontracted by C&T: Forensic Analytical 3777 Depot Road, Suite 409 Hayward, CA 94545 Jim Flores 510-887-8828	EMSL Analytical, Inc. 2235 Polvorosa Drive San Leandro, CA 94577 Silvia Noack 510-895-3675
All	Analytical groups as listed in SAP Worksheet #23 as applicable to GEL	Samples as listed on SAP Worksheet #18	Analytical groups as listed in SAP Worksheet #23 as applicable to GEL	30 Working Days	GEL Laboratories, LLC. 2040 Savage Road Charleston, SC 29407 Heather Shaffer 843-769-7386	TestAmerica-St. Louis 13715 Rider Trail North Earth City, MO 63045 Erika Starman (314) 298-8566

[1]Envirachem, C&T, and GEL have been selected to analyze samples for this project. Asbestos analysis will be subcontracted by C&T to Forensic Analytical of Hayward, California. Envirachem is performing smear screening only and as such does not require certification.

SAP Worksheet #30 -- Analytical Services Table (Continued)

GEL and C&T have successfully completed the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) certification for the matrices and methods listed in SAP Worksheet #23 and will maintain current status throughout the duration of this project. GEL is also certified by the CDPH under the California National Environmental Laboratory Accreditation Program (NELAP) for all of the analytical methods listed in SAP Worksheet #23. GEL & C&T are capable of providing the project QC and data deliverables required by this SAP and the QSM for Environmental Laboratories (DoD 2010). Asbestos testing is a specialty testing and is not part of DoD ELAP or CDPH NELAP accreditations; however, the asbestos lab chosen will have the National Voluntary Laboratory Accreditation Program certification to perform asbestos analysis.

Envirachem is located at HPNS and is being used to provide expedient sample analysis turnaround time for gross alpha/gross beta analyses. C&T is located near HPNS and is being used to provide expedient sample analysis for gamma spectroscopy that will guide site remediation, investigation, and characterization efforts in the field. C&T will also be used to perform definitive gamma spectroscopy radiological analyses.

GEL will be used to perform chemical analyses, definitive radiological analyses that C&T does not perform, and as a back-up laboratory for both Envirachem and C&T.

Definition of Detection and Quantitation Limits
Radiological analyses report data with detections limits different from chemical analyses. The following definitions are included herein to explain those differences:

- **MDA:** For this project, the minimum detectable activity (MDA) pertains only to radiological analyses as is defined as follows in accordance with the Multi-Agency Radiological Laboratory Analytical Protocols: the MDA is calculated as a sample specific value and typically these values assumed both a Type I (α) and Type II (β) error of 5 percent.
- **LOD:** The limit of detection (LOD) (associated with chemical analyses only) is the smallest amount or concentration of a substance that must be present in a sample in order to be detected at a 99 percent confidence level. Results reported above the LOD (and below the LOQ as defined below) are considered "estimated" concentrations and are qualified by the laboratory with a "J" qualifier.
- **LOQ:** The limit of quantitation (LOQ) (associated with chemical analyses only) is defined as the lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias. The LOQ is typically larger than the LOD (but may be equal to the LOD, depending upon the acceptance limits for precision and bias.) Results reported above the QLs are considered detected concentrations with no qualifications.

SAP Worksheet #31 -- Planned Project Assessments Table

(UFP-QAPP Manual Section 4.1.1)

Assessment Type	**Frequency**	**Internal or External**	**Organization Performing Assessment**	**Person(s) Responsible for Performing Assessment** (title and organizational affiliation)	**Person(s) Responsible for Responding to Assessment Findings** (title and organizational affiliation)	**Person(s) Responsible for Identifying and Implementing Corrective Actions (CA)** (title and organizational affiliation)	**Person(s) Responsible for Monitoring Effectiveness of CA** (title and organizational affiliation)
Field Sampling Surveillance	Annually; at least once per project; with discretionary follow-ups	Internal	ITSI Gilbane	PQCM (ITSI Gilbane)	Project Manager (ITSI Gilbane)	Project Manager (ITSI Gilbane)	Project Manager and PQCM (ITSI Gilbane)
Management Review	Once during the project duration	Internal	ITSI Gilbane	QCPM (ITSI Gilbane)	Project Manager (ITSI Gilbane)	Project Manager (ITSI Gilbane)	PQCM (ITSI Gilbane)

SAP Worksheet #32 -- Assessment Findings and Corrective Action Responses

(UFP-QAPP Manual Section 4.1.2)

Assessment Type	**Nature of Deficiencies Documentation**	**Individual(s) Notified of Findings** (name, title, organization)	**Time-frame of Notification**	**Nature of Corrective Action Response Documentation**	**Individual(s) Receiving Corrective Action Response**	**Time-frame for Response**
Field Sampling Surveillance	Surveillance Report	Project Manager, ITSI Gilbane	7 days after completion of report	Corrective Action Report	Project Manager and QCPM, ITSI Gilbane	5 days after notification
Management Review	Surveillance Report	Project Manager, ITSI Gilbane	7 days after completion of report	Corrective Action Report	Project Manager, ITSI Gilbane	14 days after notification

SAP Worksheet #33 -- QA Management Reports Table
(UFP QAPP Manual Section 4.2)

Type of Report	**Frequency** (daily, weekly monthly, quarterly, annually, etc.)	**Projected Delivery Date(s)**	**Person(s) Responsible for Report Preparation** (title and organizational affiliation)	**Report Recipient(s)** (title and organizational affiliation)
Field Sampling Surveillance Report	Once, at startup of sampling	Determined during the project	PQCM, ITSI Gilbane	Project Manager and QCPM, ITSI Gilbane
Management Review Report	Once after management review is completed	Determined during the project	QCPM, ITSI Gilbane	Project Manager and Program Manager, ITSI Gilbane

SAP Worksheet #34 -- Verification (Step I) Process Table

(UFP-QAPP Manual Section 5.2.1)

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
Field notes/logbook	Field notes will be reviewed internally, at intervals as needed during the project and at the completion of the work, and placed in the project file. A copy of the field notes will be attached to the final report.	I	PQCM, ITSI Gilbane
Chain-of-custody forms	Chain-of-custody forms will be reviewed internally in the field upon their completion and verified against the packed sample coolers they represent. The shipper's signature on the chain-of-custody will be initialed by the reviewer. A copy of the chain-of-custody will be retained in the project file, and the original and remaining copies will be taped inside the cooler for shipment.	I I	PQCM, ITSI Gilbane Second-level review by Project Chemist, ITSI Gilbane
Sample Receipt	For samples shipped via FedEx to GEL, the Project Chemist will verify receipt of samples by the laboratory the day following the shipment.	I	Project Chemist, ITSI Gilbane
Sample Logins	Sample login information will be reviewed and verified for accuracy and completeness in accordance with the requirements in this SAP.	E[1] E[1]	Offsite Laboratory PM, GEL Offiste Laboratory PM, C&T
Laboratory analytical results prior to release	Laboratory analytical results will be reviewed to verify that the requirements in this SAP have been met. Prior to release, results will be verified as follows:	E[1] E[1]	Offsite Laboratory PM, GEL Offisite Laboratory PM, C&T
	• Analytical results (100 percent) comply with the method- and project-specific requirements and any deviations or failure to meet criteria is documented for the project file.	E[1] E[1]	Offsite Laboratory PM, GEL Offsite Laboratory PM, C&T
	• Manual entries (100 percent) are free of transcription errors and manual calculations are accurate; computer calculations are spot-checked to verify program validity; results reported are compliant with method- and project-specific QC requirements; raw data and supporting materials are complete; spectral assignments are confirmed; descriptions of deviations from method or project requirements are documented; significant figures and rounding have been appropriately used; reported values include dilution factors; and results are reasonable.	E[1] E[1]	Analyst, GEL Analyst, C&T

SAP Worksheet #34 -- Verification (Step I) Process Table (Continued)

(UFP-QAPP Manual Section 5.2.1)

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
Laboratory analytical results prior to release (Continued)	• Analytical results reported are compliant with method- and project-specific QC; analytical methods are performed in compliance with approved SOPs. This review may be conducted after release of results since reviews are done only on 10 percent of the results.	E[1] E[1]	Offsite Laboratory PM, GEL Offsite Laboratory PM, C&T
Laboratory analytical results due at turnaround time listed on chain-of-custody record	Laboratory analytical results will be verified for having been obtained following the protocols in this SAP and being of sufficient quality to satisfy DQOs.	I I	RSOR or designee, ITSI Gilbane Project Chemist, ITSI Gilbane
Laboratory Data Packages	Screening data reports and EPA Level III or IV-equivalent laboratory data packages will be verified by the laboratory performing the work for completeness and technical accuracy prior to submittal in accordance with requirements described in SAP Worksheet #29.	E[1] E[1]	Offsite Laboratory PM, GEL Offsite Laboratory PM, C&T
Field and electronic data	One hundred percent of manual entries will be reviewed against the hard-copy information and 5 percent of electronic uploads will be checked against the hard copy.	I I	RSOR or designee, ITSI Gilbane Project Chemist, ITSI Gilbane

Notes:
[1]The Onsite Laboratory Manager for Envirachem or Offsite Laboratory Project Manager for GEL and/or C&T may direct the use of a designee for verification inputs as needed.

SAP Worksheet #35 -- Validation (Steps IIa and IIb) Process Table

(UFP-QAPP Manual Section 5.2.2) (Figure 37 UFP-QAPP Manual) (Table 9 UFP-QAPP Manual)

Step IIa / IIb	Validation Input	Description	Responsible for Validation (name, organization)
IIa	Sample Collection	Ensure that the sampling procedures described in this SAP were used to collect samples and that any deviations to those procedures were documented in a FCR.	PQCM, ITSI Gilbane Project Chemist, ITSI Gilbane
IIa	Sample Handling	Ensure that the procedures described in this SAP for sample handling, packaging, and transport to the laboratory were followed.	PQCM, ITSI Gilbane Project Chemist, ITSI Gilbane
IIa	Sample Documentation	Ensure that the chain-of-custody record procedures described in this SAP were followed for sample collection and that logbooks or field forms were completed as required.	PQCM, ITSI Gilbane Project Chemist, ITSI Gilbane
IIa	Analytical Procedures	Ensure that the analytical methods and deliverable requirements described in this SAP were followed including holding times, analyte lists, and QC criteria.	Offsite Laboratory PM, C&T Offsite Laboratory PM, GEL
IIa	Laboratory Data Reports	Data reports will be validated by the laboratory performing the work for technical accuracy and requirements listed in SAP Worksheet #29 prior to submittal.	Offsite Laboratory PM, C&T Offsite Laboratory PM, GEL
IIb	Sampling Procedures	Review of sampling procedures to appropriately document if any deviations occurred and if corrective action is required.	PQCM, ITSI Gilbane
IIb	Analytical Procedures	Review of analytical procedures to appropriately document if any deviations occurred and if corrective action is required.	RSOR or designee, ITSI Gilbane Project Chemist, ITSI Gilbane
IIb	Project Quantitation Limits and Laboratory QC Criteria	Ensure project quantitation limits and laboratory QC criteria were followed and any deviations documented.	RSOR or designee, ITSI Gilbane Project Chemist, ITSI Gilbane

Notes:
The Offsite Laboratory PM for C&T or Offsite Laboratory PM for GEL may direct the use of a designee for verification inputs as needed.

SAP Worksheet #36 -- Analytical Data Validation (Steps IIa and IIb) Summary Table

(UFP-QAPP Manual Section 5.2.2.1)

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (title and organizational affiliation)
IIa	All	All	In accordance with C&T and GEL SOPs listed in SAP Worksheet #23 and DoD QSM	RSOR or designee, ITSI Gilbane Project Chemist, ITSI Gilbane
IIb	All	All	In accordance with NAVFAC SW EWI #1,the DoD QSM, and EPA Level III and IV guidelines (see description below).	Third-Party data validator, Synectics, Inc. ITSI Project Chemist

The validation strategy for definitive data for this project is 80% Level III and 20% Level IV, in accordance with Step IIb above. The 20% will be randomly chosen on thechain-of-custody record. Screening-level data will not undergo third-party validation, but will be reviewed in accordance with Step IIa above.

EPA Level IV Data Validation

EPA Level IV data validation is a full validation that will be performed on the HPNS Parcel D-1 summary and raw data packages. The data reviewer will request any missing information from the laboratory and copy the Project Chemist when missing information is requested. The data reviewer will validate all components of the data package even when an individual QC element has been rejected. An overall final qualification of results will encompass the impact of individual findings and will be determined using the professional judgment of a senior data reviewer.

Data summary packages provided by the contract laboratory should consist of sample results and QA/QC summaries, and all raw data associated with the sample and QA/QC results.

Level IV Data Validation Elements

The QC elements to be reviewed for Level IV validation are listed below.

Radiological Analyses

- Holding times
- Initial calibration.
- Continuing calibration.
- Blanks.

SAP Worksheet #36 -- Analytical Data Validation (Steps IIa and IIb) Summary Table

- Tracer/Carrier recovery.
- Matrix spike recovery.
- Duplicate sample RPD.
- Laboratory control sample recovery.
- Analyte quantitation and detection limits.
- System performance.
- Overall assessment of data in the SDG.

Chemical Analyses

- Holding times and preservation
- Blanks
- Lab QC
- Field QC, if applicable
- Surrogates and internal standards, where applicable
- Initial and continuing calibrations
- Instrument performance checks
- Review of raw data
- Calculation checks of quantified analytical data and QC samples

EPA Level III Data Validation

EPA Level III data validation is a more cursory validation that will be performed on the Parcel D-1 summary (i.e., no raw data) packages. The data reviewer will request any missing information from the laboratory and copy the client's project manager when missing information is requested. The data reviewer will validate all components of the data package, even when an individual QC element has been rejected. An overall final qualification of results will encompass the impact of individual findings and will be determined using the professional judgment of a senior data reviewer.

Data summary packages provided by the contract laboratory should consist of sample results and quality assurance and quality control (QA/QC) summaries, and all raw data associated with the sample and QA/QC results.

Level III Data Validation Elements
The QC elements to be reviewed for Level III validation are listed below.

Radiological Analyses

- Holding times.

SAP Worksheet #36 -- Analytical Data Validation (Steps IIa and IIb) Summary Table

- Initial calibration.
- Continuing calibration.
- Blanks.
- Tracer/Carrier recovery.
- Matrix spike recovery.
- Duplicate sample RPD.
- Laboratory control sample recovery.
- Reporting limits.
- Overall assessment of data in the SDG.

Chemical Analyses

- Holding times and preservation
- Blanks
- Lab QC
- Field QC, if applicable
- Surrogates and internal standards, where applicable
- Initial and continuing calibrations
- Instrument performance checks

The following documents will be used as guidance for validating chemical analytical results: Contract Laboratory Program National Functional Guidelines for Superfund Organic Methods Data Review, EPA 540-R-08-1(EPA, 2008); Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review, EPA 540-R-10-011 (EPA 2010); EWI #1, 3EN2.1, Chemical Data Validation (SWDIV2001); Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846, Third Edition and final updates (EPA 1986); QSM (DoD 2010); and the QC criteria specified in this SAP. Radiological analytical results will be validated using Chapter 8 of the Multi-Agency Radiological Laboratory analytical Protocols Manual (MARLAP), EPA 402-B-04-001A (EPA et.al., 2004); and the QC criteria specified in the SAP.

SAP Worksheet #37 -- Usability Assessment

(UFP-QAPP Manual Section 5.2.3)

After the analytical results have been reviewed, verified, and validated in accordance with SAP Worksheets #34 through 36, a Quality Control Summary Report (QCSR) will be prepared as an appendix to the Removal Action Completion Report to assess data quality and usability. The QCSR will include review of the following:

- Sample collection and analytical methods to verify that these were performed as discussed in SAP Worksheets #14 and 17
- Project-specific QLs as listed in SAP Worksheets #15.1 through 15.10 to verify that project-specific remedial goals were met
- DQOs to determine whether they have been achieved by the data collected
- Project-specific data quality indicators for precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters as discussed below
- Analytical DQOs as assessed through the PARCC parameters are as follows:

Precision

Precision is defined as the degree of mutual agreement between individual measurements of the same property under similar conditions and provides a measurement of the reproducibility of an analytical result. Precision will be evaluated through the analysis of field duplicate samples, LCS and LCSD (if LCSD is run), and MS/MSD samples, as applicable (see SAP Worksheet #20). QC criteria failures will be documented in the case narrative and included in the Comprehensive Analytical Report. The precision measurement will be determined using the RPD or RER between the duplicate sample results as follows:

$$RPD = \frac{|A-B|}{(A+B)/2} \quad x \quad 100\%$$

where: A = First duplicate concentration

B = Second duplicate concentration

RER = (result activity – duplicate activity)/(sample uncertainty + duplicate uncertainty)
using 2 sigma propagated uncertainty

As applicable, the RPD or RER limits for laboratory duplicates, MSD, and LCSD are presented in SAP Worksheets #28.1 and 28.2. Associated samples that do not meet the criteria will be evaluated by the validator.

SAP Worksheet #37 -- Usability Assessment (Continued)

Accuracy

Accuracy is the degree of agreement between an analytical measurement and a reference accepted as a true value. The accuracy of a measurement system can be affected by errors introduced by field contamination, sample preservation, sample handling, sample preparation, or analytical techniques. A program of sample spiking will be conducted to evaluate laboratory accuracy. Accuracy will be evaluated by the percent recovery of the spiked compounds in the LCS, LCS duplicate, and MS/MSD samples. LCS and MS samples will be spiked prior to extraction with the method target compounds indicated in this SAP. MS/MSD and LCS or blank spike samples will be analyzed at a frequency of 5 percent or one per sample delivery group/analytical batch (sample sets are about 10 samples). The results of the spiked samples are used to calculate the percent recovery for evaluating accuracy, using the following equation:

$$\text{Percent Recovery} = \frac{S - C}{T} \times 100 \quad \text{where:}$$

S = Measured spike sample concentration

C = Sample concentration

T = True or actual concentration of the spike

SAP Worksheets #28.1 and 28.2 present accuracy goals for this investigation based on the percent recovery of matrix and surrogate spikes. Results that fall outside the accuracy goals will be further evaluated on the basis of other QC samples.

For MS and MSD, sample heterogeneity and the presence of interfering compounds often negatively affect the accuracy and precision of the analysis. Also, the presence of high levels of target compounds in the sample chosen for spiking may necessitate a dilution of the sample, or may otherwise result in errors in spiked compound recovery. For these reasons, MS/MSD samples may not be truly representative of the accuracy and/or precision of the analytical process.

If MS/MSD analyses do not meet the specified recovery criteria, the recoveries from the LCS will be evaluated. If the LCS accuracy criteria are met, the failure of the MS/MSD will be attributed to interference from the sample matrix, and no corrective action will be required. If the LCS accuracy criteria are not met, the associated primary and QC samples will be re-prepared and re-analyzed.

In cases where re-preparation and re-analysis of the samples is not possible, the QC criteria failures will be documented in the case narrative and included in the Comprehensive Analytical Report. The affected data will be qualified as described in the EPA National Functional Guidelines, and the impact of the QC failures on the DQOs for the project will be assessed in the final report.

Representativeness

Representativeness expresses the degree to which sample data accurately and precisely represent the characteristics of a population, variations in a parameter at a sampling point, or an environmental

SAP Worksheet #37 -- Usability Assessment (Continued)

condition that they are intended to represent. For this project, representative data will be obtained through careful selection of sampling locations and analytical parameters. Representative data will also be obtained through proper collection and handling of samples to avoid interference and minimize cross-contamination.

Representativeness of data will also be ensured through consistent application of the appropriate established field and laboratory procedures. To aid in evaluating the representativeness of the sample results, field and laboratory blank samples will be evaluated for the presence of contaminants. Laboratory procedures will be reviewed to verify that standard operating procedures were followed and method requirements were met during the analysis of project samples. Laboratory sample storage practices, holding times, sub-sampling procedures, method blanks, and evidence of matrix interference will be assessed for potential impacts on the representativeness of the data. Data determined to be non-representative will be used only if accompanied by appropriate qualifiers and limits of uncertainty.

Representativeness as it relates to field procedures refers to the collection of samples that allow accurate conclusions to be made regarding the composition of the sample media at the entire site. Representativeness will be qualitatively assessed by evaluating whether the procedures described in this SAP were followed. The site-sampling layout, including sampling locations, frequency of sampling, and timing of sampling activities, will be reviewed.

Completeness

Completeness is a measure of the percentage of project-specific data that are valid. Valid data are obtained when samples are collected and analyzed in accordance with the QC procedures outlined in this SAP and when none of the QC criteria that affect data usability is exceeded. When data validation is completed, the percent completeness value will be calculated by dividing the number of useable sample results by the total number of sample results planned for this investigation. The evaluation of completeness will help determine whether any limitations are associated with the decisions to be made based on the data collected.

Completeness will be evaluated by reviewing the tasks that contribute to the sampling event, such as chain-of-custody procedures, adherence to the Work Plan, and adherence to this Sampling and Analysis Plan. The QC parameters to be evaluated in determining completeness include: holding times, initial calibrations, continuing calibrations, surrogate recoveries, LCS recoveries, MS/MSD recoveries and RPDs, and laboratory duplicate RPDs. Completeness will be calculated based on the number of individual results (i.e, per analyte). The completeness goal for this project is 95%.

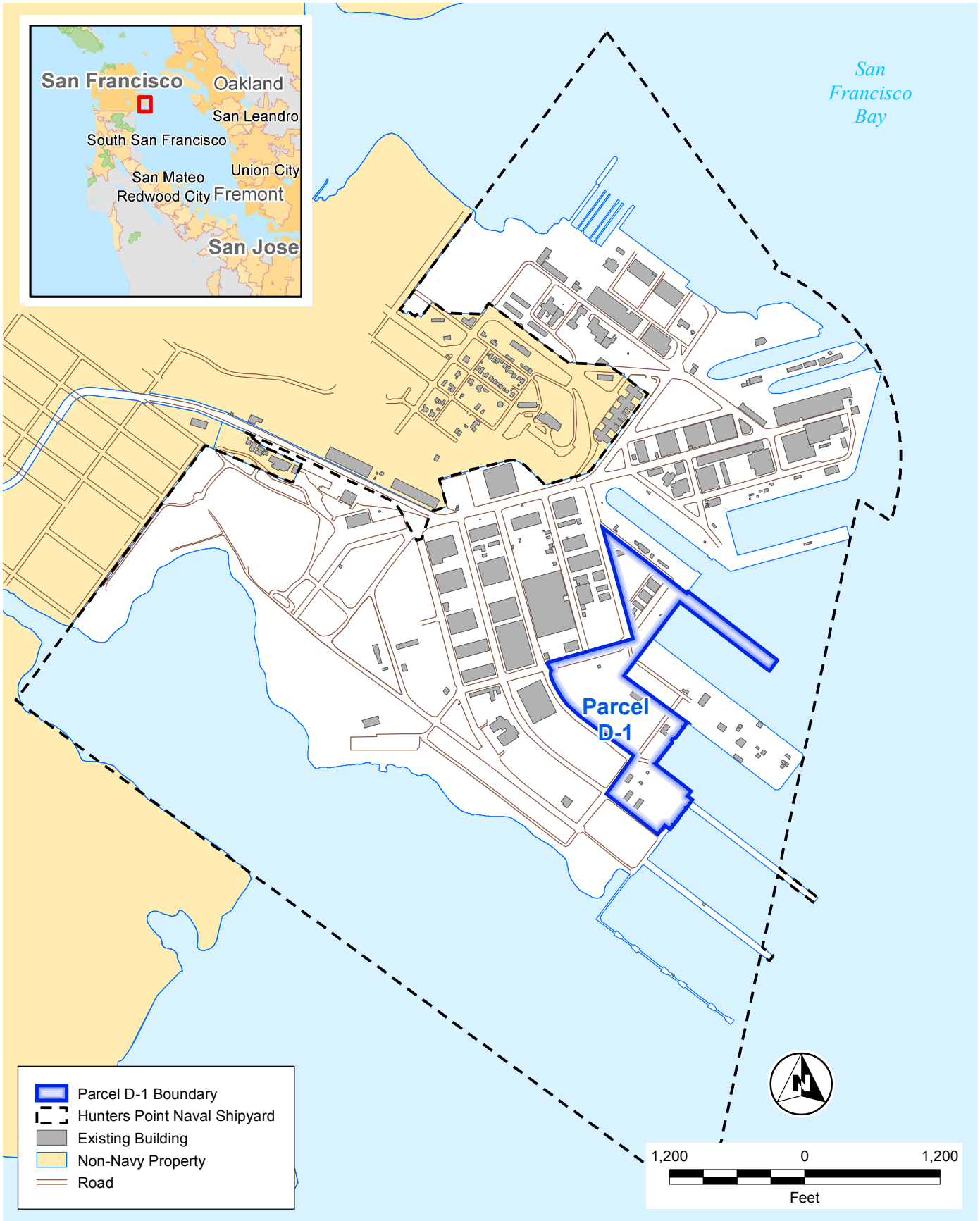
Comparability

Comparability expresses the confidence with which one data set can be compared with another. Comparability of data will be achieved by consistently following standard field and laboratory procedures and by using standard measurement units in reporting analytical data. Analytical methods selected for this field investigation are consistent with the methods used during previous investigations of this type. To ensure the comparability of laboratory data, the contract laboratory will use standard test methods and means of sample preservation; standard units, detection limits, calculation procedures, and reporting formats; and standard measures of accuracy and precision. Only laboratories that have

SAP Worksheet #37 -- Usability Assessment (Continued)

been approved by the DoD ELAP will perform chemical analyses of environmental samples to produce definitive data in support of this CTO.

SAP Figures



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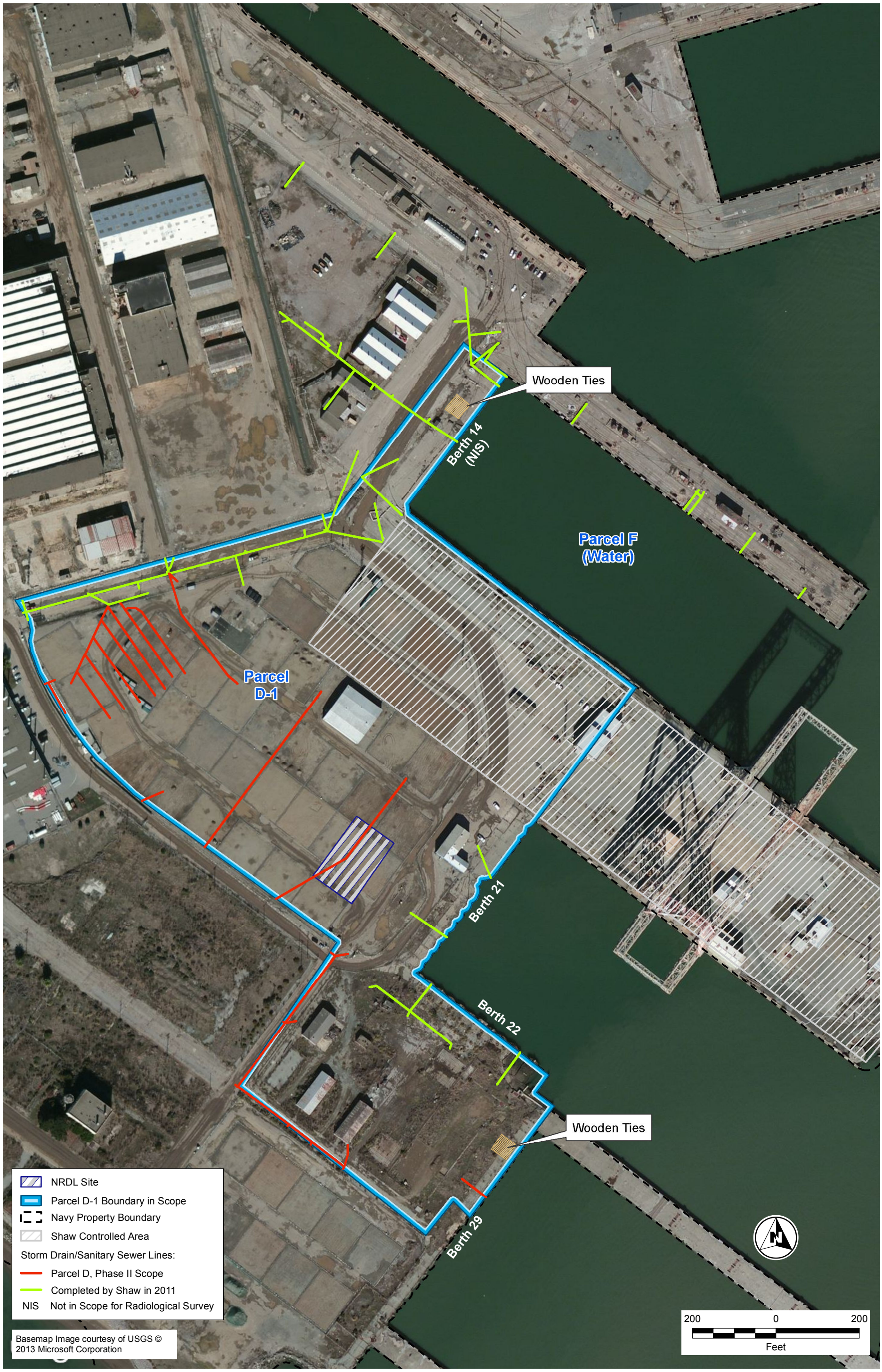
ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Parcel D-1 Vicinity Map



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ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2
Removal Areas within
Parcel D-1, Phase II

SAP Appendix A: ITSI Gilbane Standard Operating Procedures

ITSI GILBANE RADIATION SAFETY OPERATING PROCEDURE

Title: Radiation Safety Instrumentation

Identifier: CO-ITSI-RSOP-03.01

Approved By:

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April 17, 2013
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April 17, 2013
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Revision History:

Version	Changes	Affects Section/Pages	Effective date
1	Entire document revision	All	12 April 2013

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ATTACHMENTS

ATTACHMENT A: Minimum Detectable Activity and Decision Levels
ATTACHMENT B: Master Scalar Setup
ATTACHMENT C: Scalar Daily QC Response Check
ATTACHMENT D: Ratemeter QC Daily Response Check

1.0 PURPOSE

This instruction provides guidance to ITSI Gilbane personnel and their subcontractors on set-up and operation of scaler and ratemeter instruments.

As used in this instruction, a survey instrument consists of a survey meter identified by a unique serial number paired with a specific radiation detector also identified by a unique serial number.

Deviation from this instruction may be required by project-specific requirements. Questions or conflicts regarding implementation are to be resolved by the Radiation Safety Officer (RSO) or designee.

2.0 SCOPE

The requirements for radiation safety instrumentation specified in this RSOP apply to all instrumentation and equipment used by ITSI Gilbane for the performance of radiological work.

3.0 ACRONYMS AND DEFINITIONS

Acronyms

cm2	square centimeter
mg	milligram
RSO	Radiation Safety Officer
RSOP	Radiation Safety Operating Procedure
RSOR	Radiation Safety Officer Representative
RST	Radiation Safety Technician
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission

Definitions

Check Source − A radioactive source, not necessarily calibrated, which is used to confirm the continuing satisfactory operation of an instrument.

Performance Test / Response Test − A test to evaluate an instrument against accepted criteria for continuing satisfactory operation.

Standard (instrument or source) − An instrument, source, or other system or device maintained and promulgated by the U.S. National Institute of Standards and Technology (NIST).

Acceptable Result − An acceptance range is typically determined by adding ± 20 percent or ± 2σ to the expected value.

Calibration Sticker – A label affixed to a properly calibrated instrument that indicates the date calibrated and the date through which the calibration is valid.

Check Log (Daily QC Response Test) – A form or series of forms which are used to document that an instrument was checked prior to usage in the field. Check logs can consist of multiple pages and must contain at least one page identifying the instrument. At least one page shall also specify the parameters (source, geometry, etc.) used for the daily check. Space shall be provided to document the daily tests in the log. The log should be designed so as to clearly associate the required verifications with the signature or initials of the individual performing the check and date of each check.

Instrument Efficiency – A measure of the response (counts) obtained with a particular instrument when exposed to a known fluence of radioactive particles. Instrument efficiency has units of counts per particle or counts per disintegration.

4.0 OVERVIEW

This procedure provides general requirements for radiation safety instrumentation.

5.0 RESPONSIBILITES

This section describes the responsibilities of ITSI Gilbane personnel and its subcontractors with respect to the procedures and requirements outlined in this RSOP.

5.1 RADIATION SAFETY TECHNICIAN

The Radiation Safety Technician (RST) is responsible for the following:

5.1.1 Sets up and operates radiation safety instrumentation in accordance with this procedure.

5.1.2 Ensures that each instrument is compliant with its calibration, performance testing, and physical condition requirements.

5.1.3 Verifies that all instruments used are appropriate for the type(s) of survey(s) being performed.

5.2 RST SUPERVISOR

5.2.1 The RST Supervisor (RSTS) is responsible for ensuring that all personnel assigned the task of operating radiation and contamination survey meters and instruments are familiar with this procedure and are adequately trained with the specific instrument being used to perform surveys. The RSTS is responsible for ensuring that a copy of this procedure is available at the job site. The RSTS will also be responsible for ensuring that RSTs are qualified by training and experience to perform the requirements of this procedure, notifying the RSO of any unsafe or unusual conditions observed during operation of the instrument, and implementation of this procedure. The RSTS is responsible for ensuring that RSTs implement and use this procedure. The RSTS will ensure that personnel under their cognizance observe proper precautions when using this procedure.

5.2.2 Provides a sufficient supply of radiation safety instruments within calibration and ready for use to meet the needs of the RSTs.

5.2.3 Ensures that instruments are maintained and repaired as needed.

5.2.4 Maintains calibration, performance test, and maintenance and repair records.

5.3 RADIATION SAFETY OFFICER OR REPRESENTATIVE

The RSO or RSO Representative is responsible for the following:

5.3.1 Ensures appropriate instruments are researched and available for the type of radiological monitoring required.

5.3.2 Procures the necessary instrumentation for each work site.

5.3.3 Ensures that adequate procedures are developed for each type of radiation safety instrument being used.

6.0 LIMITATIONS AND PRECAUTIONS

6.1.1 Set up instruments upon initial receipt and after calibration, repairs, or major maintenance are performed.

6.1.2 Use care to not damage detector Mylar window. Ensure that the thin Mylar or mica window and other sensitive parts of the instrument is protected from punctures during instrument set-up, operation, and storage.

6.1.3 Use only NIST-traceable calibration sources to perform instrument set-up.

6.1.4 If an instrument fails the checks in the daily quality control (QC) checks , or other inconsistencies are observed in its performance (e.g., unusually high or low background readings, source checks outside the acceptable range, etc.), remove the instrument from use and report the condition to the project/site RSO or designee.

6.1.5 Do not attempt to calibrate instruments. Instead, return them to the instrument supplier for repair or replacement.

6.1.6 Vendor instrument manuals and/or instrument operating procedures will be used for establishing conditions and limitations of operation.

6.1.7 When checking instruments, place the source in a jig or center it on the probe. During initial setup, move source to different locations and choose a location representative of the average. Use this location on future daily checks.

7.0 INSTRUCTIONS

7.1 INSTRUMENT SELECTION

7.1.1 Instruments shall be used (only) for those applications indicated as appropriate for the specific instrument and conditions in the tables below:

Typical Contamination Instruments			
Detector Type	*Description*	*Application*	*Additional Remarks*
Gas Proportional	<1mg/cm2 window (50 to 1000 cm^2 probe)	Direct contamination surveys (alpha/beta); Final Status Surveys	Requires a fill gas – good instrument sensitivity
Air Proportional	<1mg/cm2 window (approx 50 cm^2 probe)	Direct contamination surveys (alpha)	Requires no fill gas – good operational support instrument
Scintillation	ZnS(Ag) scintillator (50 to 100 cm^2 probe)	Direct contamination surveys (alpha/beta) Smear/Swipe counter	Has wider temperature range than air proportional
Geiger-Mueller	<2 mg/cm2 window (10 to 100 cm^2 probe)	Direct contamination surveys (beta) Smear/Swipe counter	

Typical Radiation Instruments			
Detector Type	*Description*	*Application*	*Additional Remarks*
Ion Chamber	Pressurized or non-pressurized	General area exposure rates	
Geiger-Mueller	Pencil Probe with shielded window	Contact surveys; Hotspot surveys; Beta radiation	Closed window: gamma/x-ray Open window: gamma/x-ray/beta
Scintillation	NaI(Tl) scintillator	Gamma spectroscopy	Has laboratory and field uses
Solid State	Germanium semiconductor	Gamma spectroscopy	Usually requires liquid nitrogen; has laboratory and field uses
BF3 Gas Proportional with polyethylene sphere	More commonly known as a rem-ball	Neutron radiation	Used for measuring boundaries

7.2 CALIBRATION OF INSTRUMENTS

7.2.1 Calibration of radiation monitoring, counting, and air sampling instruments shall be performed in accordance with using measuring and test equipment and National Institute of Standards and Technology (NIST) traceable sources.

7.2.2 Calibrations will be performed at an accredited calibration laboratory. The sources shall be of the type, energy, and geometry representative of the radiation to be measured.

7.2.3 Properly calibrated instruments shall be marked with a calibration sticker and include an accompanying calibration certificate.

7.2.4 Calibration shall be performed annually or on a schedule consistent with the manufacturer's recommendation or its use if more restrictive.

7.2.5 All instruments shall be calibrated prior to first use; following any repair, maintenance, or modifications that could affect calibration; and after failure of a response test requiring adjustments or repair that could affect calibration.

7.2.6 Off-site calibration of Radiation Safety instrumentation by an approved vendor is acceptable if calibration certification is supplied by the vendor and such calibration certification is reviewed by the RSO or designee for completeness and accuracy prior to use of the instrument. These instruments will be either rental or purchased with calibrations performed by outside approved vendors or the original manufacturer.

7.3 SCALER INSTRUMENT SET-UP

7.3.1 Scaler Set-up

7.3.1.1 Document the instrument set-up and operational parameters on the Scaler Instrument Set-Up Worksheet (see Attachment B). The Scaler Instrument Set-Up Worksheet may be manually completed or used in an Excel spreadsheet format.

7.3.1.2 Select a low background area to use for instrument set-up and daily response checks.

7.3.1.3 Identify the type of radiation(s) for which the instrument is being set up.

7.3.1.4 Record the following information, as applicable:

- Project name and/or number;
- Serial number and calibration date of the survey meter and detector, including high voltage (HV) setting;
- Name of technician performing the set-up;
- Location where the instrument set-up is being performed;
- Date of instrument set-up;
- Source certificate date, serial number, source or surface emission rate (particles/min), source radionuclide and its half-life;
- Background and source count times (use 1 minute unless otherwise directed);
- Detector area correction factor (detector active area divided by 100 cm^2);
- Scan observation interval (time the detector active area is over any given spot).

7.3.1.5 Inspect the instrument (see Section 8.3.10, Instrument Inspection).

7.3.1.6 Complete the remainder of the scaler instrument setup steps outlined below.

7.3.1.7 Once completed, sign and date the Scaler Instrument Set-Up Worksheet (Attachment B). Provide the Scaler Instrument Set-Up Worksheet to the project/site RSO or designee for review to ensure instrument set-up complies with work plan requirements and instrument MDCs meet project needs.

7.3.2 Scaler Background Response

Perform a set of background counts for each type of radiation for which the instrument will be used to detect.

7.3.2.1 Ensure any radiation sources are far enough away to not influence the instrument response.

7.3.2.2 For multi-channel meters, select the desired channel (alpha or beta).

7.3.2.3 Set the meter pre-set timer to the selected background count time. Use 1 minute, unless otherwise directed.

7.3.2.4 Position the detector in the source jig (or reproducible geometry) used for instrument set-up. Do not use the check source.

7.3.2.5 Allow the instrument reading to stabilize for several seconds.

7.3.2.6 Obtain and record the count (x). Repeat 20 times (n = 20).

7.3.2.7 Sum the 20 counts. Divide the total by 20 to obtain the average counts ($\bar{x}$).

7.3.2.8 Subtract the average counts ($\bar{x}$) from each count (x) and record the difference ($x - \bar{x}$) on the worksheet. Repeat for each of the background counts.

7.3.2.9 Calculate the standard deviation using the following equation:

$$s = \sqrt{\frac{\Sigma(x - \bar{x})^2}{n - 1}}$$

7.3.3 If a background count time other than 1 minute was used, divide the average counts ($\bar{x}$) and the standard deviation (s) by the count time to obtain units of counts per minute (cpm). Record the values on the worksheet.

7.3.4 Scaler Source Response

Perform a set of source counts for each type of radiation for which the instrument will be used to detect. Use a check source that emits the same type of radiation (alpha, beta, and/or gamma) and produces a similar instrument response as the radiation being measured.

7.3.4.1 For multi-channel meters, select the desired channel (alpha or beta).

7.3.4.2 Set the meter pre-set timer to the selected source count time. Use 1 minute, unless otherwise directed.

7.3.4.3 Place the check source beneath the face of the detector. Use a source jig, if available, or other source-detector alignment that can be easily repeated.

7.3.4.4 Allow the instrument reading to stabilize for several seconds.

7.3.4.5 Obtain and record the count (x). Repeat 20 times (n = 20). Remove and replace the check source between each count.

7.3.4.6 Sum the 20 counts. Divide the total by 20 to obtain the average counts ($\bar{x}$).

7.3.4.7 Subtract the average counts ($\bar{x}$) from each count (x) and record the difference ($x - \bar{x}$) on the worksheet. Repeat for each of the 20 source counts.

7.3.4.8 Calculate the standard deviation using the following equation:

$$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$$

7.3.4.9 If a source count time other than 1 minute was used, divide the average counts ($\bar{x}$) and the standard deviation (s) by the count time to obtain units of cpm. Record the values on the worksheet.

7.3.5 Chi-Squared Test

Perform a chi-squared test for each type of radiation for which the instrument will be used to detect.

7.3.5.1 Select the source count data set to be used.

7.3.5.2 Square the difference ($x - \bar{x}$) calculated in the preceding step for each count. Record the value. Repeat for each of the 20 source counts.

7.3.5.3 Calculate the chi-squared value (χ^2) using the following formula:

$$\chi^2 = \frac{\Sigma(x-\bar{x})^2}{\bar{x}}$$

7.3.5.4 Confirm the chi-square value (χ^2) falls within the acceptable range of 8.91 to 32.85. If the chi-squared value falls outside this range, notify the project/site RSO or designee for further instructions. (Note: the acceptable range represents a two-tailed distribution at the 95% confidence interval, assuming n-1 degrees of freedom.)

7.3.6 Scaler Acceptable Range

Calculate the acceptable range for background and instrument source response for each type of radiation for which the instrument will be used to detect.

7.3.6.1 Subtract two times the standard deviation (s) from the average ($\bar{x}$). Record the result as the lower bound of the acceptance range for instrument response.

7.3.6.2 Add two times the standard deviation (s) to the average ($\bar{x}$). Record the result as the upper bound of the acceptance range for instrument response.

7.3.7 Scaler Total Efficiency

Calculate the total efficiency for each type of radiation (alpha and/or beta) for which the instrument will be used to detect. This step does not apply to gamma radiation.

7.3.7.1 Divide the average counts ($\bar{x}$), in cpm, by the surface emission rate, in particles/min, of the check source. Record the value as the instrument efficiency (E_i).

7.3.7.2 Multiply the instrument efficiency (E_i) by the surface efficiency (E_s) to obtain the total efficiency (E_T). Unless otherwise directed, use 0.25 as the alpha surface efficiency and 0.5 as the beta surface efficiency (ISO 7503-1, 1988).

$$E_T = E_i + E_s$$

7.3.7.3 Record the total efficiency (E_T) on the worksheet.

7.3.8 Scaler Static MDC

Calculate an a priori static MDC for each type of radiation (alpha and/or beta) for which the instrument will be used to detect. Use the following equations unless otherwise directed. This step does not apply to gamma radiation.

7.3.8.1 Where the background and sample (or field) measurements have the same count time, calculate the MDC as follows (NUREG-1507, Equation 3-10):

$$MDC_{Static} = \frac{3 + 4.65\sqrt{R_B \times T_S}}{T_S \times E_T \times ACF}$$

where:

MDC = minimum detectable concentration (dpm)

R_B = background count rate (cpm)

T_S = sample (or field) count time (min)

E_T = total efficiency (cnts/dis)

ACF = detector area correction factor (unitless)

where the background and sample (or field) measurements have different count times, calculate the MDC as (NUREG-1507, Equation 3-11):

$$MDC_{Static} = \frac{3 + 3.29\sqrt{R_B \times T_S(1 + \frac{T_S}{T_B})}}{T_S \times E_T \times ACF}$$

Where, in addition to the variables defined above:

T_B = background count time (min)

7.3.8.2 Record the static MDC on the worksheet.

7.3.9 Scaler Scan MDC

Calculate an a priori scan MDC for beta/gamma scanning. Use the following equation unless otherwise directed. This step does not apply to alpha or gross gamma scanning.

7.3.9.1 Calculate the scan MDC as follows (NUREG-1507, Equation 6-9):

$$MDC_{Scan} = \frac{1.38\sqrt{R_B \times T_S}}{\sqrt{p} \times T_S \times E_T \times ACF}$$

where, in addition to the variables defined earlier:

T_S = time interval of observation while detector passes over sample (min)

p = surveyor efficiency (0.5; NUREG-1575, Section 6.7.2.1)

7.3.9.2 Record the scan MDC on the worksheet.

7.3.10 Instrument Inspection

Inspect the instrument daily prior to use.

7.3.10.1 Verify the survey meter and detector each have a current calibration label. Do not use instruments with expired calibrations or with no calibration sticker.

7.3.10.2 Inspect the survey meter and detector for physical damage that could affect performance.

7.3.10.3 Turn the survey meter on.

7.3.10.4 Perform a battery check. If the needle fails to fall within the "Bat Test" check band, replace the batteries.

7.3.10.5 Verify the high voltage (HV), as applicable, setting on the instrument matches the instrument calibration value.

7.3.10.6 Check scintillation detectors for light leaks by pointing the Mylar window of the detector toward a light source and observing no change in meter indication.

7.3.11 Daily Response Check

Perform a response check of the instrument daily prior to use for each type of radiation for which the instrument will be used to detect. Perform the response check at the same location in the same source-detector geometry used at instrument set-up. See example form in Attachment C, Scaler Daily Response Check Sheet.

7.3.11.1 Ensure any radiation sources are far enough away to not influence the instrument response.

7.3.11.2 For multi-channel meters, select the desired channel (alpha or beta).

7.3.11.3 Set the meter pre-set timer to the selected background/source count time.

7.3.11.4 Obtain and record the background count.

7.3.11.5 Place the check source beneath the face of the detector. Use a source jig, if available.

7.3.11.6 Allow instrument reading to stabilize for several seconds.

7.3.11.7 Obtain and record the source count.

7.3.11.8 Compare the background and source count readings to the acceptable range of instrument response. If either reading falls outside the acceptable range, re-perform the response check. If either reading falls outside the acceptable range again, remove the instrument from service and notify the project/site RSO or designee.

7.3.11.9 Document the acceptability of the instrument for use. Update trending/control chart, if used.

7.3.12 Scaler Survey Technique

Use scaler instruments to provide quantitative measurements of radioactivity at fixed point locations, i.e., static measurements. Scan measurements are qualitative in nature and are not performed with a scaler instrument, unless it is in ratemeter mode.

7.3.12.1 Exercise care to avoid instrument contamination when performing measurements of surfaces or objects with known or suspected removable contamination.

7.3.12.2 Exercise care to prevent damage to the Mylar window on detectors so equipped.

7.3.12.3 Place the detector over the area to be measured. For alpha measurements, hold the detector face within 0.5 cm (1/4 in) of the surface. For beta measurements, hold the detector face within 1 cm (1/2 in) of the surface.

7.3.12.4 Allow the instrument reading to stabilize for several seconds.

7.3.12.5 Obtain and record the count(s).

7.3.13 Interpretation of Results

Convert the scaler read-out (gross counts) as follows:

7.3.13.1 To convert the read-out to net count rate (cpm), divide the read-out (counts,) by the sample (or field) count time (min) and subtract the background average count rate (cpm).

7.3.13.2 To convert the read-out to alpha/beta surface radioactivity concentration (dpm/100 cm^2), multiply the net count rate (cpm) by the detector area correction factor (unitless) and divide by the total efficiency (cnts/dis). The detector area correction factor adjusts units to 'per 100 cm^2.'

7.3.13.3 To obtain radiation levels (µR/hr), divide the net count rate (cpm) by the detector sensitivity (cpm/µR/hr). The detector sensitivity is obtained from the instrument manufacturer or modeled based on sample (or field) measurement geometry and source radionuclide(s). Consult the RSO or designee.

7.3.13.4 Ensure that each instrument being used:

- is appropriate for the types, levels, and energies of the radiations encountered and the existing environmental conditions;
- is within calibration;
- physical condition is acceptable.
- Batteries are checked

7.4 RATEMETER SETUP

7.4.1 Instrument Set-Up

Document the instrument set-up and operational parameters on the QC Daily Response Check Sheet (see Attachment D). The worksheet may be manually completed or used in an Excel spreadsheet format.

7.4.1.1 Select a low background area to use for instrument set-up and daily response checks.

7.4.1.2 Record the following information, as applicable:

- Project name and/or number
- Serial number and calibration date of the survey meter and detector
- High voltage (HV) setting (if applicable)
- Name of technician performing the set-up
- Location where the instrument set-up is being performed
- Date of instrument set-up
- Source certificate date, serial number, source or surface emission rate (particles/min), source radionuclide and its half-life

7.4.1.3 Inspect the instrument (see Section 8.2.10, Instrument Inspection).

7.4.1.4 Complete the remainder of the scaler instrument setup steps outlined below.Once completed, sign and date the Rate Meter QC Daily Response Check Sheet (Attachment D). Provide the Daily Response Check Sheet to the RSO or designee for review to ensure instrument set-up complies with work plan requirements.

7.4.2 Background Response

Perform a set of five (5) background readings.

7.4.2.1 Ensure any radiation sources are far enough away to not influence the instrument response.

7.4.2.2 Position the rotary switch to the lowest range scale.

7.4.2.3 Position the detector in the source jig (or reproducible geometry) used for instrument set-up. Do not use the check source.

7.4.2.4 Allow the instrument reading to stabilize for several seconds. Record the background reading. Repeat five (5) times.

7.4.2.5 Sum the background readings. Divide the total by the number of readings five (5) to obtain the average.

7.4.2.6 Record the average background reading on the Daily Response Check Sheet.

7.4.3 Source Response

Perform a set of five (5) source readings. Use a check source that emits the same type of radiation (alpha, beta, and/or gamma) and produces a similar instrument response as the radiation to be measured.

7.4.3.1 Place the check source beneath the face of the detector. Position the detector in the source jig (or easily reproducible source-detector geometry) used for instrument set-up.

7.4.3.2 Position the rotary switch to the appropriate range scale (needle indication near middle of range).

7.4.3.3 Allow the instrument reading to stabilize for several seconds.

7.4.3.4 Obtain and record the reading. Repeat five (5) times. Remove and replace the check source between each reading.

7.4.3.5 Sum the five (5) readings. Divide the total by the number readings five (5) to obtain the average reading.

7.4.3.6 Record the average source reading on the Daily Response Check Sheet.

7.4.4 Acceptable Range

Calculate the acceptable range (± 20%) for instrument background and source response.

7.4.4.1 Multiply the average reading by 0.8. Record the result as the lower bound of the acceptance range for instrument response.

7.4.4.2 Multiply the average reading by 1.2. Record the result as the upper bound of the acceptance range for instrument response.

7.4.4.3 Record the acceptable range values on the Ratemeter QC Daily Response Check Sheet (Attachment D).

7.4.5 Instrument Inspection

Inspect the instrument daily prior to use.

7.4.5.1 Verify the survey meter and detector (if separate from meter) each have a current calibration label. Do not use instruments with expired calibrations or with no calibration sticker.

7.4.5.2 Inspect the survey meter and detector for physical damage that could affect performance.

7.4.5.3 Turn the survey meter on.

7.4.5.4 Perform a battery check. Replace the batteries if the needle does not fall within the "Bat Test" check band.

7.4.5.5 Verify the HV setting on the instrument matches the instrument calibration value (if applicable).

7.4.5.6 Check scintillation detectors for light leaks by pointing the Mylar window of the detector toward a light source and observing no change in meter indication.

7.4.5.7 Check gas-flow proportional detectors for leaks.

7.4.5.8 Position the meter fast/slow ("F/S") response switch to slow ("S").

7.4.6 Daily QC Response Check

Perform a response check of the instrument daily prior to use. Perform response check at the same location in the same source-detector geometry used at instrument set-up.

7.4.6.1 Ensure any radiation sources are far enough away to not influence the instrument response.

7.4.6.2 Position the rotary switch to the lowest range scale.

7.4.6.3 Position the detector in the source jig (or reproducible geometry) used for instrument set-up. Do not use the source.

7.4.6.4 Allow instrument reading to stabilize for several seconds.

7.4.6.5 Obtain and record the background reading.

7.4.6.6 Place the check source beneath the face of the detector. Position the detector in the source jig (or reproducible geometry) used for instrument set-up.

7.4.6.7 Allow instrument reading to stabilize for several seconds.

7.4.6.8 Obtain and record the source reading.

7.4.6.9 Compare the background and source readings to the acceptable range of instrument response. If either reading falls outside the acceptable range, re-perform the response check. If either reading falls outside the acceptable range again, remove the instrument from service and notify the project/site RSO or designee.

7.4.6.10 Document the acceptability of the instrument for use on the Ratemeter Daily QC Response Check (Attachment D).

7.4.7 Survey Technique

Use ratemeter instruments to provide qualitative measurements of radioactivity, e.g., scan measurements, general area radiation levels. Scan measurements are qualitative in nature and are not performed with a scaler instrument, unless it is in ratemeter mode.

7.4.7.1 Exercise care to avoid instrument contamination when performing measurements of surfaces or objects with known or suspected removable contamination.

7.4.7.2 Exercise care to prevent damage to the Mylar window on detectors so equipped.

7.4.7.3 Place the detector over the area to be measured. For alpha measurements, hold the detector face within 0.5 cm (1/4 in) of the surface. For beta measurements, hold the detector face within 1 cm (1/2 in) of the surface. For gamma measurements, hold the detector within 3 cm (1 inch) for contact measurements, within 30 cm (12 inches) for postings, and at 1 m (3 ft) for general area readings.

7.4.7.4 For fixed point measurements, allow the instrument reading to stabilize for several seconds before observing and recording the read-out.

7.4.7.5 For scan measurements, turn up the audio volume and move the instrument slowly over the surface. Pay particular attention to areas where radioactivity could concentrate, such as drainage ditches, floor cracks, and wall/floor joints. Observe meter indication and listen for increases in audible clicks. Note that the instrument's audible response is faster than the analog display.

7.5 INSTRUMENT INVENTORY AND CONTROL

7.5.1 A sufficient inventory and variety of operable and calibrated portable, semi-portable, and fixed radiological instrumentation shall be established and maintained to satisfy the following considerations:

- Effective measurement of radiation exposure and control of radioactive material with equipment appropriate to enable the assessment of gamma, beta, alpha, and neutron radiation at the energies and intensities anticipated.
- Frequency and types of surveys or measurements required to support normal and anticipated activities.
- Allowance for repair and calibration requirements.
- Minimize delays in personnel access and egress from radiological areas.

7.5.2 Equipment shall be identified and tracked. As a minimum, this inventory should provide a distinct identifying number (or the vendor number), the most recent calibration date, the next calibration due date, and the location of the instrument (out for repair, ready to issue, etc.).

8.0 TRAINING

Personnel implementing and performing the activities described in this SOP shall be trained in advance on each instrument they will use.

9.0 REQUIRED RECORDS

The records generated by this procedure are:

- Instrument Calibration Certifcations
- Radiation Check Source Data
- Daily QC Response Checks
- Instrument Setup Forms

All records will be maintained in accordance with the ITSI Gilbane Records Retention Procedure, 2008.

10.0 REFERENCES

U.S. Nuclear Regulatory Commission (NRC), 1998, NUREG-1507**,** *Minimum Detectable Concentrations with Typical Radiation Survey Instruments for Various Contaminants and Field Conditions.*

NRC, 2000, NUREG-1575, *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), Revision 1.

International Standards Organization (ISO) 7503-1, 1988 Evaluation of surface contamination − Part 1: Beta-emitters (maximum beta energy greater than 0,15 MeV) and alpha-emitters

ATTACHMENT A: MINIMUM DETECTABLE ACTIVITY AND DECISION LEVELS

Stationary Counting Instruments (Contamination)

For contamination detection instruments, in a stationary mode (e.g., Eberline BC-4, SAC-4, NE Electra, etc.), use the following equation to determine the minimum detectable concentration:

$$MDC = \frac{3 + 3.29\sqrt{R_b \times t_g\left[1 + \left(\frac{t_g}{t_b}\right)\right]}}{ef \times ft_g \times K}$$

Where: MDC = minimum detectable concentration

R_b = background count rate (cpm)

t_g = gross count time (minutes)

t_b = background count time (minutes)

eff = efficiency (counts/disintegration)

K = correction and conversion factors

Contamination Scanning Instruments

For contamination detection instruments, in a scanning mode (e.g., NE Electra, etc.), use the following equation to determine the minimum detectable concentration:

For Alpha Activity, using an instrument with a near-zero (BKG < 3 cpm) background count rate, the probability of observing a single count is determined by:

$$P(n \geq 1) = 1 \times e^{-\frac{GEd}{60V}}$$

Where: P(n ≥ 1) = probability of observing a single count

G = contamination activity, release limit (dpm)

E = detector efficiency (4π)

d = width of detector in direction of scan (cm)

V = velocity, scanning speed (cm/s)

When a count is detected, then stationary measurements are performed, and the MDC for stationary counting instruments above applies.

The time that a survey should stop and wait until the probability of getting another count is at least 90% is calculated as follows:

$$t = \frac{13{,}800}{CAE}$$

where: t = time period for static count (s)

C = release criteria (dpm/100 cm2)

A = physical probe area (cm2)

E = detector efficiency (4π)

For Beta Activity: Beta Scan $MDC = \frac{MDCR}{\sqrt{E_{hf}} \times E \times \left(\frac{A}{100}\right) \times C}$

Where: MDCR = minimum detectable count rate (cpm)

E_{hf} = human factors efficiency (default value = 0.65)

E = efficiency

A = probe area

C = other conversion factors

The MDCR (cpm) is defined as: $MDCR = d' \times \sqrt{b_i} \times \left(\frac{60}{i}\right)$

Where:

d' = detectability value, assumed to be 2.65 for a correct detection rate of 90% and a false positive probability of 10%

b_i = background count in counting interval i

i = count interval where the probe is near the source

Dose Rate Instruments

For dose rate instruments (e.g., Eberline RO-20, Victoreen 450B, Eberline ESP-1, etc.), the Minimum Detectable Dose Rate (MDDR) is defined as 20% of the top end of lowest range.

ATTACHMENT B: SCALER SETUP

Page 1 of 2

SCALER INITIAL SETUP SHEET

Project Name / No: _____ **Setup Date:** _____

Instrument / SN: _____ **Cal. Due:** _____ **Source Cert. Date:** _____

Probe Type / SN: _____ **Cal. Due:** _____ **Source SN:** _____

Technician: _____ **Surface Emission Rate:** _____ particles/min

Location: _____ **Source Type:** _____

HV Check/Setting: _____

1. Total Background Counts observed:

Chi-squared Calculations

Background Count Time: _____ minutes

Source/Sample Count Time: _____ minutes

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Average Counts = _____ counts

Average Count Rate = _____ cpm

Standard Deviation = _____ counts

Sum of Squares = _____

Area Correction Factor (ACF) = _____ $100cm^2$

Scan Observation Interval = _____ sec

2. Total Source Counts observed:

Chi-squared Calculations

1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

Average Counts = _____ counts

Average Count Rate = _____ cpm

Standard Deviation = _____ counts

Sum of the Squares = _____

Chi-Squared Statistic = _____

Acceptable Ranges for Chi-x^2

8.91 to 32.85

(assumes n-1 degrees of freedom; two-tailed distribution @ 95% confidence level)

Instrument Efficiency (E_i) = _____ cpm/dpm

Surface Efficiency (E_s) = _____ cpm/dpm

Net source cts = _____ counts **Total Efficiency (E_T) =** _____ cpm/dpm

Std. Dev. Net = _____ counts

Net Ct. Rate = _____ cpm **MDCR =** _____ cpm (@ 95% confidence level)

MDA Scan= **dpm/100 cm^2**

MDA Static= **dpm/100 cm^2**

Bkg count range _____ to _____ (2 sigma)

Source count range _____ to _____ (2 sigma)

_____ _____

Technical Reviewer Date

ATTACHMENT B: SCALER SETUP

Page 2 of 2

Source Activity Correction Worksheet

Isotope	0.00		
ID #	0	Equation:	$Act_T = Act_0 \times e^{-((.693/t)T)}$
Initial Activity (dpm)	0		
Ref. Date	0-Jan-00		
Half-life (years)	2.13E+05	7.77E+07 days (Half-life)	
Current Date	0-Jan-00	0.00 days (t)	

Corrected Surface Emission Rate = **0** ***particles/min***

Equations

Chi-squared Calculations $\frac{\chi 2=\Sigma(n-n)^{\wedge}2}{n}$

s_i = #DIV/0! counts

Minimum Detectable Count Rate (MDCR) $MDCR = s_i \times 60/i$

$s_i = d' \times SQRT(b_i)$

Scan Minimum Detectable Concentration (Scan MDC) $Scan\ MDC = MDCR/(SQRT(p) \times E_T \times ACF)$

Static MDC

$$MDC = \frac{3 + 3.29(R_g t_s[1 + t_s/t_b])^{1/2}}{(t_s)(E)(A)}$$

d' = 1.38 (source: MARSSIM Table 6.5, pg. 6-40; assumes correct decision rate of 95%)
i = scan observation interval (sec)
b_i = number of background counts in scan observation interval *i*
s_i = minimum detectable number of net source counts in scan observation interval *i*
p = surveyor efficiency (source: MARSSIM Section 6.7.2.1, pg. 6-42)

Review:

Technical Reviewer Date

ATTACHMENT C SCALER DAILY QC RESPONSE CHECK

Instrument Daily **Source Check** Corrected Activity (in dpm)

Instrument #: _____ Setup Date: _____ High Voltage: _____
Cal. Date: _____ Source ID: _____ Total Efficiency: _____
Probe #: _____ Project/#: _____ MDA (in dpm): _____

Ranges Background: _____ counts to _____ counts using ± 2 Sigma Count Time (min):
Source: _____ counts to _____ counts using ± 2 Sigma

Date/ Time	Source Counts	Background Counts	HV	BAT	SPKR	Sat/ Unsat	Pre and Post checks	Technician Initials	Additional Comments

Completed By: _____ Date _____
Reviewed By: _____ Date _____

ATTACHMENT D: RATEMETER QC DAILY RESPONSE CHECK

Instrument Daily _____ **Source Check** _____ Corrected Activity (in dpm)

Instrument #: _____ Setup Date: _____
Cal. Date: _____ Source ID: _____
Probe #: _____ Project/#: _____

Acceptable Ranges: Background: _____ counts to _____ counts using ± 20% High Voltage (if applicable): _____
Source: _____ counts to _____ counts using ± 20%

Date/ Time	Source Counts	Background Counts	HV	BAT	SPKR	Sat/ Unsat	Pre and Post checks	Technician Initials	Additional Comments

Completed By: _____ Date _____
Reviewed By: _____ Date _____

ITSI GILBANE RADIATION SAFETY OPERATING PROCEDURE

Title: Radiological Monitoring

Identifier: CO-ITSI-RSOP-05.01

Approved By:

Mike Salmon
Environmental Sr. Vice President

April 18, 2013
Date

Jay Pride
Corporate Radiation Safety Officer

April 18, 2013
Date

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Date

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ATTACHMENT C: Contamination Survey Form
ATTACHMENT D: Survey Drawing
ATTACHMENT E: Survey Log

1.0 PURPOSE

This Radiation Safety Operating Procedure (RSOP) describes ITSI Gilbane policies and procedures for appropriate and consistent monitoring for purposes of:

- Demonstrating compliance,
- Documenting site conditions,
- Detecting changes in radiological conditions,
- Detecting the buildup of radiation contamination,
- Verifying the effectiveness of controls, and
- Identifying potential sources of exposure.

Adherence to this procedure will provide reasonable assurance that the surveys performed have reproducible results.

2.0 SCOPE

This RSOP provides guidance on survey techniques, and instructions for monitoring personnel with hand-held instruments and for surveying work areas.

3.0 ACRONYMS AND DEFINITIONS

The units of activity for the purpose of this procedure are disintegrations per minute (dpm) for loose and fixed surface contamination, picocuries per gram (pCi/g) for soil, or microcuries per milliliter (uCi/mL) for airborne contamination.

Acronyms

ALARA	As low as reasonably achievable
cpm	Counts per minute
LAS	Large area swipe
NaI	Sodium iodide
RSO	Radiation Safety Officer
RSOP	Radiation Safety Operating Procedure
RST	Radiation Safety Technician
RSTS	Radiation Safety Technician Supervisor
TSP	Task-specific plan

Definitions

Contamination − Deposition of radioactive material in any place it is not desired. Contamination may be due to the presence of alpha particles, beta particles, or gamma ray-emitting radionuclides.

Controlled Area − Any area to which access is controlled in order to protect individuals from exposure to radiation and radioactive materials and/or to prevent the release of radioactive materials to the uncontrolled areas.

Exposure Rate − The amount of radiation (exposure) delivered at a given point per unit of time. Typical units are microroentgen per hour (uR/hr).

Fixed Contamination − Radioactive contamination that is not readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe or maslin.

Minimum Detectable Activity (MDA) − For purposes of this procedure, MDA for removable radioactive contamination is defined as the smallest amount of sample activity that will yield a net count with a 95 percent confidence level based upon the background count rate of the laboratory counting instrument used.

Radiation Work Permit (RWP) − A document generated in accordance with CO-ITSI-RSOP-01.01 to provide:

- A description and scope of the work to be performed.
- The existing radiological conditions in the work area.
- The radiological limits of applicability for the RWP (if radiation levels exceed limits, then a new RWP or a modification to the existing RWP must be made).
- The protective measures to be employed during the work to protect the worker(s).
- The period of time the RWP is valid.
- Special instructions to workers and RSTs during the course of work.
- The proper approvals required to begin work.

Removable Surface Contamination − Radioactive contamination that is readily removed from a surface by applying light to moderate pressure when wiping with a paper or cloth disk swipe, or Maslin.

Uncontrolled Area − An uncontrolled area is any area where access is not controlled for radiological purposes.

4.0 OVERVIEW

This RSOP describes ITSI Gilbane policies and procedures for ensuring appropriate and consistent monitoring when:

- An RWP is needed to perform an approved job,
- A condition exists where radiological data are needed,
- An investigation is required due to abnormal conditions or indications,
- An ongoing job requires a survey to update radiological postings and/or an RWP,
- As required, to support Task Specific Plans or Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM; NUREG-1575) based survey activities.

5.0 RESPONSIBILITES

The following subsections outline the responsibilities of ITSI Gilbane personnel for monitoring-related activities.

5.1 RADIATION SAFETY TECHNICIAN

5.1.1 The Radiological Safety Technician (RST) shall be responsible for the performance of the requirements of this procedure and documentation of work performed.

5.1.2 The RST shall ensure compliance with this RSOP and other referenced procedures.

5.2 RST SUPERVISOR

5.2.1 The RST Supervisor (RSTS) shall be responsible for ensuring that personnel performing the tasks required by this procedure are properly trained.

5.2.2 The RSTS is responsible for ensuring that personnel conducting surveys are familiar with the requirements of this RSOP and have access to a copy of the Radiation Work Permit(s) (RWPs).

5.2.3 The RSTS can review the results of surveys in place of the Radiation Safety Officer (RSO) when necessary.

5.2.4 The RSTS shall be responsible for assisting in the assignment of personnel who will perform the tasks required by this procedure.

5.2.5 RSTSs are responsible for the control of radioactive material, for coverage of radiation workers, and for ensuring that personnel under their supervision/cognizance observe proper precautions.

5.2.6 The RSTS or RSO is responsible for reviewing survey documentation.

5.2.7 The RSTS shall ensure that the necessary instruments are available to the RST for conducting monitoring and survey activities.

5.3 RADIATION SAFETY OFFICER OR REPRESENTATIVE

5.3.1 The RSO or representative is responsible for the overall implementation of and compliance with the requirements of this RSOP during all project operations. The RSO shall conduct periodic reviews, via personal observation of personnel conducting radiation and contamination surveys, to ensure adherence to the requirements of this RSOP.

5.3.2 The RSO is responsible for the training of personnel working with radioactive materials.

5.3.3 The RSO shall ensure that personnel are adhering to the requirements of this RSOP. The RSO shall review and approve documentation generated in accordance with this RSOP, including the results of all surveys.

6.0 LIMITATIONS AND PRECAUTIONS

6.1.1 Naturally occurring radioactive gases (i.e., radon and thoron) have daughter products (progeny) that decay by alpha and beta emission and can be falsely interpreted as regulated radioactive material.

6.1.2 Material or property believed to be free of contamination may be recounted a minimum of twenty (20) minutes after the initial count to allow for decay of short-lived isotopes.

6.1.3 A decrease in alpha activity over 20 minutes, accompanied by increased beta activity, indicates the presence of these short-lived naturally occurring isotopes.

6.1.4 Recounting two to four hours after the initial count should allow for a majority of naturally occurring radioactive material to decay.

7.0 INSTRUCTIONS

7.1 GENERAL

7.1.1 Radiation surveys are performed to identify radiation areas, measure the exposure rate, and assess the intensity and shape of those areas to determine control requirements at the work site.

7.1.2 Contamination surveys are conducted to detect loose surface contamination and fixed contamination. Loose surface contamination normally is detected indirectly by a swipe sample or wipe performed on the item or surface of interest. Fixed contamination levels are measured directly.

7.1.3 Survey results, locations, and any unusual conditions shall be documented and described on a Survey Form and Survey Drawing, Attachments C and D, respectively.

7.2 OBJECTIVES

7.2.1 *Demonstrate compliance with the regulations*

7.2.1.1 All types of monitoring described previously help demonstrate regulatory compliance. To demonstrate compliance with the quantitative values that define regulatory controls, it is necessary to make quantitative measurements.

7.2.2 *Document radiological conditions*

7.2.2.1 Many types of monitoring are used to document radiological conditions. These include elements of a comprehensive workplace monitoring program (e.g., area monitoring, work monitoring, and workplace indicators) as well as routine monitoring.

7.2.3 *Detect changes in radiological conditions*

7.2.3.1 Once radiological conditions are evaluated and controls are established, it is important to detect when these conditions change. This is best accomplished through establishing a monitoring program and using qualitative techniques (such as large area swipe [LAS]) that allow the assessment of large areas frequently.

7.2.4 *Verify the effectiveness of engineered and administrative controls*

The reliance placed upon engineered controls (e.g., shielding) requires that the performance of engineered controls be monitored to determine their effectiveness.

7.2.4.1 When continuous monitoring of areas is implemented, regulatory guidance suggests that the survey frequency may be reduced given these redundant processes.

7.2.5 ***Identify and control potential sources of individual exposure***

7.2.5.1 All types of monitoring described previously help identify and control potential sources of individual exposure to radiation and/or radioactive material.

7.3 PLANNING AND PREREQUISITES

Instruments used to perform radiation and contamination surveys shall be operated in accordance with their operating procedures. Steps to be completed during the survey planning phase include the following:

7.3.1 Obtain and review any site-specific survey plans (such as a Task-specific Plan [TSP], work instruction, or time-critical removal action work plan) and previous surveys performed in the area.

7.3.2 Obtain appropriate survey instruments and prepare the instruments for use.

7.3.3 Obtain the necessary forms, swipes, and protective clothing that will be used during the survey.

7.3.4 Items of special consideration for implementing the survey plan shall be addressed consistent with the As Low As Reasonably Achievable (ALARA) policy contained in the ALARA Job Review, CO-ITSI-RSOP-02.01.

7.3.5 Prior to entering an area to perform a survey, each radiation detection instrument shall be checked in accordance with the guidelines in CO-ITSI-RSOP-03.01, Radiation Safety Instrumentation, for the following:

- Battery condition
- Obvious physical damage
- Current instrument calibration

7.3.6 If any of the above conditions in are unsatisfactory, the instrument shall be tagged out of service and not used. In addition each instrument shall be quantitatively response-checked daily prior to use.

7.4 TYPES OF SURVEYS

7.4.1 ***Total Surface Contamination Survey***

7.4.1.1 Total surface contamination includes both the fixed and the removable components; it must therefore be measured using a survey meter.

7.4.2 ***Scan Survey***

7.4.2.1 Scan surveys are used to detect total contamination. It is sometimes possible to find previously unknown contamination that remains fixed and is not detected by means of an LAS.

7.4.2.2 A scan survey for fixed contamination requires passing a portable instrument over the surface of the area being surveyed at a fixed, known scan speed and at a specified distance from the surface. Typically, the scan speed is 2 inches per second

(5 centimeters per second [cm/sec]) and the maximum distance is 0.25 in. (0.6 cm) for alpha contamination instruments, but this can vary depending on the instrument, probe configuration, probe direction of scan, and background radiation levels.

7.4.3 *Timed Count Survey*

7.4.3.1 A timed count, or a careful evaluation at a fixed location, is useful to quantify the amount of total (fixed plus removable) contamination present. When it is important to measure low levels of contamination or to obtain the best possible estimate of total contamination levels, a timed count using an instrument with a scalar mode should be performed.

7.4.4 *External Radiation Survey*

7.4.4.1 Evaluation of the external dose fields in the workplace is required to properly post areas and to maintain ALARA doses. Exposure rates can vary over time due to operations and decay of short-lived radionuclides.

7.4.5 *Dose Rate Survey*

7.4.5.1 Dose rates are measured real time with calibrated instruments. Dose rates are measured 30 cm from sources or surfaces when determining posting requirements. Measurements may also be made on contact or in the general work area (ambient measurements).

7.4.6 *Dose Measurement Survey*

7.4.6.1 Dose may be measured passively (retrospectively, as opposed to real time) to:

- measure chronic dose rates too low to measure with real time instruments (particularly true for neutrons because active measurements are not as sensitive);
- evaluate doses over long periods (quarterly or annually) when dose rates may vary (e.g. radiography, accelerator operations); and
- measure dose delivered in an hour due to pulsed radiation fields.

7.4.7 *Airborne Radioactivity Survey*

7.4.7.1 Airborne radioactivity typically is measured using workplace air monitoring and sampling described in ITSI Gilbane's Radiological Air Sampling Procedure (CO-ITSI-RSOP-04.01), primarily to detect the unanticipated release of radioactivity into an occupied workplace.

7.4.7.2 Areas with known airborne radioactivity concentrations are not routinely occupied and are only entered under the provisions of an RWP with RST support. Specific airborne radioactivity measurements and/or indications from existing monitoring and sampling are used to determine appropriate controls.

7.5 TYPES OF CONTAMINATION SURVEYS

7.5.1 *Monitoring Personnel for Contamination*

The following are general requirements for personnel monitoring.

7.5.2 *Personnel Exiting Contamination Areas, High Contamination Areas, Airborne Contamination Areas*

7.5.2.1 Radioactivity Areas, or Restricted Areas established for contamination control shall frisk for contamination. This does not apply to personnel exiting areas containing only radionuclides, such as tritium, that cannot be detected using hand-held or automatic frisking equipment. Personnel contamination monitoring also is required as directed by RSTs and/or as specified by RWP.

7.5.2.2 Personnel exiting a Restricted Area should, at a minimum, perform a hand and foot frisk. This frisk is optional if the Restricted Area exit is immediately adjacent to the location where the exiting worker already has performed a whole-body frisk. Personnel can self-frisk if trained.

7.5.2.3 Personal items, such as notebooks, papers and flashlights, shall be subject to the same frisking requirements as the person carrying them.

7.5.2.4 Where frisking cannot be performed due to high background radiation levels, personnel shall remove all protective equipment and clothing at the exit, proceed directly to the nearest designated monitoring station, and conduct a whole body frisk.

7.5.2.5 Personnel frisking shall be performed using instruments that meet the minimum detection requirements of Summary of Contamination Limits, Attachment A, and follow Guidelines for Personnel Monitoring With Hand-Held Survey Instrument, as provided in Attachment B.

7.5.2.6 The use of automated personnel contamination monitor(s) is encouraged.

7.5.2.7 Instructions for personnel frisking should be posted adjacent to personnel frisking instruments or monitors.

7.5.2.8 Individuals found with detectable contamination on their skin or personal clothing, other than noble gases or natural background radioactivity, should be decontaminated promptly under the direction of the RSO or RSOR.

7.5.3 *Monitoring Surfaces for Contamination*

7.5.3.1 Surveys are performed to locate contamination on surfaces. Swipes and direct readings should be taken in places where contamination is likely to accumulate.

7.5.3.2 Where surface contamination by both alpha and beta emitting radionuclides exists, the limits in Attachment A apply independently.

7.5.3.3 Contamination surveys are recorded on a Contamination Survey form (Attachment C)). Maps showing the location of the survey also should be provided (Attachment D).

7.5.3.4 Surveys shall be performed as specified in Technical Work Documents, RWPs, and this procedure and as directed by RST Supervisors.

7.6 STANDARD LARGE AREA SWIPE TECHNIQUE

7.6.1 The standard LAS is a qualitative and preferred technique for detecting changes in facility conditions, searching for possible contamination, or verifying that areas remain uncontaminated.

7.6.2 LASs are encouraged and should be used to supplement standard swipe techniques in areas generally assumed not to be contaminated, such as entrances to Restricted Areas. If an evaluation indicates than an area wiped is contaminated, a thorough contamination survey should be performed using a combination of swipes and LAS.

7.6.3 LASs typically are taken over an area greater than 1 square meter (m^2). Applications using LASs include Maslin mops and hand wipes. Normally, LASs are not quantified, and are used as a basis for determining if contamination is present. In some cases it may be appropriate to quantify the data with an appropriate technical basis review.

7.6.4 Scan each wipe with an appropriate instrument. Record the highest reading from each wipe in units of dpm/large area wipe on the survey form, making note of the surface area size and the location of the wipe, as applicable.

7.6.5 Scan the LAS with an appropriate field instrument (2360/43-89, or equivalent), in an area with a low background. Hold the detector within ½ inch of the swipe and move the detector over the swipe at a maximum rate of 1 inch per second. If any indication of an increased count rate is noted, pause to allow the meter reading to stabilize. If the swipe reading is indistinguishable from background, consider the surveyed surface to be free from contamination. If the LAS reading is greater, conduct further surveys to isolate the boundaries of the contamination. Dispose of used LAS media as radioactive waste.

7.7 STANDARD SWIPE TECHNIQUES

7.7.1 The swipe technique is used to document area radiological conditions and to release an item/area for unrestricted use. Work involving radioactive material usually requires pre-, during-, and post-job surveys that are documented to support the work activity and to assess radiological conditions.

7.7.2 Each swipe should be numbered (label or number swipes, as necessary, to identify each swipe) and its location recorded on a survey map (e.g., a Contamination Survey form, Attachment C).

7.7.3 If contamination is detected during a scan survey for fixed contamination, a survey for removable contamination should be performed to determine if the contamination is fixed and to quantify any removable contamination. The survey should be performed using a small piece of absorbent material, such as a standard paper smear. If no contamination above the guideline values for removable contamination is detected during the smear survey, the contamination is fixed, and the area should be posted appropriately. Using a dry filter, soft absorbent paper, or cloth, swipe approximately 100 cm^2 of surface area, using moderate pressure. Usually take a swipe approximately 65 cm (16 inches) long in an "S" shaped pattern (this assumes a swipe diameter of 1 inch). Exercise care on rough surfaces so as not to tear the swipes.

7.7.4 Using wet wipes may be appropriate in some situations, such as for improving surface efficiency, or for taking tritium swipes. Wet wipes will only be performed when specified in work documents or RWPs, or when specified by an RST. Exercise care on rough surfaces so as not to tear the swipes. Exercise care on wet surfaces so as not to degrade the swipes. Ensure that surfaces are not submerged in water and that cloth swipes or similar are used on wet/damp surfaces.

7.7.4.1 Swipes that become wet due to environmental conditions must be dried prior to counting for activity when counting for alpha or beta contamination.

7.7.4.2 Count the swipes in accordance with the instrumentation procedures, and record the survey results on the Survey Form and map (Attachments C and D).

7.7.4.3 Attach computer-generated counting activity reports to the survey form, if applicable.

7.7.4.4 If the contamination level is greater than the appropriate Table 1 value, and further analysis is required, retain the swipe(s). Place each swipe into a separate glassine envelope and label the envelope with the RST's name, the date and location of the sample, and the contamination level.

7.8 EXPOSURE SURVEYS

7.8.1 When entering posted or suspected high radiation areas, or unknown areas, the instrument range selector switch (if applicable) shall be selected to the highest range and moved down through the lower ranges until the meter indicates on scale.

7.8.2 Always survey a sufficient number of locations to determine average and maximum general area and contact radiation levels.

7.8.3 A Ludlum Model 19 or equivalent should be used for performing exposure rate surveys for gamma radiation. The instrument should be operated in accordance with the manufacturer-supplied operations manual and any applicable requirements from work-specific documents (i.e., work instructions or TSPs). Care should be taken to ensure that the instrument has been allowed to stabilize between individual measurements.

7.8.4 When performing general area exposure rate surveys, the RST should:

- Attempt to determine the source of radiation fields.
- Record the highest level as the general area exposure rate (record data on the swipe survey map).
- Perform contact exposure rate measurements with the detector within 1 inch of the surface to be surveyed.
- Perform surveys at approximately 1 meter (waist level) from the surface to establish posting requirements for the area.
- Verify the exposure rates of known hot spots.

7.9 DIRECT MEASUREMENT TECHNIQUES

7.9.1 Direct measurements normally are required in combination with swipes for determining area radiological conditions and for performing surveys for unrestricted release. The appropriate instrument is determined based on the radionuclide(s) of interest. The Radiation Safety Instrumentation Procedure (CO-ITSI-RSOP-03.01) provides a description of instruments appropriate for direct measurements.

7.9.2 Direct measurement involves taking stationary readings or scanning the items, structures, or areas being surveyed. The distance of the probe surface from the surface remains constant for either technique. The standard rule of thumb is ¼-inch distance when surveying for alpha contamination, and within ½ inch when surveying for beta contamination, with a 2-inch-per-second scan rate (when scanning). Other distances may

be appropriate based on Radiation Safety guidance, depending on the instrument being used and the purpose of the survey.

7.9.3 Stationary measurements usually are taken with an instrument that provides a digital readout and time of count. Instruments are normally set up to take 60-second counts; however, this may vary depending on specific project guidance. Count time may also be adjusted to meet MDA static requirements.

7.9.4 Scanning measurements are used to locate elevated areas of contamination. These instruments normally are equipped with an audible alarm feature to signal an increase in counts. When an increase in counts is discovered, pause the instrument over the suspect area and take a stationary count reading.

7.9.5 If the contamination discovered is abnormal or not expected for the surface being monitored, the surface shall be evaluated to determine if additional action is required, and the RSTS shall be notified.

7.9.6 The RST will record instrument readings on the survey form and drawing (Attachments C and D).

7.9.7 The RST will record instrument information for each survey, including the calibration due date, instrument efficiency, MDA, and background, on the survey form. (Attachment C).

7.10 REMOVABLE CONTAMINATION SURVEYS

7.10.1 *Removable Contamination Swipe*

The following guidance shall be used unless an approved site-specific survey/work instruction directs otherwise. Specific survey instructions will be prepared and given in work-specific documents (i.e., work instructions or TSPs) for radioisotopes requiring unusual sampling techniques, such as tritium (^{3}H).

7.10.2 *Swipe Surveys*

7.10.2.1 When surveying an area:

- Obtain swipes from sample points, which are representative of the average and maximum contamination levels in the area, as identified during preliminary surveys. These areas could include:
  - Areas of high traffic
  - On and under benches or tables
  - Beneath piping and components
  - On accessible wall surfaces
  - On piping and significant components
  - Near drains, sumps and low spots
- Swipe floor and component surfaces that display evidence of leakage of potentially contaminated water.
- Ensure contamination is not spread to clean areas when obtaining swipes.

7.10.2.2 When surveying equipment:

- Obtain swipes on large surfaces,
- Obtain swipes in cracks or crevices where contamination may have settled,
- Obtain swipes on openings to internal surfaces,
- Handle swipes in a manner that will prevent cross-contamination (such as by placing each swipe in a separate envelope).

7.10.3 *Counting Swipes*

Low-background gas proportional counters should be used whenever practical. Typically a Protean IPC 9025 and/or a Tennelec Series 5 XLB gas-flow proportional alpha/beta radiation counter will be employed to count swipes. As a backup to the gas-flow proportional counters a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS (Ag) scintillation probe (or equivalent) may be used.

- Count the swipes in accordance with the operating procedure for the instrument,
- Record swipe results in dpm/100 cm^2,
- Store/archive used swipes as radioactive material until end of project.

7.11 SURVEYS FOR FIXED ALPHA/BETA CONTAMINATION

7.11.1 *General*

7.11.1.1 Fixed contamination surveys are used to obtain indications of fixed contamination levels on surface areas, pieces of equipment, or tools for characterization and/or release surveys. Fixed contamination surveys also are performed to assess if residual contamination is present greater than the release criteria for the radionuclide(s) of concern.

7.11.1.2 A Ludlum Model 2360/43-68 or equivalent should be used for performing fixed contamination surveys for alpha and beta radiation.

7.11.2 *Scans*

7.11.2.1 When surveying for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less from the surface being surveyed. The movement rate of the detector probe should be 1 inch per second or slower.

7.11.2.2 When performing direct scan surveys of objects, surfaces, materials, equipment, etc., static measurements should be performed frequently to ensure the detection of residual activity.

7.11.2.3 Whenever practical, 100 percent of accessible areas being surveyed should be direct scan surveyed, unless the applicable work planning document indicates otherwise.

7.11.2.4 Scan ranges are documented as the range from the lowest measurement to the highest measurement observed.

7.11.3 *Static*

7.11.3.1 Count time for conducting static measurements will be dependent upon the isotope of concern and the MDA for the instrument being used.

7.11.3.2 Static measurements should be performed as required by a work specific document (i.e., TSP or work instruction) or frequently enough to ensure the detection of residual activity.

7.11.3.3 When taking a static measurement for fixed alpha/beta contamination, the probe should be held within 1/4 inch or less of the surface being surveyed.

7.11.3.4 Results should be reported in units of net counts per minute (cpm) above background or dpm/100 cm^2.

7.11.3.5 The following formula should be used for converting direct probe readings in cpm to dpm/100 cm^2:

7.11.3.6 Typically a surface efficiency of 0.25 will be used for alpha/beta emitters unless justified in the Task-Specific Plan.

$$As = (Rs+b-Rb)/(\varepsilon i * \varepsilon i * W_A/100cm2)$$

where,

AS = total surface activity (dpm/100 cm^2)
$Rs+b$ = the gross count rate of the measurement in cpm,
Rb = the background count rate in cpm
εi = the instrument efficiency (counts per particle)
εi = the contaminated surface efficiency (particles per disintegration)
WA = the physical area of the detector window (cm^2)

In the absence of experimentally determined surface efficiencies, ISO-7503-1 and NUREG-1507, provide conservative recommendations for surface efficiencies. ISO- 7503-1, recommends a surface efficiency of 0.25 for alpha emitters, and 0.5 for beta emitters.

7.12 GAMMA SURVEYS

A Ludlum Model 2350-1/44-10 or equivalent should be used for gamma radiation surveys. A single detector or an array of detectors may be used to perform gamma scans.

7.12.1 *Scans*

7.12.1.1 Set the audio response switch to the "on" position.

7.12.1.2 If a single detector is used, traverse a path at a maximum speed of approximately 0.5 meters per second and slowly move the detector assembly in a serpentine (S-shaped) pattern, while maintaining the detector approximately 10 centimeters (cm) (4 inches) from the area being surveyed.

NOTE: This is for general area survey. Detection of underground artifacts will require full survey of the ground conducted at a speed that provides at least an agreed-upon confidence of detecting a specific sized (e.g., 10 nanocuries) commodity. These procedures will be developed as task-specific plans (TSPs) designed for the type of equipment used (e.g., a towed array of multiple sodium iodide [NaI] 2-inch by 2-inch or single or dual specially 2-inch by 18-inch NaI detectors) that allow a survey with speed adjustment to meet objectives.

7.12.1.3 If a detector array is used, it will be pushed or pulled in a straight line with the detector centers positioned approximately 30 cm apart.

7.12.1.4 Scan ranges should be recorded from the lowest reading to the highest reading noted.

7.12.1.5 If data logging is being performed, the scan data will be collected at the time interval necessary to obtain the measurements required for the survey.

7.12.1.6 Locations of radiation levels greater than 3 standard deviations above background shall be marked and identified for further investigations.

7.12.1.7 Measurement results are recorded in cpm.

7.12.2 *Static*

7.12.2.1 Static photon measurements require positioning the detector assembly approximately 10 cm (4 inches) above the surface and completing a stationary 60-second survey.

7.12.2.2 Static measurements should be performed as required in the applicable work planning document or frequently enough to ensure the detection of residual activity.

7.12.2.3 Record results in cpm.

7.13 ROUTINE RADIOLOGICAL SURVEYS

7.13.1 *Frequency Requirements for Routine Surveys*

Appropriate routine radiological surveys shall be performed at the frequencies indicated in the following paragraphs, unless directed otherwise by the applicable work planning document.

7.13.2 *Exposure Rate Surveys*

Surveys should be performed as frequently as necessary to ensure that radiological postings accurately reflect actual conditions during activities that have the potential to modify exposure rates. Additionally, radiation surveys should be performed under the following circumstances:

- Upon initial entry into potential radiation areas after extended periods of closure.
- Daily, in the vicinity of contamination concentration points on operating high-efficiency particulate air (HEPA)-filtered ventilation units.
- Weekly, in occupied office spaces located inside radiologically controlled areas.
- Weekly, or upon entry if entries are less frequent than weekly, inside radiation areas and radioactive material storage areas.
- Weekly, along radiation area boundaries to ensure that the radiation areas do not extend beyond the posted boundaries.

7.13.3 *Contamination Surveys*

Daily when in use, or once per shift in high-use situations at contamination control points, radiological change areas, or step-off pads.

- Daily, in court rooms and laboratories that are used to analyze potentially contaminated samples.
- Daily, in office spaces located inside radiologically controlled areas.

- Daily, in lunchrooms, eating areas, locker rooms and shower areas adjacent to radiologically controlled areas.
- Weekly, for all designated lunchrooms and offices for the project.
- Weekly, or upon entry if entries are less frequent, in the areas where radioactive materials are handled or stored.
- Weekly, or upon entry if entries are less frequent, in posted contamination areas.

7.13.4 *Identifying and Scheduling Routine Radiological Surveys*

7.13.4.1 The RSO, or designee, shall identify and schedule routine surveys as required by the radiological conditions and work activities.

7.13.4.2 Routine survey schedules shall be developed using a standard system for designating surveys as follows:

- Daily (D)
- Weekly (W)
- Monthly (M)
- Quarterly (Q)
- Semiannually (S)
- Annually (A)
- Upon Entry (U)

7.13.4.3 Routine survey schedules shall be submitted to and approved by the RSO, or designee.

7.13.4.4 Routine survey tracking forms should be prepared using the approved routine survey schedules.

7.13.4.5 Changes to any routine survey schedule shall be submitted to and approved by the RSO, or designee.

7.13.5 *Contamination Survey Frequency, As Required*

- Prior to transfer of equipment and material from one Restricted Area to another.
- Prior to transfer of equipment and material from a Contamination Area.
- Following a leak or spill of radioactive material.
- Upon receipt of radioactive material.
- On the outer package of radioactive material prior to shipment.
- During initial entry into a known or suspected Contamination Area.
- When breaching a contaminated or potentially contaminated system.
- Periodically assessing radiological conditions during and upon completion of work involving radioactive material.
- As specified by the appropriate RWP or Technical Work Document.
- Prior to and periodically during work with radioactive material that involves:
  - Grinding, chipping, scraping, brushing, sweeping, scaling or drying.
  - Cleaning with a volatile solution.
  - Removal of paint or sealant.

- Removal of coverings or components.

- As part of Decontamination and Decommissioning (D&D) or Remedial Action (RA) activities in facilities/areas.

7.14 DAILY SURVEYS

Perform daily surveys as follows:

7.14.1 at contamination control points, change areas, and step-off pads in normal use situations.

7.14.2 In eating areas in buildings that contain Restricted Areas for contamination control.

7.14.3 In office spaces located within Restricted Areas established for contamination control (or in Restricted Area located in office area).

7.15 WEEKLY SURVEYS

Perform weekly surveys only if material is greater than 10 CFR 20, Appendix C, limits require labeling, as follows:

7.15.1.1 In routinely occupied Restricted Areas.

7.15.1.2 In vaults containing special nuclear material (SNM), or upon entry if entry is less frequent.

7.15.1.3 In occupied Contamination Areas and adjacent areas, or upon entry if entry is less than weekly.

7.15.1.4 In areas where radioactive materials are handled or stored (survey upon entry if entry is less frequent than weekly), if Material > 10 CFR 20 Appendix C.

7.15.1.5 On staged equipment, piping, and components that are pending size reduction or disposal (representative surveys of these items can be performed in conjunction with other weekly surveys specified above).

7.16 MONTHLY SURVEYS

Perform monthly surveys only if material is greater than 10 CFR 20, Appendix C, limits require labeling as follows:

7.16.1 Perform monthly surveys:

- In laboratory facilities used for the analysis of radioactive samples and bioassay.
- On radioactive vacuum cleaners.
- To detect fixed contamination that may become removable over time (may also be performed quarterly or semi-annually, depending on the integrity of the containment or fixative).

7.17 SEMI-ANNUAL SURVEYS

Semi-Annual surveys do not apply to exempt sources) as follows:

7.17.1 On the outside of licensed radioactive sources or their containers if sealed.

NOTE: ITSI Gilbane will implement leak test procedures are specified in Appendix O of NUREG 1556, Vol. 18).

7.17.2 ***Survey Log***

Completion of surveys shall be documented using the assigned survey log (see Attachment E) for the project. This is not limited to initial surveys but includes routine surveys. Each survey shall be assigned a unique tracking number consistent with the practices of the project.

7.17.3 *Performance of Routine Surveys*

RSTs shall perform routine surveys in accordance with the RWP and the other applicable procedures. Upon completion of a routine survey, the RST shall initial the appropriate Survey Log.

7.17.4 *Periodic Evaluation of Routine Surveys*

Routine survey schedules shall be prepared by the RSOR and updated periodically to ensure that all areas within the project boundaries are receiving appropriate routine survey coverage.

Changes of conditions within the project area will be reported to the RSO, or designee, and may require a modification of the routine radiological survey schedule.

7.17.5 *Management Notification*

The RSOR shall be notified in writing by the RSTS of any failure to complete a routine survey as scheduled. The missed survey will be completed as soon as possible after the discovery that it was missed.

8.0 TRAINING

Personnel implementing and performing the requirements described in this RSOP shall be trained and qualified to meet the requirements specified for their tasks.

9.0 REQUIRED RECORDS

The records generated by this procedure are:

- Contamination Survey Form
- Survey Drawing (showing Survey points)
- Survey Log

All records will be maintained in accordance with the ITSI Gilbane Records Retention Procedure, 2008.

ATTACHMENT A

SUMMARY OF CONTAMINATION LIMITS

RADIONUCLIDE	Surface Contamination Levels		
	Removable[2,4]	Average Total (Fixed + Removable)[2,3]	Maximum Total (Fixed + Removable)[2,3]
U-natural, U-235, U-238 and associated decay products	1,000[7]	5,000[7]	15,000[7]
Transuranics, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	20	100	300
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000	3,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above.[5] Includes mixed fission products containing Sr-90.	1,000	5,000	15,000

Notes:

1. *The values in this table, with the exception noted in footnote 5 below, apply to radioactive contamination deposited on, but not incorporated into the interior or matrix of, the contaminated item. Where surface contamination by both alpha- and beta-gamma- emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides apply independently.*
2. *As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.*
3. *The levels may be averaged over one square meter provided the maximum surface activity in any area of 100 cm^2 is less than three times the value specified. For purposes of averaging, any square meter of surface shall be considered to be above the surface contamination value if: (1) from measurements of a representative number of sections it is determined that the average contamination level exceeds the applicable value; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm^2 area exceeds three times the applicable value.*
4. *The amount of removable radioactive material per 100 cm^2 of surface area should be determined by swiping the area with dry filter or soft absorbent paper, applying moderate pressure, and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. (Note - The use of dry material may not be appropriate for tritium.) When removable contamination on objects of surface area less than 100 cm^2 is determined, the activity per unit area shall be based on the actual area and the entire surface shall be wiped. It is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.*
5. *This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from the other fission products or mixtures where the Sr-90 has been enriched.*
6. *Tritium contamination may diffuse into the volume or matrix of materials. Evaluation of surface contamination shall consider the extent to which such contamination may migrate to the surface in order to ensure the surface contamination value provided in this appendix is not exceeded. Once this contamination migrates to the surface, it may be removable, not fixed; therefore, a "Total" value does not apply.*
7. *(alpha)*

ATTACHMENT B

GUIDELINES FOR PERSONNEL MONITORING WITH HAND-HELD SURVEY INSTRUMENTS

General Requirements

1. The instrument(s) used must be capable of detecting the radionuclide(s) present in the contaminated area i.e., if alpha emitters are present, an instrument capable of detecting alpha must be available. Verify that the instrument is in service, set to the proper scale and the audio output can be heard during frisking.
2. Hold probe less than 1/2 inch from surface being surveyed for beta and gamma contamination, approximately 1/4 inch for alpha contamination.
4. Move probe slowly over surface, approximately 2 inches per second.
5. If the count rate increases during frisking, pause for 5 to 10 seconds over the area to provide adequate time for instrument response.
6. If the count rate increases rapidly or the instrument alarms, remain in the area and notify Radiation Safety personnel.
7. The whole body frisk should take at least two to three minutes.

Performance of Monitoring

1. Frisk the hands before picking up the probe.
2. Perform the frisk in the following order:
   a. Head (pause at mouth and nose for approximately 5 seconds).
   b. Neck and shoulders.
   c. Arms (pause at each elbow).
   d. Chest and abdomen.
   e. Back, hips, and seat of pants.
   f. Legs (pause at each knee).
   g. Shoe tops.
   h. Shoe bottoms (pause at sole and heel).
   i. Personnel and supplemental dosimeters.
3. Return the probe to its holder and leave the area. The probe should be placed on the side or face up to allow the next person to monitor their hands before handling the probe.

*These instructions should be placed at hand-held frisking stations.

ATTACHMENT C: CONTAMINATION SURVEY FORM (TYPICAL)

Survey Data Sheet

Tech / Date:_____ RSO / Date:_____

Survey No.:		**Item Surveyed:**	
Date:		**Contaminant/Limits:**	
Building Number:		**Comments:**	
Survey Tech.:			
Count Rm. Tech.:			
Survey Type:			

Notes:
Survey Types: Routine, Release, Informational, Reciept, FSS
ACF = Area Correction Factor
Total/Direct Activity Calculation (dpm) = ((Gross Cnt/Cnt Time)-Bkgrd)/(Eff x ACF)
Removable Activity Calculation (dpm) = ((Gross Cnt/Cnt Time)-Bkgrd)/(Efficiency)

Instrument Parameter	*Total (Direct)*		*Removable*	
	Alpha	Beta-Gamma	Alpha	Beta-Gamma
Probe / SN:				
Instrument / SN:				
Inst. Set-Up Date:				
Cal. Due Date:				
Bkgd (cpm)				
Efficiency:				
MDA (dpm):				
ACF:			N/A	N/A
Count Time (min):				

No.	*Descriptions*	*Gross cnt*	**dpm*	*Gross cnt*	**dpm*	*Gross cnt*	**dpm*	*Gross cnt*	**dpm*
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
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32									
33									

ATTACHMENT C: CONTAMINATION SURVEY FORM (TYPICAL)

(Page 2 of 2)

Survey Information Sheet

Comments:

General Information

Survey No.: 0 **Building Number:** 0

Date: 0-Jan-00 **Survey Tech.:** 0

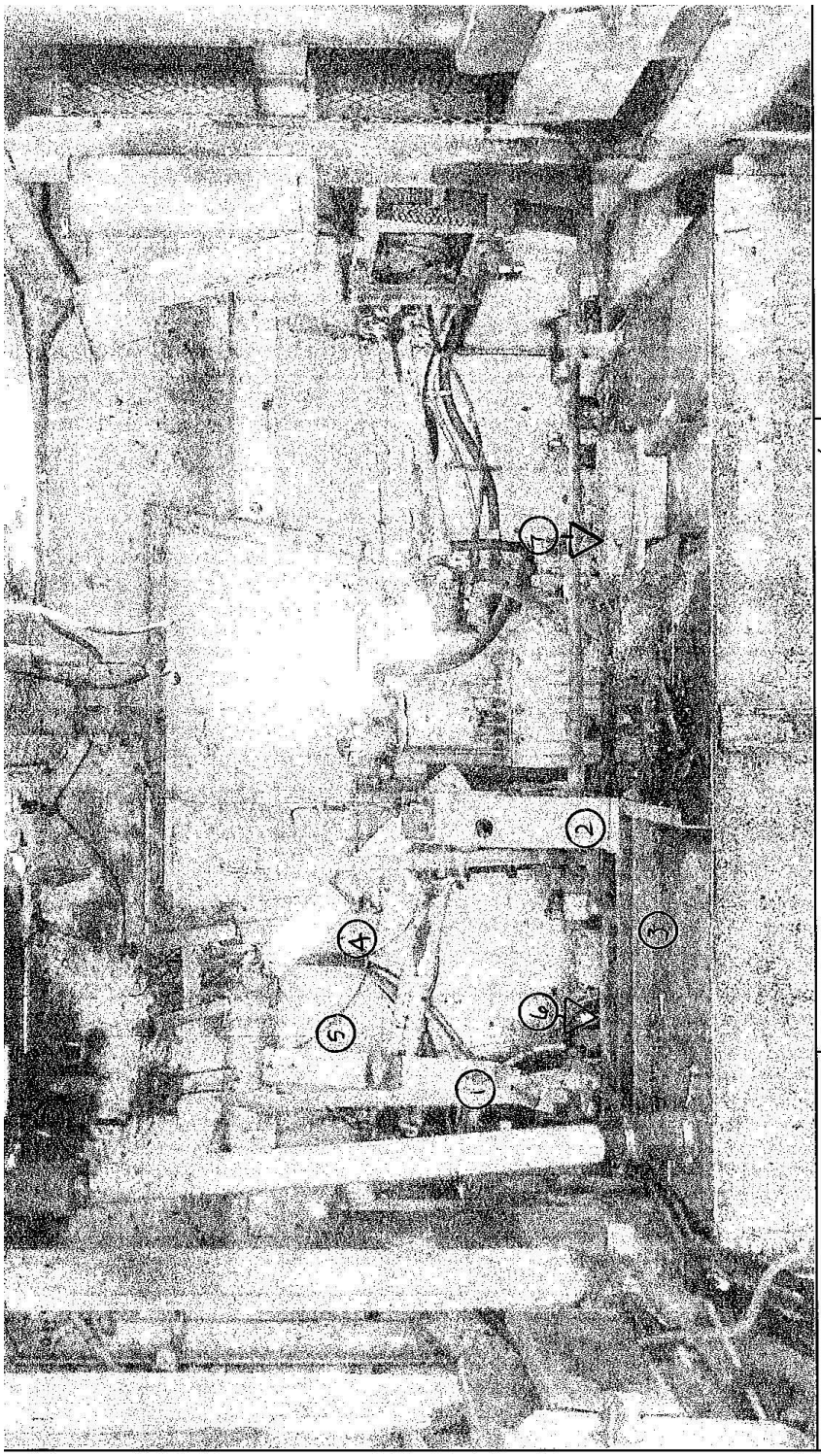
Page: 2 of 2

= Exposure Rate Reading (in µR/hr)

/ # / # = contact/ 1 ft / 3 ft readings (in µR/hr)

(#) = Smear Location

ATTACHMENT D: SURVEY DRAWING (TYPICAL)



Survey Date: 10/2/12 APC Type: M59

Survey #: 28-1-1

APC #: 28-1

Survey Tech: Ranger Slade Initials: RP

RSO Review: _____ Initials: _____

NOTES/COMMENTS: Physical Description for removeable's
1, Left side bracket assembly 2, Pedal
3, Floor in front Pedal 4, Wall Behind dial assembly
5, Above bracket assembly on wall
6, In Right Pit below pedal
7, In Left Pit

LEGEND

[#] Exposure Rate Location and Reading (uR/hr)

(#) Swipe Location and Number

<#> Static Location and Number

ATTACHMENT E: SURVEY LOG

Project: **Location:**

Survey Number			Date	Survey Description	Surveyor (Init.)
Project	#	Year			

ITSI Gilbane

ITSI GILBANE RADIATION SAFETY OPERATING PROCEDURE

Title: Effluent and Environmental Monitoring

Identifier: CO-ITSI-RSOP-09.01

Accepted By:

Mike Salmon
Environmental Sr. Vice President

APRIL 16, 2013
Date

Jay Pride
Corporate Radiation Safety Officer

Apr. 16, 2013
Date

Reviewed By:

Radiation Safety Committee

04/18/2013
Date

Revision History:

Version	Changes	Affects Section/Pages	Effective date
1	Entire document revision	All	12 April 2013
MC1	Added "5.4 Radiation Safety	TOC	15 May 2014
	Technician Supervisor" per		
	Navy Admin Request.		
MC2	Deleted redundant 5.4	TOC and page 2	22 July 2014
MC3	page numbering change	Page 1 - change '1 of 9' to '1 of 8'	22 July 2014

Jay Pride
Digitally signed by Jay Pride
DN: cn=Jay Pride, o=ITSI Gilbane, ou=RSO; Nuclear, email=jpride@itsi.com, c=US
Date: 2014.05.15 14:51:01 -04'00'

Jay Pride
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Date: 2014.07.24 18:25:19 -04'00'

Jay Pride
Digitally signed by Jay Pride
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Date: 2014.07.24 18:25:45 -04'00'

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Attachment B Soil Sampling Guidelines

Attachment C Sediment Sampling Guidelines

Attachment D Pipe and Drain Line Sampling

Attachment E Solid Material

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Attachment G Water Sampling Guidelines

Attachment H Vegetation Sampling Guidelines

ITSI Gilbane
MC-1 added 5.4 to TOC

1.0 PURPOSE

This procedure addresses protocol for the survey, collection and handling of samples collected for either environmental compliance (e.g. storm water runoff, stack emissions) or to meet regulatory criteria (verification of soil samples to cleanup goals) or other sampling requirements.

Guidance regarding methods and selection of sample locations is contained in this procedure or in a project Task Specific Procedure (TSP).

2.0 SCOPE

This procedure addresses protocol for the collection and handling of samples for environmental, and regulatory or contract requirements.

3.0 ACRONYMS AND DEFINITIONS

Acronyms

ALARA	As Low as is Reasonably Achievable
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain of Custody
QC	Quality Control
RSO	Radiation Safety Officer
RSOP	Radiation Safety Operating Procedure
RSOR	Radiation Safety Officer Representative
RST	Radiation Safety Technician
TLD	Thermoluminescent Dosimeters
TSP	Task Specific Procedure

Definitions

Affected Area − An area that having potential radioactive contamination (based on history) or known radioactive contamination (based on past or preliminary radiological surveillance). This would normally include an area where radioactive materials were used and stored, where records indicate spills or other unusual occurrences that could have resulted in spread of contamination, and where radioactive materials were buried. Areas immediately surrounding or adjacent to locations where radioactive materials were used, stored, spilled, or buried are included in this classification because of the potential for inadvertent spread of contamination.

Controlled Area − An area, outside of a restricted area but inside the site boundary, access to which can be limited by the licensee.

Guideline Values or Cleanup Goals − A set of numerical guidelines that enable the licensee to demonstrate compliance with release criteria for structures and for cleanup goals or remediation activities.

Soil Samples - Soil samples are defined as soil collected for analytical purposes. Soil samples will be collected from the top 15 centimeters (cm) of the surface, unless otherwise noted in the applicable work-planning document [e.g. a Task-specific Plan (TSP), Work Instruction or Work Plan].

Sediment Samples - Sediment samples are defined as a collection of clay, silt, sand, and/or gravel deposited by water, wind, or glaciers used for analytical purposes.

Solid Material Samples − Solid material samples are defined as pieces of concrete, brick, porcelain, wood, or any other hard material collected for analytical purposes from buildings or surrounding areas. The samples could include accumulations from ventilation systems or drain systems.

Swipe Samples − Swipe samples are materials, which after being wiped over a surface, are analyzed to determine the presence of removable radioactivity on the surface area that was wiped.

Liquid Samples − Liquid samples are defined as liquid collected for analytical purposes from sinks, drain piping, sewer systems, rinsate, groundwater, leachate, liquid investigation-derived waste, and low-point accumulation areas inside of buildings, sumps, and excavation pits.

4.0 OVERVIEW

Assessment of the radiological status of a given site may include the collection of representative solid and water samples. The sampling protocol contained within this procedure may be used to assess the deposition of radioactive material.

5.0 RESPONSIBILITES

5.1 RADIATION SAFETY TECHNICIAN

The RST implements the requirements of this procedure as directed by the RST Supervisor (RSTS). The RST shall be responsible for the performance of the requirements of this procedure and documentation of work performed. The RST shall ensure compliance with this and any other referenced procedure.

5.2 RADIATION SAFETY TECHNICIAN SUPERVISOR

The RSTS shall ensure, by periodic personal observation, that samples are collected appropriately and a Chain of Custody (COC) is controlled. The RSTS is responsible for the control of radioactive material samples, and supervision of RSTs performing the requirements of this procedure. Only RSTs who are trained in sampling techniques and preparing COCs will be assigned this task.

5.3 RADIATION SAFETY OFFICER OR REPRESENTATIVE

The RSO, or designated Representative (RSOR), is responsible for training personnel on the various types of sampling and preparing the COCs. The RSO is responsible for the overall implementation and compliance with this procedure during all project operations.

The RSO or Representative will:

5.3.1 The RSO shall conduct periodic reviews, via personal observation of conducting sampling and contamination surveys, to ensure adherence to the requirements of this procedure.

5.3.2 Advise the RST supervisor as to when to perform sampling in accordance with the requirements of this procedure.

5.3.3 Evaluate radiological characterization data at each work site to determine potential for radionuclide(s) of concern to enter the environment.

5.3.4 Analyze radiological sampling data in accordance with this procedure.

5.3.5 Perform investigation/evaluation of elevated or abnormal radiological sampling results.

5.3.6 Determine when to implement additional monitoring.

6.0 LIMITATIONS AND PRECAUTIONS

Preliminary assessments of samples utilizing field survey techniques should be performed promptly upon removal and recoded in the RST logbook, survey form or sample collection log.

In situations where background levels of radon and thoron progeny interfere with evaluation of air samples, prompt field assessments may not be possible and require time to decay prior to analysis.

Field instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibrations and completed daily verification checks.

Coring may be necessary for an assessment of subsurface contamination. This technique consists of the use of a special tool to sample soil as a function of depth. Care will be exercised to keep samples from different depths uncontaminated and identifiable. Specific coring techniques will depend on the composition and consistency of the soil to be sampled.

The number, location, depth and volume of samples should be predetermined by the RSO or the RSTS, in accordance with a TSP. In addition, RSTs performing sampling must understand the type of analysis to be performed on the samples, relative to contamination control needed to support the sampling effort.

The number and pattern of samples may be modified to suit the terrain, or the level of contamination anticipated based on radiation survey readings. Any modifications shall be documented by the RST and reported to the RSO.

Special surveys may require deviations from this procedure. Such deviations shall be described in detail in a TSP, radiation work permit, or survey specific procedure, as required.

To prevent cross-contamination, non-disposable equipment used for sample collection shall be cleaned prior to use and between samples.

Sample containers should be verified as non-contaminated and not previously used. Sample containers can be polyethylene, glass or other approved material by the receiving analytical laboratory and should be sealable to prevent any sample leakage.

7.0 INSTRUCTIONS

7.1 GENERAL

7.1.1 Surveys are to be performed at each location before initiating sampling. This will identify the presence of gross contamination, which will require that samples and equipment be treated as radioactive and handled in accordance with applicable license requirements.

7.1.1.1 Perform direct radiation measurements at sample location before initiating sample collection to identify gross radionuclide contamination, if appropriate.

7.1.1.2 Record results on a Sample Log (Attachment A), in field notebook, survey form or equivalent.

7.1.1.3 Perform biased measurements in potentially contaminated areas.

7.1.1.4 Perform unbiased measurements for areas with no historical information expected to have little or no surface contamination present.

7.2 ENVIRONMENTAL MONITORING

7.2.1 *Environmental monitoring will be performed at the perimeter boundary*

Environmental monitoring will be performed at perimeter boundaries in accordance with project plans to ensure compliance with ITSI Gilbane's radioactive materials license requirements and ensure worker, public and environmental protection. Examples include: perimeter fence lines, radioactive materials storage areas, process release points, locations outside radiologically controlled areas (building or fence lines).

ITSI Gilbane will monitor environmental conditions through measurements performed on air samples, surface water samples, sanitary sewerage discharge, soil samples, and ambient radiation, as appropriate for the project. These samples serve to identify potential areas of concern and would trigger appropriate radiological response or process changes in the event that unanticipated radiological conditions are identified.

Direct exposure rate radiation reading using a microR meter, or equivalent, to verify conditions are less than 50 microRoetgen (R)/hour (hr) to ensure compliance with 10 CRF 20.1301 that a member of the general public will not have an annual exposure greater than 100 mrem/yr or no more than 2 mrem/hr. Results from these measurements, if positive, can be utilized to calculate potential doses to members of the public. [Note that for gamma radiation, a quality factor of 1 is used to convert readings of R to rem; all readings collected with a microR meter will be documented in units of microR].

7.2.2 *Environmental Air Sampling (Permitted Stack)*

7.2.2.1 To ensure that airborne releases are within license, regulatory limits, or project defined limits, ITSI Gilbane will perform monitoring of stack process effluents at the point of release through the use of continuous air particulate, sampling equipment (as appropriate).

7.2.2.2 Continuous low volume air particulate and air iodine (if applicable) samples shall also be collected at locations located at the site fence line boundaries if required by project documents.

7.2.2.3 Environmental air samples shall be analyzed for constituents of concern as outlined in project contract or sampling and analysis plan. Any samples exceeding ten percent of the effluent concentrations in Table 2, Column 1 of Appendix B of 10 CFR 20 shall require immediate notification to the RSO.

7.2.3 *Environmental Surface Water Monitoring*

Surface water monitoring will be conducted in accordance the methods outlined in ITSI Gilbane, CO-ITSI-RSOP-09.01, Effluent and Environmental Monitoring, or in accordance with project sampling and analysis plans. Samples will be analyzed for ROCs contaminates of concern for the project site. An investigation shall be performed whenever samples indicate man-made activity exceeding 10 percent of the Table 2, Column 2 values in Schedule Appendix B of 10 CFR 20.

7.2.4 *Sanitary Sewerage Monitoring*

Samples of process liquids to be discharged to sanitary sewerage shall be analyzed prior to release for Radionuclides of Concern (ROC). Any samples exceeding 10 percent of the Table 2, Column 3 values in Schedule Appendix B of 10 CFR 20 may require that the liquids be solidified and disposed of by land disposal. Approval to allow releases to sanitary sewerage requires prior approval by the RSO the client and the entity that controls the sewage system.

7.2.5 *Ambient Radiation Monitoring*

Thermoluminescent Dosimeters (TLDs) shall be posted at boundaries of RCA controlled or other site boundary areas (related to RAM and a member of the public) to monitor maximum exposures to individuals in accordance with project work plans and sampling and analyses plans.

ITSI Gilbane will utilize the concept of stay-times to estimate exposures to individual members of the public in controlled areas (outside of restricted areas). Individual member of the public is not expected to remain in controlled areas for greater than eight hours per day. For purposes of dose calculations, a worst case would be a worker assumed to be at fence-line 50 weeks a year and 40 hours a week.

For controlled areas, ITSI Gilbane shall maintain records of employee personnel exposures, that, along with RCA general area exposure monitoring, will ensure that exposure to radiation fields in areas frequented by individual members of the public is as low as reasonably achievable (ALARA).

Engineering controls are added per direction of the RSO if at any point of a boundary the microR meter exceeds 50 microR/hr. Examples of engineering controls include shielding and expanding the fenced boundaries.

7.2.6 *Environmental Action Levels*

7.2.6.1 Air, water, and sanitary sewerage action levels shall be set at 10 percent of the applicable Table 2 values in Appendix B of 10 CFR 20.

7.2.6.2 Soil and sediment action levels shall be set as required by project-specific documents.

7.2.7 *Immediate notification shall be made to the RSO of any samples or doses exceeding action levels*

7.2.7.1 The RSO shall perform an investigation and response consisting of one or more of the following actions:

7.2.7.1.1 Verify laboratory data and calculations;

7.2.7.1.2 Analyze and review probable causes;

7.2.7.1.3 Evaluate need for reanalysis or additional analyses on original sample;

7.2.7.1.4 Evaluate need for re-sampling;

7.2.7.1.5 Evaluate need for sampling of other pathways;

7.2.7.1.6 Document all actions, analysis, and evaluations in logs or files;

7.2.7.1.7 Assess dose.

7.2.7.1.8 Samples higher than the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanup goals will require additional remediation, decontamination or other methods to achieve these goals.

7.3 SAMPLING

Attachments B through H provide detailed sampling guidance for different media as listed below:

Attachment B: Soil Sampling Guidelines

Attachment C: Sediment Sampling Guidelines

Attachment D: Pipe and Drain Line Sampling Guidance

Attachment E: Solid Materials

Attachment F: Ventilation Sampling

Attachment G: Water Sampling Guidance

Attachment H: Vegetation Sampling Guidelines

7.4 SAMPLE TOOL CLEANING

7.4.1 ***Upon sampling completion:***

7.4.1.1 Wipe tool surfaces free of loose material using dry paper towels or wet wipes.

7.4.1.2 As needed, use stiff bristle brush to remove solid materials from tools.

7.4.1.3 Allow tools to air dry as needed.

7.4.1.4 Survey tools to verify unconditional release criteria is met (CO-ITSI-RSOP- 07.01) and document results in logbook or applicable survey form.

7.4.1.5 Repeat steps above as necessary to achieve release criteria.

7.4.1.6 Tools not meeting release criteria after three cleaning attempts shall be dispositioned as radiological contaminated material and may require liquid decontamination method. Water will be collected as waste.

7.4.1.7 Collect all cleaning material/residue and survey for disposition.

7.4.1.8 Material not meeting release criteria shall be dispositioned as radioactively contaminated material.

7.5 REGULATORY/CONTRACTUAL SAMPLES ANALYSIS

7.5.1 ***Analyzed for Constituents of Concern***

7.5.1.1 Regulatory or contract sampling requirements, and acceptance criteria will be in accordance with project requirements.

7.6 SAMPLE INTEGRITY

Sample integrity should be maintained from the time of collection to time of analysis by use of ITSI Gilbane PR-TC-01.04.05.00, Chain of Custody Procedures for Environmental Samples.

7.6.1.1 Samples will be delivered for analysis to a client approved laboratory via a box, cooler, or similar container (ice is not required if only radiological analysis will be performed) along with the completed COC.

7.6.1.2 Quality control samples will be collected and analyzed per applicable work planning documents.

7.6.1.3 Samples designated for transport off-site will be packaged in accordance with applicable Department of Transportation and International Air Transport Association procedures.

7.6.1.4 At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage.

7.6.1.5 For samples transported by an off-site laboratory courier, two custody seals will be taped across the lid of the box or cooler: one seal in the front and one seal in the back. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the top two copies (white and pink) of the COC will then be released to the courier for transportation to the laboratory.

7.6.1.6 For samples shipped via a commercial carrier, the COC will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies (white and pink) of the COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. The yellow copy of the COC will be maintained by the on-site laboratory and the manila copy will be submitted to the ITSI Gilbane project chemist. A duplicate of the manila copy may also be kept in the ITSI Gilbane project file on site. The box/cooler will be taped shut with strapping tape as necessary. Two custody seals will be taped across the lid: one seal in the front and one seal in the back. The pouch for the airbill will be placed on the box/cooler and secured with clear tape.

7.6.1.7 The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple boxes/coolers are being shipped, then the original airbill will be placed on the box/cooler with the COC, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated in advance with the designated off- site laboratory and placement of "Saturday Delivery" stickers on each box and/or cooler to be shipped should be confirmed with the commercial courier prior to release. Prepared packages will also be surveyed prior to shipment.

7.6.2 *Quality Control*

Quality Control (QC) sampling shall be done in accordance with project requirements (i.e., Sampling and Analysis Plan). If none are available, the following steps should be taken to ensure that samples collected are representative of the material sampled. Replicate samples should be taken periodically to determine the reproducibility of sampling.

7.6.2.1 QC samples should be collected at approximately 10% of the sample locations.

7.6.2.2 If collecting 10 samples or less, obtain 1 QC sample.

7.6.2.3 If collecting more than 10 samples, obtain 1 QC sample for every 10 survey samples, with one QC sample for any odd lot over 10 samples, e.g., collect two QC samples for 15 survey samples.

7.6.2.4 Obtain QC samples adjacent to survey sample locations.

7.6.2.5 Identify as QC sample in accordance with project Sample and Analysis Plan identification and COC.

7.6.2.6 Record the sample identification number and pertinent information on a COC Record.

8.0 TRAINING

Personnel implementing the requirements and performing the activities outlined in this procedure shall be adequately trained and qualified to meet the requirements specified for their tasks.

9.0 REQUIRED RECORDS

Sample collection records will include field logbooks, survey forms, sample logs and COCs. These records will be completed and maintained in accordance with the project and ITSI Gilbane procedure requirements.

Records necessary to document the activities performed in support of the environmental program shall be maintained. Documentation of sample collection shall include description, location, date, and time of sample; receipt and laboratory identification of the sample. In addition, background samples, analytical blank samples, data reduction and verification of samples shall be documented.

All records will be maintained in accordance with the ITSI Gilbane Records Retention Procedure (ITSI, 2008).

10.0 REFERENCES

Project specific work documents or site Sampling and Analysis Plan

ITSI, 2008, *Records Retention Procedure*

ITSI, 2009, *Chain of Custody Procedures for Environmental Samples,* PR-TC-01.04.05.00

ITSI Gilbane, 2013, *Contamination Monitoring Program,* CO-ITSI-RSOP-05.01

ITSI Gilbane, 2013, *Unrestricted Release Program*, CO-ITSI-RSOP-07.01

ATTACHMENT A: SAMPLE LOG (example)

Project:		Sampling Date/Time		
Sample Type/Depth			Biased Unbiased	
Instrument	Serial Number	Cal. Due Date	Probe Type/Serial #	Cal Due Date

Grid Location	Surface Measurement		Water Depth	Sample Number	Water Sample Taken	Remarks
	1 meter	Contact				
Background						
QC Sample						
QC Sample						

Performed by	Date

ATTACHMENT B: SOIL SAMPLING GUIDELINES

A. Soil Samples- Surface (< 1 foot deep)

Because standard surface soil contamination criteria for radionuclides are applicable to the average concentration in the upper 15 cm of soil, the sampling protocol described here is based on obtaining a sample of this upper 15 cm. Special situations, such as sampling at depths greater than 15 cm, evaluating trends or airborne deposition, determining near-surface contamination profiles, and measuring non-radiological contaminants, may require special sampling procedures. These and other special situations that may exist are addressed in the project specific work documents.

- scoop or trowel*
- bucket/hand auger*
- soil coring device
- waste pile sampler
- split spoon sampler
- Shelby tube sampler
- mixing bowl or tray*
- spatula

*Samples will be collected with a hand-auger, hollow-stem auger, split-spoon sampler, disposable scoop, bucket/hand auger mixing bowl or tray, or equivalent.

The soil removed for sampling must be sufficient to yield a sample of sufficient volume for the sample container being used. Soil samples will be collected and handled as follows:

1. Loosen the soil at the selected sampling location to a depth of approximately 15 cm, using a trowel or other digging instrument.
2. Remove large rocks, vegetation and foreign objects. In some cases, however, these objects may be the source of the contamination and may be collected as separate samples for characterization.
3. Place as much soil as practical into sample container.
4. Complete the following steps:
   A. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
   B. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.
   C. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
   D. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
   E. Record sample identification and location on a sample identification tag, or equivalent, in accordance with ITSI Gilbane COC. Document all samples collected in the sample logbook as applicable.
   F. Record the sample identification number and pertinent information on a COC.

G. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.

H. Ensure no free standing liquid is generated or released to environs.

I. Transport samples for analysis as soon as possible after sample collection.

J. Clean or decontaminated tools will be used at each sampling location.

B. Soil Sample Collection (up to 3 meters) Non-Core Samples

This method is applicable to depths of approximately 3 meters, when boreholes or trenches do not collapse upon excavation, and/or do not contain water. This method is not applicable to core samples intended for determination of contamination stratification.

1. Excavate borehole or trench to lower end of desired sampling depth using an auger, post hole digger, or other suitable tool. Comply with the ITSI Gilbane Excavation/Trenching SWP prior to digging.
2. Lower sampling tool to upper end of sampling depth in borehole or trench.
3. Scrape inside borehole or trench wall with toothed edge of tool, from upper to lower end of sampling depth, until sample is collected.
4. Transfer sample into container.

C. Soil Sample Collection - Option 2 (up to 3 meters) Core Samples

This method is applicable to depths of approximately 3 meters, when boreholes or trenches collapse upon excavation, and/or contain water. This method is applicable to core samples intended for determination of contamination stratification.

1. Subsurface soil samples can be collected via a standard drill rig or direct push drilling by advancing a dedicated or decontaminated large-diameter sampling device (e.g., split spoon, Shelby tube or soil corer) in the borehole. A decontaminated split spoon retaining basket should be used to prevent loss of the soil back into the borehole while raising the split spoon sampling device to the surface. Upon retrieval to the surface, the large-diameter sampling device (e.g. split spoon, soil corer or Shelby tube) should be handled and transported in such a way to prevent lose while opening or during shipment preparation. The split spoon or soil corer sampling devices should be opened with caution to ensure that soil remains within one half of the split barrel or liner for later screening and sample collection. Soil that has fallen out of the large-diameter sampling device cannot be used for laboratory analysis and should be discarded to prevent cross-contamination.
2. Excavate borehole or trench to upper end of desired sampling depth using an auger, post hole digger, or other suitable tool.
3. Drive a split-spoon or Shelby tube collector beyond the augured depth to lower end of sampling depth.
4. Remove sampling device and remove collected bore.
5. Place core into plastic bag-lined cardboard container or equivalent.
6. Care must be taken to preserve the integrity of core bore samples if it is intended that the samples be analyzed for contamination stratification.

7. Core may be split into multiple segments, representing different sampling depths, as prescribed by the characterization plan.
8. Securely seal bag or container.
9. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
10. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
11. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC.
12. Record the sample identification number and pertinent information on a COC.
13. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.
14. Ensure no free standing liquid is generated or released to environs.

ATTACHMENT C: SEDIMENT SAMPLING GUIDELINES

When sampling sediment, a wide variety of materials may be encountered. The matrix may include fine grained material, a mixture of coarse and fine grained material which may include dead vegetative material (leaves, sticks, etc.) or peat moss. The bulk sampling of sediments can be collected with a core sampler or clamshell dredge. The method of collecting the discrete sample will depend upon the type of material encountered. Therefore, various sampling tools must be available to ensure the collection of representative samples.

One of the problems encountered when sampling sediments is the amount of water in the sample. The high level of moisture will increase the detection limits of the analysis due to the concentration calculation on a dry weight basis.

In some cases the density of the material may not allow a sample to be collected within the required weight range of the analytical method or the required weight of material may not be fully submerged in the preservative. These cases may require the addition of preservative by the laboratory to submerge the sample which will increase the detection limits of the sample.

Several methods are available to collect sediment samples from sewer pipes, or shallow stream. The tools used will be appropriate to the circumstances and may include use of trowels, augers, or other hand tools. Sediment sampling will be conducted as follows:

1. A hand-auger, trowel or similar device will be used to access each sampling location. The sample collection tool will be selected based on physical limitations accessing the sample location.
2. Place as much material as practical into sample container

Complete the following steps:

1. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
2. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.
3. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
4. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
5. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.
6. Record the sample identification number and pertinent information on a COC.
7. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.
8. Ensure no free standing liquid is generated or released to environs.
9. Transport samples for analysis as soon as possible after sample collection.
10. Clean or decontaminated tools will be used at each sampling location.

ATTACHMENT D: PIPE AND DRAIN LINE SAMPLING

Pipe and drain line sampling is conducted to assess residual radioactivity that may be inside of drain lines or materials within sanitary sewer and storm drain systems.

1. Since the type of material found inside drain lines varies, there is no specific method identified to collect these samples. Samples may be collected using a plumber's snake, swabs, scraper, trowel, etc.
2. As much material as possible should be collected and sampler container.

A grab sample is a single sample "grabbed" by filling up a container, either by hand or with the container attached to a pole. An in-line sediment trap can be used for long term samples.

Sediments sample can be taken using similar techniques as soil and by using an auger oin an extension with a vacuum pick up line collected loosen sediment back to a sample container. Frequently, an access location such as a sewer line branch line can be accessed to allow remote sampling without digging up the floor area.

Complete the following steps:

1. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
2. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.
3. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
4. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
5. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.
6. Record the sample identification number and pertinent information on a COC.
7. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.
8. Ensure no free standing liquid is generated or released to environs.
9. Transport samples for analysis as soon as possible after sample collection.
10. Clean or decontaminated tools will be used at each sampling location.

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ATTACHMENT: E SOLID MATERIAL

Several methods are available to collect solid material samples. Use a drill, impact tool (breaker), grinder, chisel, or other device to provide shaving. To collect samples, solid materials may need to be broken into smaller pieces. Solid materials will be collected as follows:

1. Break up the material into small enough pieces to fill a sample container.
2. Complete the following steps:
   A. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
   B. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.
   C. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
   D. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
   E. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.
   F. Record the sample identification number and pertinent information on a COC.
   G. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.
   H. Ensure no free standing liquid is generated or released to environs.
   I. Transport samples for analysis as soon as possible after sample collection.
   J. Clean or decontaminated tools will be used at each sampling location.

ATTACHMENT F: VENTILATION SAMPLING

Ventilation sampling will be performed to identify if the system is impacted and assess the residual radioactivity that may be present.

1. If visible dust is present inside the ventilation system, use a masslin cloth to accumulate the material into a pile. (If no visible dust is present, collect a swipe sample as discussed in CO-ITSI-RSOP-06.01, Contamination Monitoring. Using a flat utensil, such as a piece of paper or scraper, carefully place as much material as possible sample container.
2. Complete the following steps:
    A. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
    B. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.
    C. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.
    D. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.
    E. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.
    F. Record the sample identification number and pertinent information on a COC.
    G. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.
    H. Ensure no free standing liquid is generated or released to environs.
    I. Transport samples for analysis as soon as possible after sample collection.
    J. Clean or decontaminated tools will be used at each sampling location.

ATTACHMENT G: WATER SAMPLING GUIDELINES

1. Collect water using any of the following sampling equipment: disposable bailer, peristaltic pump, coliwassa-type tube sampler, or equivalent. Care will be taken to avoid collection of bottom sediment or vegetation.
2. Surface Water - Using a clean container, dip water from the selected location, being careful to avoid collection of surface debris, vegetation or bottom sediment.
3. Transfer and filter the water into the sample container.

Complete the following steps

A. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.

B. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.

C. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.

D. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.

E. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.

F. Record the sample identification number and pertinent information on a COC.

G. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.

H. Ensure no free standing liquid is generated or released to environs.

I. Transport samples for analysis as soon as possible after sample collection.

J. Clean or decontaminated tools will be used at each sampling location.

ATTACHMENT H: VEGETATION SAMPLING GUIDELINES

1. Collect desired amount of live vegetation and place in plastic bags that are large enough to contain an adequate size sample. (Laboratory Manager can provide guidance on sample size.)
2. Fill completely a sample container.

Complete the following steps

A. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.

B. Securely seal bag or container. Tape the cap of the container in place or seal the ziplock plastic bag.

C. Seal and label sample container. Place container in a protective outer container, as needed, during transportation and storage.

D. Accurately mark sample plot on survey map, or by reference coordinate, and record appropriate sample identification number.

E. Record sample identification and location on a sample identification tag, or equivalent, in accordance with COC document all samples collected in the sample logbook as applicable.

F. Record the sample identification number and pertinent information on a COC.

G. Clean sampling tools, as necessary, before collecting another sample to prevent cross-contamination of samples.

H. Ensure no free standing liquid is generated or released to environs.

I. Transport samples for analysis as soon as possible after sample collection.

J. Clean or decontaminated tools will be used at each sampling location.

Standard Operating Procedure

Field Documentation

PR-TC-01.04.01.00 v2

Effective Date: 05 June 2013

Reviewed by: _____ Date: 14 May 2013

Rogerio Leong, Project Geologist

Reviewed by: _____ Date: 15 May 2013

Jim Schollard, Program QA/QC Manager

Approved by: _____ Date: 05 June 2013

Jeffrey Hess, Director Technical Services

Review / Revision History:

Version	Changes	Affects Section/Pages	Effective Date	Approval*
1.0	Initial Issue	NA	14 Mar 2011	NA
2.0	Updated and revised documentation requirements, and instructions for uploading completed daily field documents to eDMS and project servers.	All pages	05 Jun 2013	NA

* Approval required for minor changes not requiring updated review and approval by signatures to the SOP.

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1.0 PURPOSE AND SCOPE

This standard operating procedure (SOP) provides an overview of required field documentation to be performed as part of an environmental site visit or field activity performed by ITSI Gilbane Company (ITSI Gilbane). This documentation occurs through the use of specific field forms identified herein, and the use of other forms applicable to specific work activities that may be performed, as identified in their SOPs, in project specific plans, or by the client.

Proper documentation of field activities is a crucial part of any and all field activities, both for technical and legal defensibility. The field documentation should, at a minimum, provide the basic information from the site visit or field activity, such as time onsite, the names of the crew, subcontractors onsite, names of any visitors, weather conditions, activities performed, significant findings or observations, and references to any site or activity-specific forms completed that day.

In the event that site conditions change, or direction is received from client or regulatory agency personnel, potentially resulting in changes to the scope of activities specified in the approved plans (i.e., work plan, sampling and analysis plan [SAP]), the field documentation should properly and adequately reflect such changes, provide the basis of each change, and fully document instructions received from client or regulatory agency personnel.

2.0 ACRONYMS AND DEFINITIONS

For purposes of this procedure, a number of terms and acronyms have the meanings defined below.

APP: Accident Prevention Plan

CPR: Contractor Production Report

CQCP: Contractor Quality Control Plan

DAR: Daily Activity Report, a hand-written form used to document the daily field activities performed at a project site.

DoD: Department of Defense

eDMS: environmental data management system

FTL: Field Team Leader

GPS: global positioning system

HSP: Health and Safety Plan

IDW: investigation-derived waste

QA: Quality Assurance

QCM: Quality Control Manager

SCL: Sample Collection Log

SAP: Sampling and Analysis Plan

SOP: Standard Operating Procedure

3.0 EQUIPMENT/MATERIALS

The list below represents the equipment and materials recommended to complete the tasks defined in the SOP:

- Daily Activity Report (or in some cases, a bound field logbook for specific programs, sites or regulatory applications)
- Other field forms as appropriate for the project
- Indelible pen (fine-tip preferable).
- Camera
- GPS

4.0 PROCEDURES

The following subsections describe the procedures for field documentation. In the event that these procedures cannot be performed as written in this SOP, the field personnel must contact the individual in charge of the project (e.g., project manager) to obtain approval for deviation of procedures prior to starting field activities.

4.1 DAILY ACTIVITY REPORT (DAR)

Each Field Team Leader (FTL), Task Manager, or Site Superintendent overseeing or conducting field activities shall be responsible for completing and maintaining a DAR (or field logbook, when applicable) to document the activities performed each day in the field. DARs must be filled-in by hand using an indelible pen, unless use of a computer is specifically allowed for a given project (based on type of work and available infrastructure) and if permissible by program requirements and with prior approval of the project manager. A copy of the DAR is attached (Section 6.0).

At a minimum the following information shall be recorded in the DAR (or field logbook):

- Project name and project number
- Site name and location
- Date(s) of field activity
- Name of individual reporting field notes
- Name, affiliation, and responsibilities of the personnel (both ITSI Gilbane and subcontractors) on site. For larger projects with significant field staff, this information may be entered into the Contractor Production Report (discussed in Section 4.2)
- Arrival and departure times
- Daily weather conditions
- Chronology and location of field activities
- Pertinent field observations, including:

  - Physical description and sketch or map of the field activity location (to include details such as structures, sample points, borings, wells, stained areas, and any other pertinent information)
  - References to global positioning system (GPS) data collected, if applicable (note, all locations where information is collected (such as sample locations, water quality testing locations, photographs of key features) should be located using a GPS)
  - References to photographs of the site and site activities, as applicable, including location and direction faced when taken
- Record of relevant daily telephone calls, project e-mails, and/or direct contact with individuals at the site where direction may have been received (e.g., from client, program or project management), comments or requests received from regulators, or issues brought up by subcontractors.

Other pertinent information should be included, with the specific nature of this information dependent on the type of field activity. For example, if the field activity involved the collection of samples for environmental or geotechnical analysis, relevant information to include in the DAR (or field logbook, when applicable) would consist of the following:

- Daily summary of equipment preparation procedures, as appropriate
- A description of sampling methodology and type of equipment used
- Time and locations of sample collection (unless reported in an appropriate Sample Collection Log [SCL]. If SCLs are used, reference the accompanying SCLs in the DAR and the focus of the DAR should then be on summarizing the day's activities.)
- Numbers, types of samples collected, and sample identification numbers (unless reported in SCLs and summarized in the accompanying Sample Tracking Log. If SCLs are used, the emphasis should be on summarizing the day's production.)
- Management and disposal of investigation-derived wastes (IDW). Describe type and quantities of IDW generated each day, and location of stored IDW.

Specific field programs, sites, regulatory or weather conditions, may necessitate the use of bound field logbooks in addition to or in lieu of completing DAR forms. There are several types of acceptable logbooks, depending on the requirements of the field activity. One of two types of logbooks are recommended, if used: 1) permanently bound, sequentially numbered, pocket-sized logbook with water-resistant paper; or 2) custom logbook consisting of approved forms printed on water-resistant paper and spiral-bound to prevent pages from being added or removed in the field. Other options exist, but care should be taken if alternate logbooks are used to make sure the selection is consistent with the underlying requirement for use of a logbook in place of a DAR.

The FTL, Task Manager, or Site Superintendent overseeing or conducting field activities will be responsible for completing the DAR (or completing and maintaining the field logbook[1]). Blank lines should not be left on the completed DAR. Any blank space on the DAR should be crossed-out with a single line, initialed, and dated.

When completing any field documentation, all errors should be lined-out with a single line through the entry. Never correct an error by overwriting text. Corrections or insertions must be clearly indicated and all changes must be initialed and dated with the current date by the person making the changes directly above the lined-out correction. Field personnel shall adhere to the field reporting protocol described above, and ensure that all entries are recorded in a manner consistent with this SOP.

4.2 CONTRACTOR PRODUCTION REPORT (CPR)

The Contractor Production Report (CPR) form is used to record hours worked by employees and all subcontractor personnel onsite, generally by individual tradecraft. The CPR also covers construction equipment onsite and used each day and any equipment or materials that are received. This form is required for all work on Department of Defense (DoD) projects in order to document total field hours for all personnel (ITSI Gilbane and subcontractors) onsite consistent with reporting requirements in EM-385, and similar reporting of all hours worked on jobsites is required for all projects by Gilbane Building Company. A copy of the CPR is attached (Section 6.0).

This form is used to report needed information on costs on a daily basis, since it contains a list of all personnel onsite on a daily basis, all equipment used, and all materials received. When coupled with the DAR listing other incurred costs (e.g., the number and type of samples collected, the volume and type of waste generated, etc.), the CPR:

- Provides the needed detail to review and approve vendor invoices for subcontractor hours, materials, equipment, and waste transport and disposal.
- Allows for near real-time monitoring of incurred costs on our field projects – a necessity for some of our cost-reimbursable government contracts and important on fixed-price projects to support any needed change order or request for equitable adjustment.

4.3 OTHER FORMS

In addition to the DAR and CPR, the following additional forms may be needed to document specific field activities:

- Quality Control Report. This series of forms is used to document the day-by-day quality control activities, including but not limited to preparatory meetings, initial inspections,

[1] Each page of the field logbook will be sequentially numbered and dated. When using field logbooks, all entries shall be legible and each day will be documented in chronological order, reflecting the order of each day's activities as they transpire. Unused partial pages (i.e., at the end of each workday) should be crossed-out, signed and dated. If an event is inadvertently not recorded in proper sequence, or was missed, the item should be flagged with an asterisk (*) at the beginning and end of the entry when it is added to the logbook, along with the time of the actual entry and the author's initials. If field logbook duties are transferred to another party, then the individuals relinquishing and receiving the logbook will both sign and date the logbook and record the transfer time.

follow-up or ongoing inspections, incoming materials inspections, and development of a "punch list" during activity closeout. These forms are provided in the site-specific Contractor Quality Control Plan (CQCP).

- Tailgate Safety Meeting form. This form is used to ensure all field personnel are informed of the nature of the work being performed and the safety precautions for that day. The form is provided in the site-specific Health and Safety Plan (HSP) or Accident Prevention Plan (APP).
- Equipment and Truck Inspection Checklist. This form may be required for vehicles accessing some sites, to ensure compliance with site-specific requirements (i.e., presence of fire extinguisher in the vehicle, properly operating brake lights, etc.). This form is provided in the site-specific HSP or APP.
- Visitor Sign-in Log. This form is typically used for projects with extended field periods to document 3rd-party personnel onsite. This form is provided in the site-specific HSP or APP.
- Health and Safety Plan Acknowledgement Form. This form is used to ensure all field personnel have read and understand the information provided in the site-specific Health and Safety Plan (HSP) or Accident Prevention Plan (APP).
- Field Change Request Form (attached; Section 6.0). This form is used to request changes to criteria specified in the approved site-specific plans that are identified during implementation of the work (i.e., changes in sampling methodology, analyte list, sample locations, etc.).
- Field activity-specific forms used to document specific field activities at environmental sites provided with their respective SOPs and the site-specific SAP. These can include, but are not limited to, the following:
    - Monitoring Well Water Level Measurement Forms
    - Instrument Calibration Records
    - Monitoring Well Purge and Sample Forms
    - Sample Collection Logs
    - Sample Tracking Log
    - Chains-of-Custody

Feld personnel shall use these forms (and any other forms identified in the site-specific plans or by project management on a project- or task-specific basis), in addition to the DAR and CPR as described in Section 4.1 and Section 4.2, respectively, to assure that all activities are properly and fully documented at the time the work is performed.

4.4 FEDERAL, STATE, AND LOCAL AGENCY FORMS

Any forms required by federal, state, and/or local agencies (i.e., site access, hot work permits, Uniform Hazardous Waste Manifests, local drilling and well construction/destruction permits, etc.) shall be completed and submitted in accordance with current federal, state and local guidance requirements and regulations. A copy of each document shall be included in the "daily field documentation package".

5.0 FIELD RECORDS MANAGEMENT

All records associated with the field activities shall be managed by the designated responsible party (*e.g.*, FTL, Task Manager, Site Supervisor, Quality Control Manager (QCM), site health and safety officer, or onsite Project Manager). Completed forms shall be gathered into "daily field documentation packages", scanned and submitted to the client, as required (i.e., daily by 10 a.m. the next morning for projects with Navy ROICC oversight), and also uploaded daily (unless otherwise permitted by the Project Manager and Project Health and Safety and QC Managers) to:

1) eDMS[2] for field efforts involving the collection of environmental data (whether physical samples for fixed or mobile laboratory analysis, data collected from instrumentation in the field, or field observations of an environmental nature);
2) Program or client required portals (e.g, EPA, NAVFAC or USACE) for field efforts not involving the collection of environmental data but on projects with associated program or client portals; or
3) DMS for field projects not involving the collection of environmental data and with no required program or client portals.

After scanning and uploading, the hard copies of the daily field documentation packages should then be kept in a binder or folder onsite during field activities to allow for client inspections, and subsequently maintained in the project files after completion of field activities.

Daily uploading of the daily field documentation packages is critical for any project with samples being collected, to allow for timely coordination between the sample crew, the project chemist, and the analytical laboratory. For projects with no sampling occurring, uploading the daily field documentation packages no later than the end of each week may be acceptable, with concurrence from the project manager and both health and safety and quality assurance oversight personnel.

After the daily field documentation packages (i.e., DAR, field forms, sampling forms, etc.) have been completed, scanned and uploaded, field records shall be reviewed by the appropriate project personnel (i.e., Project Manager, Quality Assurance (QA), Project Chemist, etc.), and corrections made as needed. All corrections shall be noted how/where, and original documents that required corrections will be scanned in and uploaded along with the corrected documents, and also attached to the back of the corrected documents and retained in the project files.

[2] Instructions on both uploading and approving daily field documentation packages are provided in Attachment A. Directly uploading to eDMS has the advantage of being web-based and does not require logging into the VPN network, required when uploading the daily field documentation packages to the project servers.

6.0 ATTACHMENTS/FORMS

6.1 ATTACHMENTS

Copies of the following documents are attached.

- Attachment A - Instructions on Uploading and Approving Documents in eDMS
- Attachment B - Field Forms

6.2 FORMS

Copies of the following forms are attached. Additional approved activity-specific forms such as those identified in Section 4.3 are provided with their respective SOPs, in project specific plans, or by the client.

- Daily Activity Report (DAR)
- Contractor Production Report (CPR)

7.0 REFERENCES

Los Alamos National Laboratory, 2010. *SOP-5181 Environmental Programs Waste and Environmental Services for Notebook and Logbook Documentation for Environmental Directorate Technical and Field Activities.* 2010.

U.S. Environmental Protection Agency (USEPA) Region 4, 2007. *Operating Procedure for Logbooks,* SESDPROC-010-R3. November.

USEPA, 2011. *Contract Laboratory Program Guidance for Field Samplers,* Office of Superfund Remediation and Technology Innovation, OSWER 9240.0-47, EPA 540-R-09-03. January.

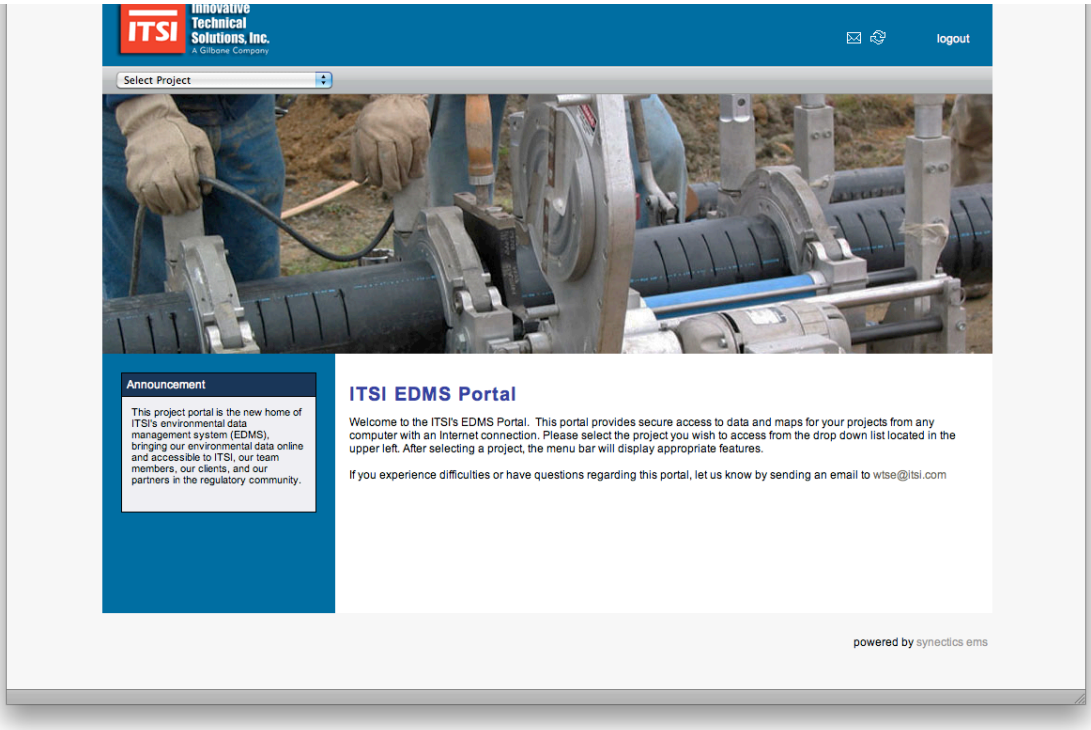
Attachment A

Instructions on Uploading and Approving Documents in eDMS:

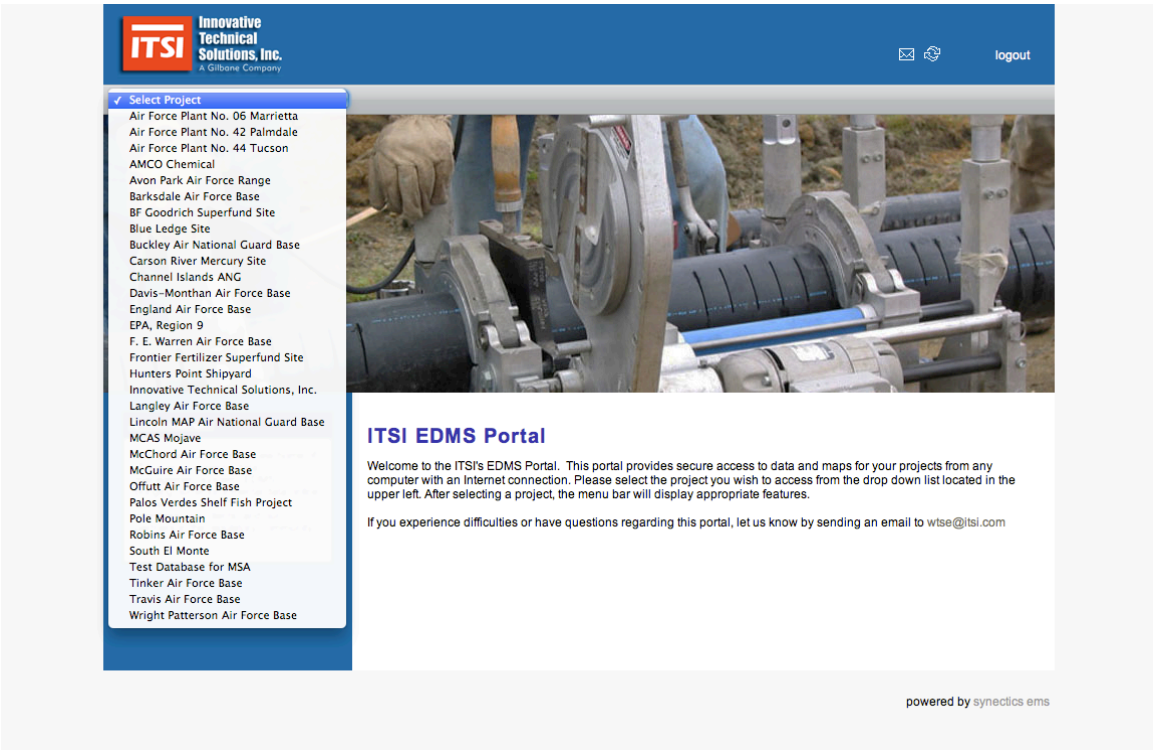
- Uploading Documents in eDMS
- Approving Documents in eDMS

Instructions
Uploading Documents in eDMS

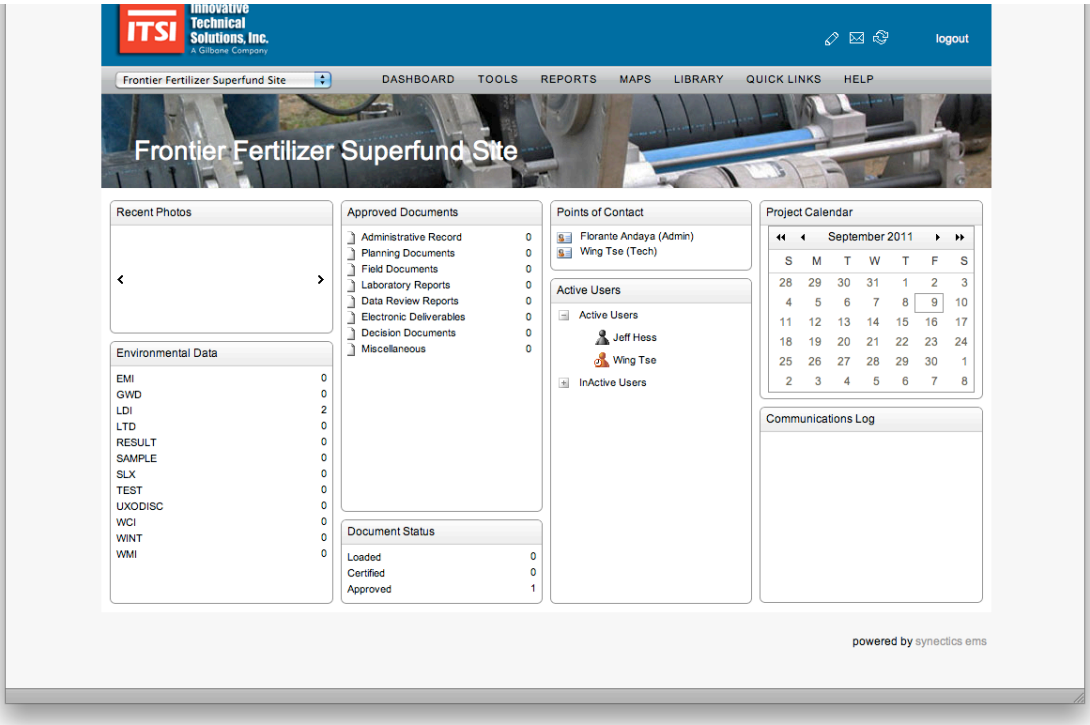
Open your browser, and go to http://edms.itsi.com



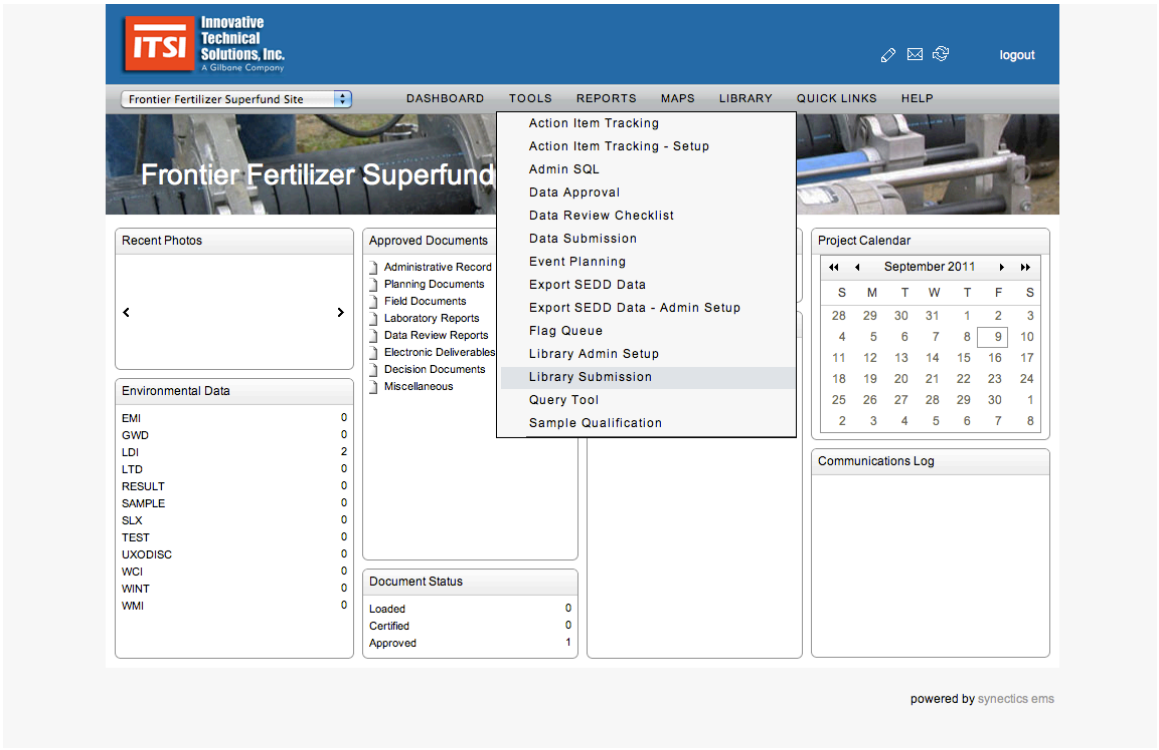
Select your project from the pull-down menu. Note, each person's list of projects will vary, as only those projects you have permissions for are shown.



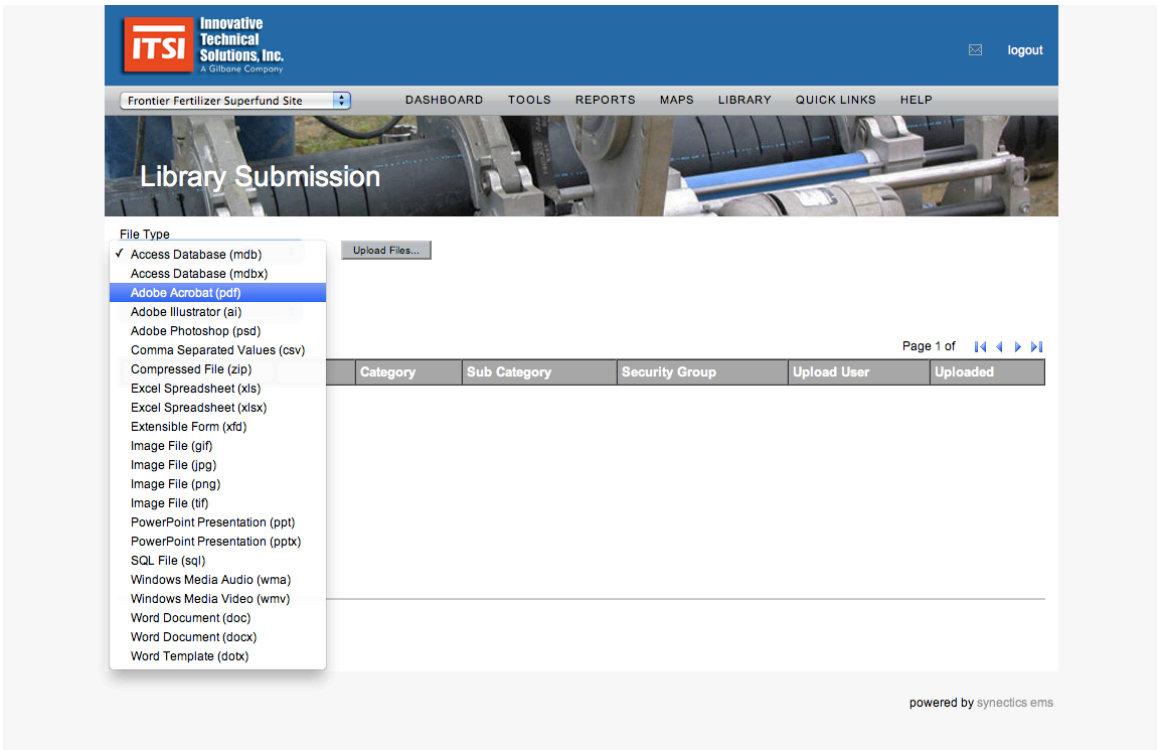
The screenshot below is of the "dashboard" for the Frontier Fertilizer project database under eDMS, as an example. The dashboard shows the status of various submittals, points of contact, project calendar, and displays recent photos uploaded to the project database.



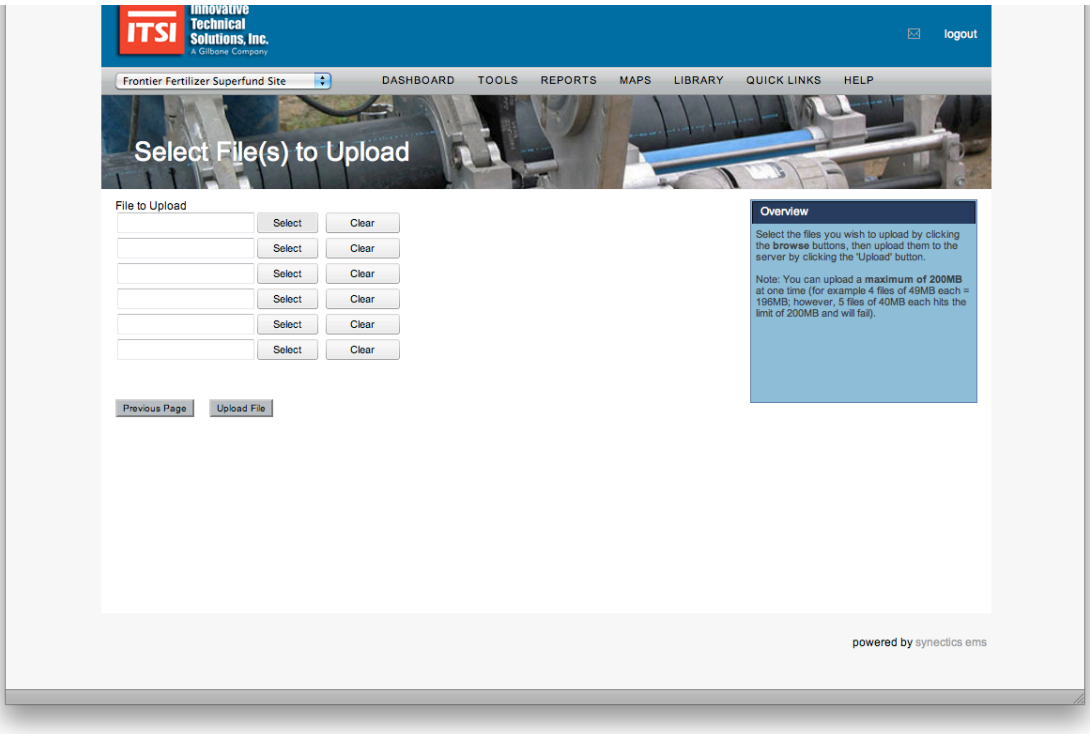
To upload documents to the library in the project database, click on the “Tools” menu and select “Library Submission”.



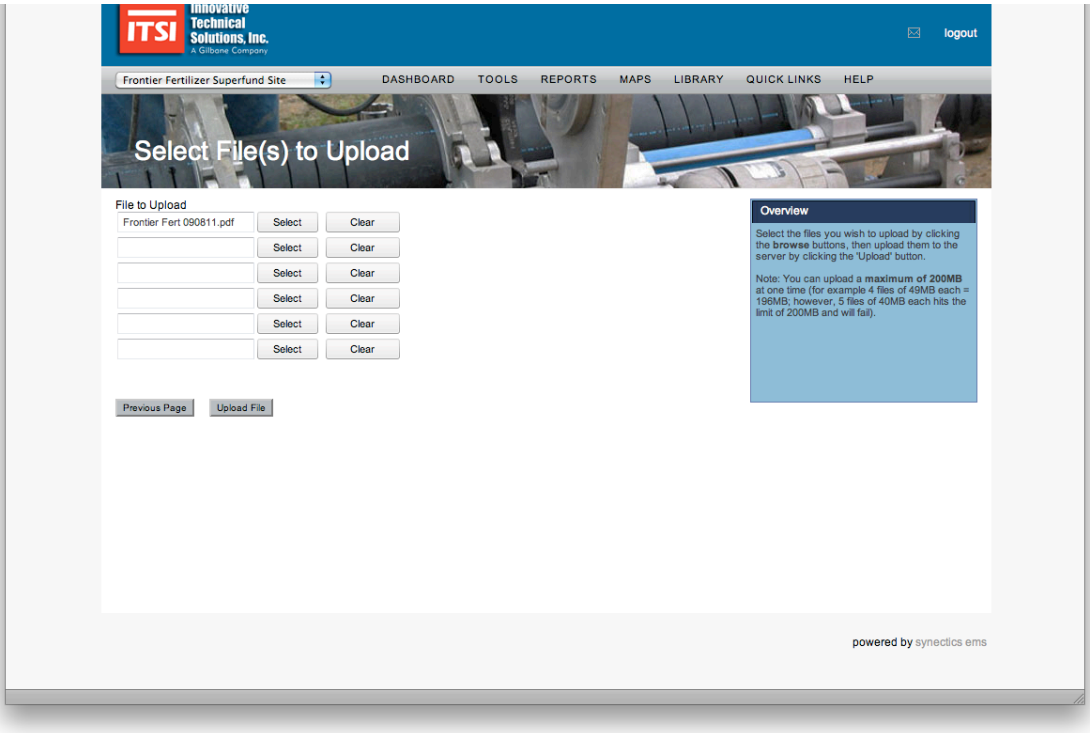
Select the “File Type” from the pull-down menu.



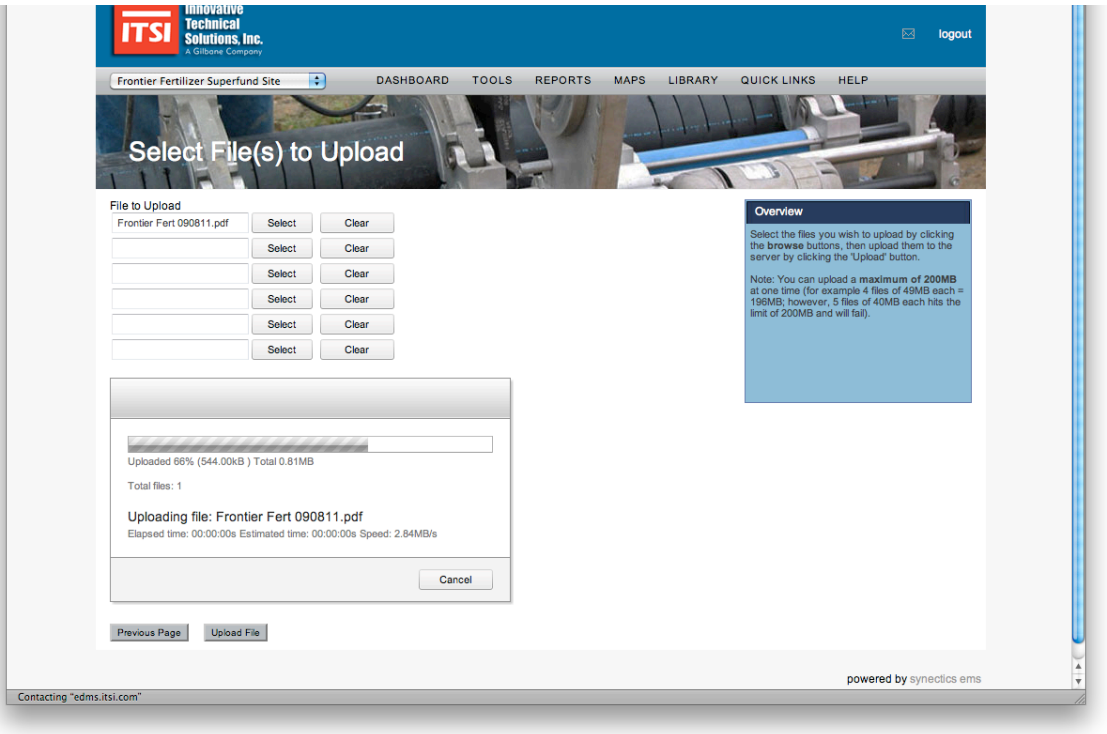
A menu appears which allows up to 6 files to be uploaded at once, with a 200 MB maximum upload.



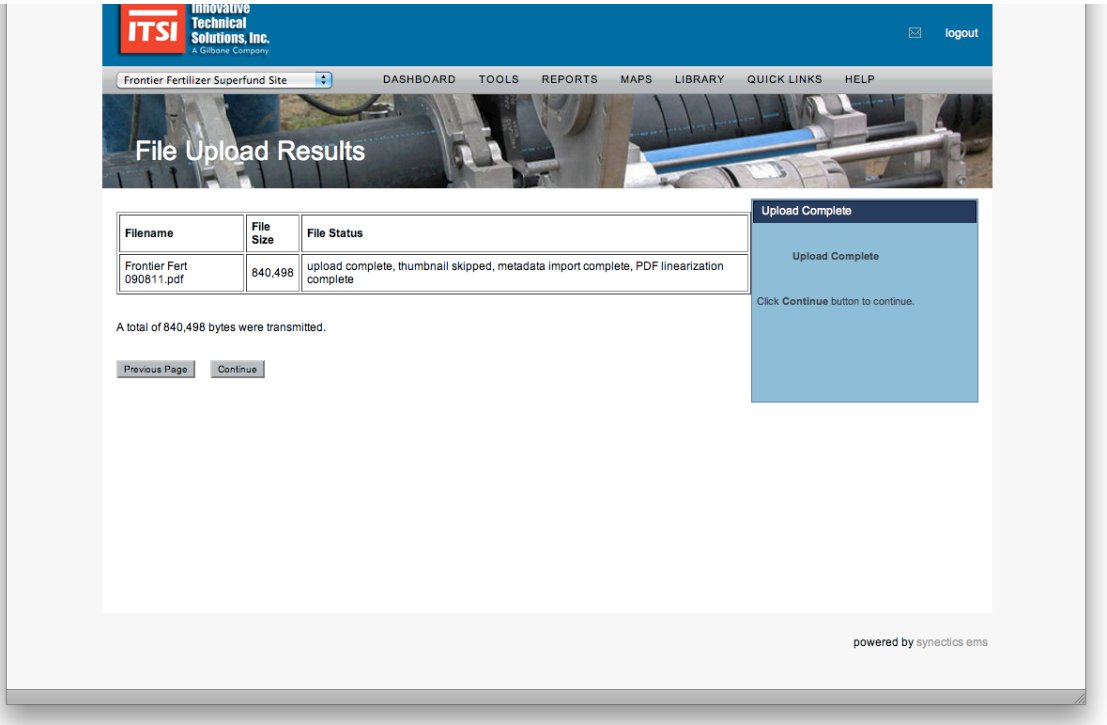
Click on the "Select" button and select the file to upload from your computer.



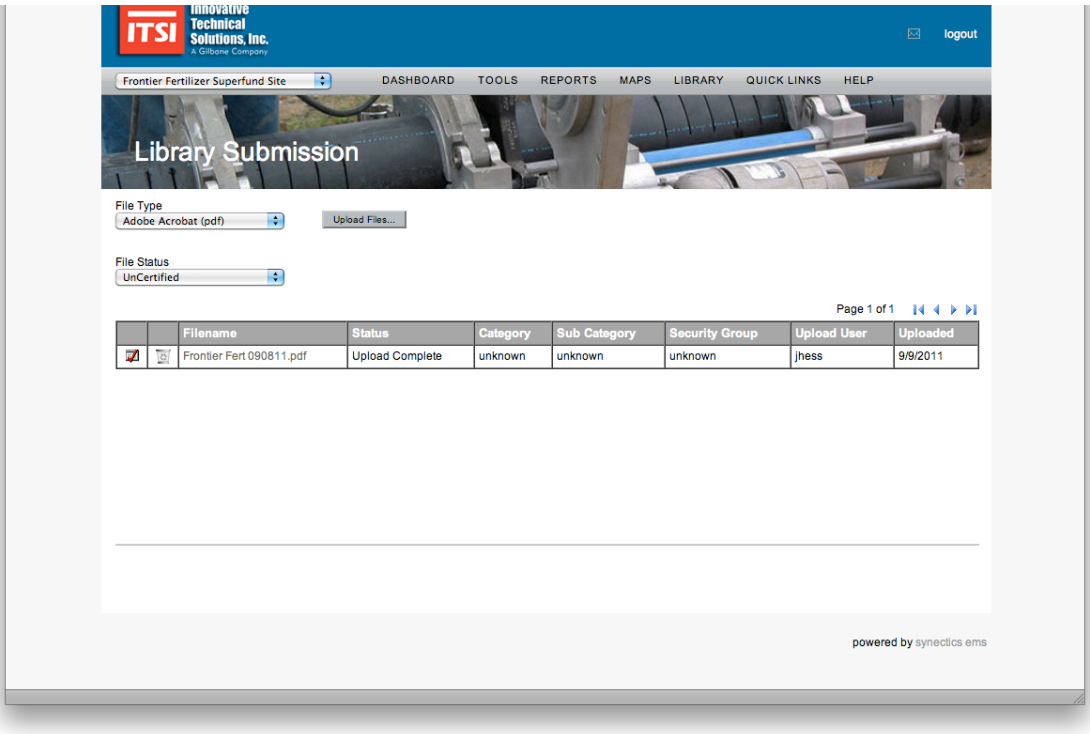
Hit “Upload File”. The upload process is then displayed.



The file is then listed in the “File Upload Results” screen, and shows the uploaded file size.



Hit the “Continue” button.



The file is now displayed in the “Library Submission” screen as an “uncertified” file. Files have three states:

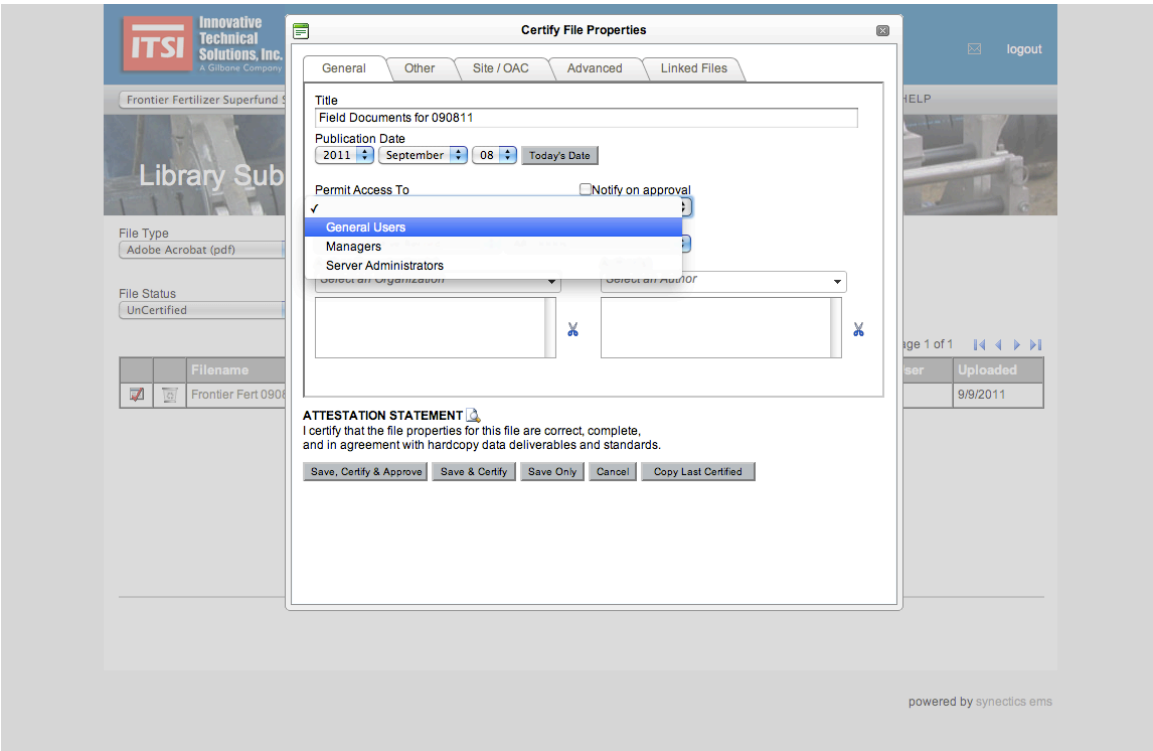
1) **Uncertified**. Uncertified files represent the initial uploaded document without completed metadata, and can only be accessed and edited by the person who uploaded the file.
2) **Certified**. The file is complete from the perspective of the person uploading the file. The document and associated metadata is ready for QC, and is visible only to those parties with approval authority.
3) **Approved**. The document and associated metadata is complete and accurate, represents information collected consistent with the planning documents and other requirements of the project, and was successfully QC’ed by an appropriately knowledgeable second person. The “approved” document is now viewable by all parties who have appropriate access to the project database.

Since the above document is still “Uncertified”, the file upload process is not yet complete until additional information (the metadata) is input relative to the file, and the file is “certified” by the submitter.

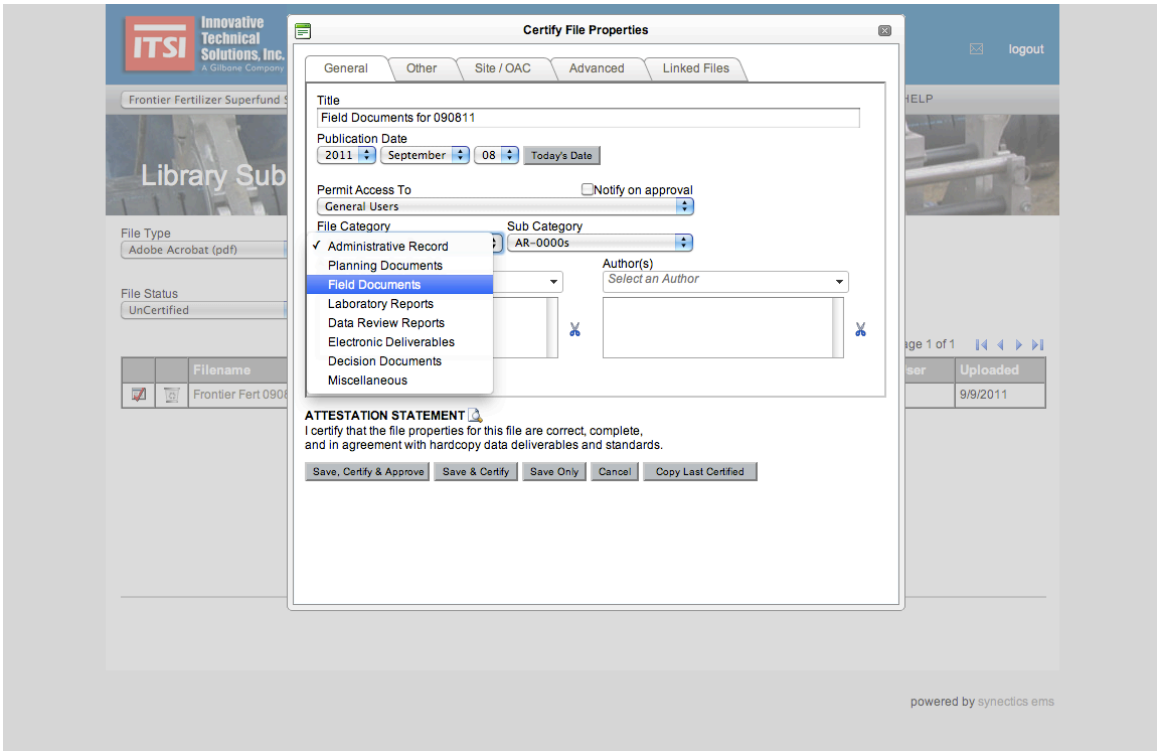
To edit the metadata (source data) associated with the uploaded file, click on the far left box with the check mark and enter the appropriate information on the resulting “Certify File Properties” screen. This information includes (at a minimum):

- Title of the document (this is the name the document will have in the project library, so keep this consistent for the same type of document),
- Date of the document (or date the field or meeting notes represent)
- Permit access to (who can access the document, typically this is “general users” but the system does allow for the storage of confidential information available only to a select category of user)
- Document “file category” and “sub category” (these are important, as specific searches can be performed by sub category of document, such as requesting all chain-of-custodies on the project to date)
- Author organization (typically ITSI for our reports, memorandums, field notes etc.)

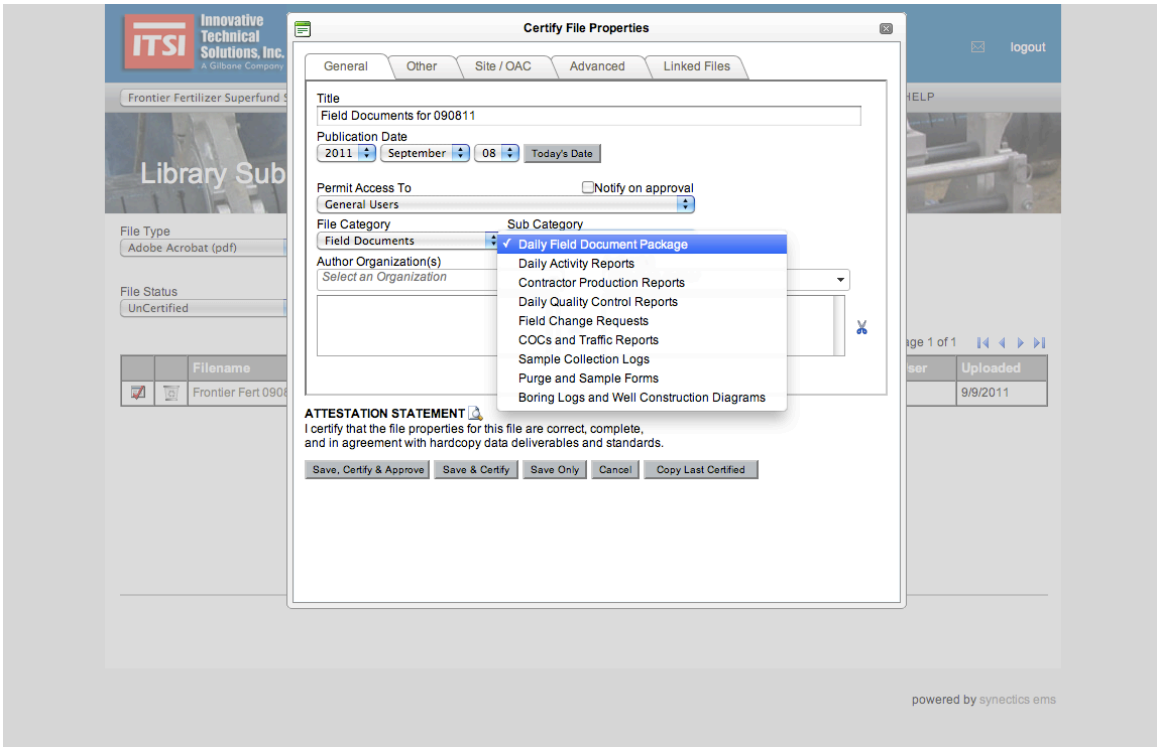
To set the document access:



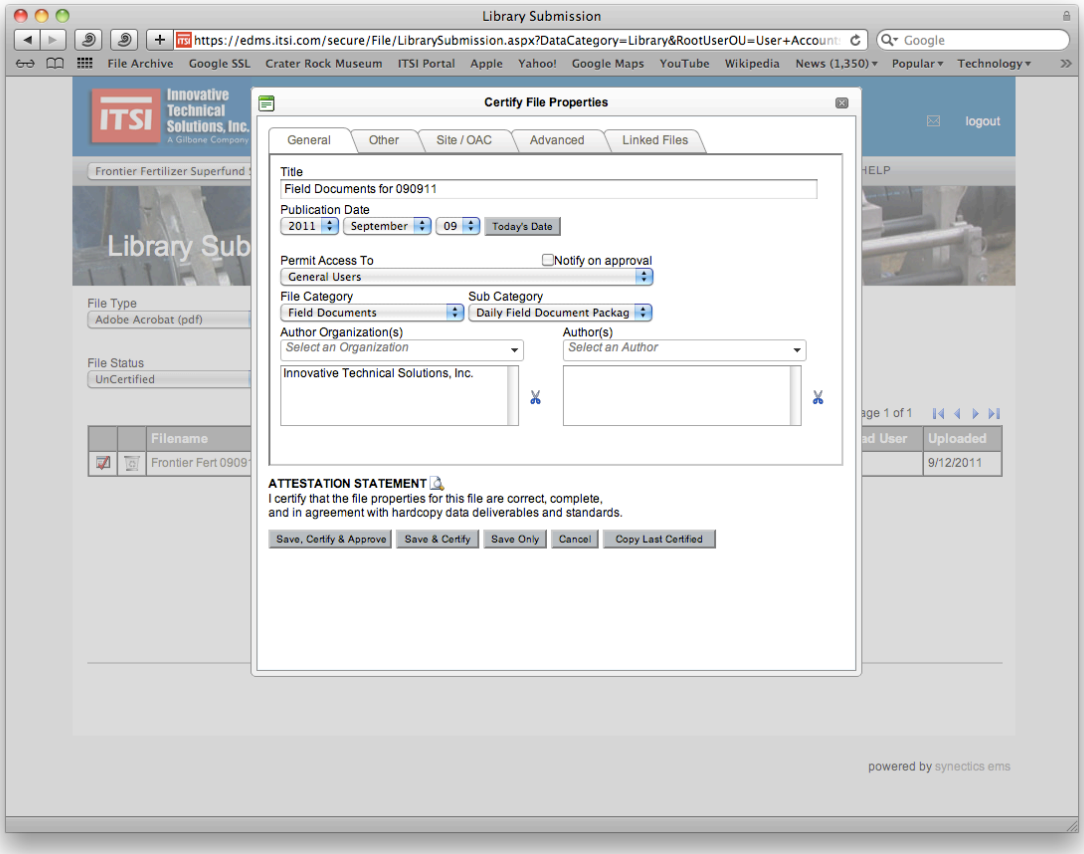
To set the “File Category”:



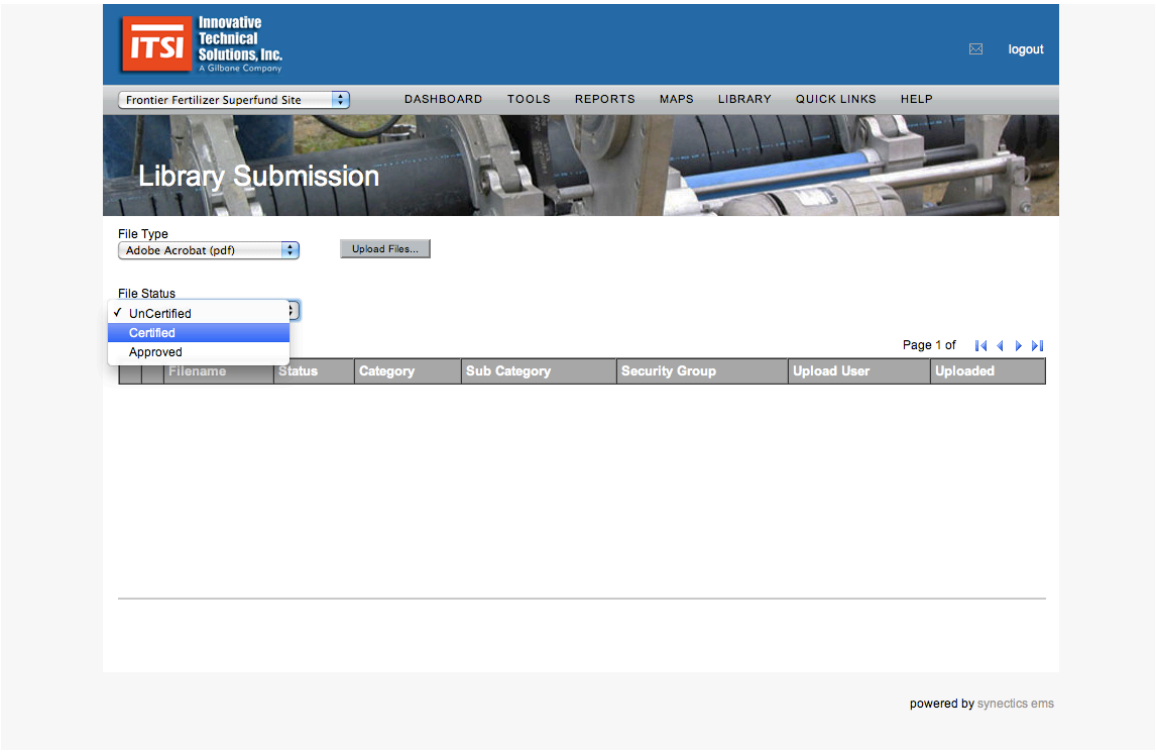
To set the document “Sub Category”:



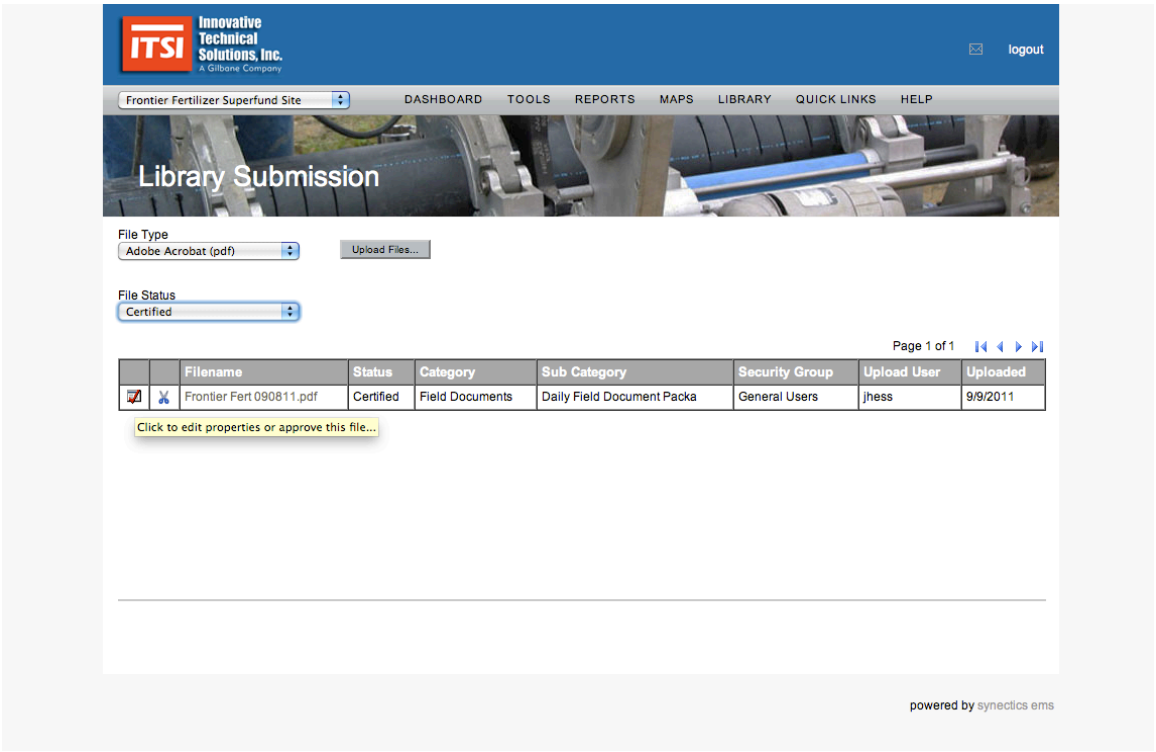
Once the metadata is completely entered (at least the minimum set of information as identified above), click the “Save and Certify” button.



To verify the document has been saved and certified, select ‘Certified” from the pull down menu under “File Status”.



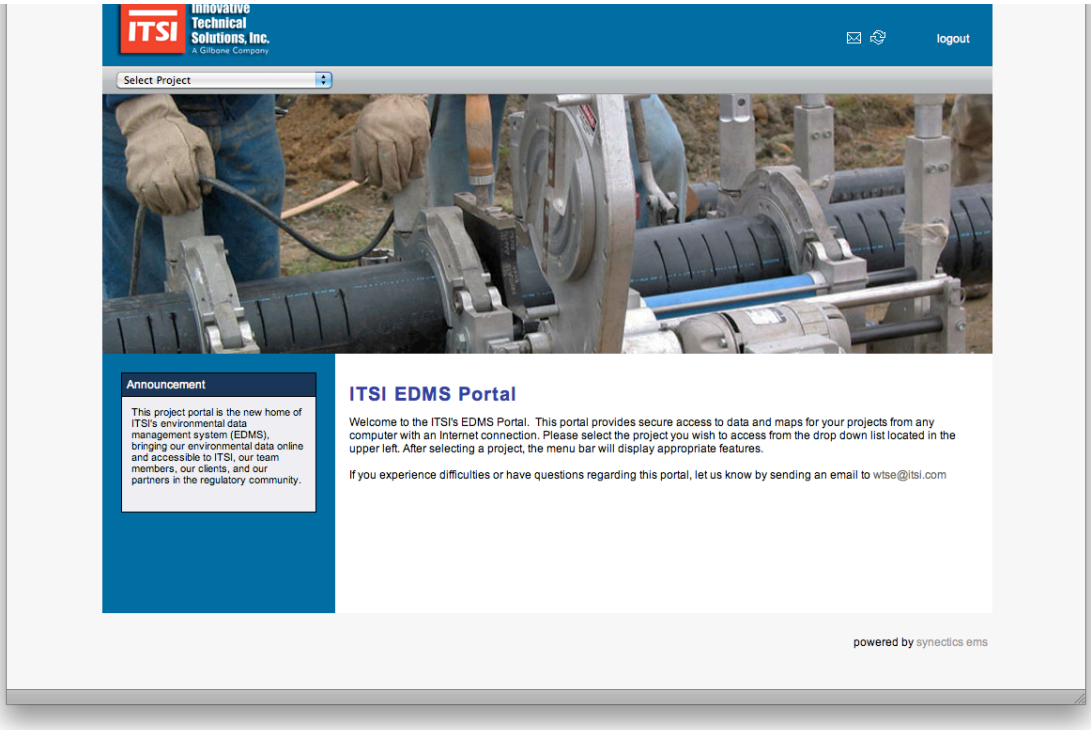
The document will now appear in the list under “Certified”.



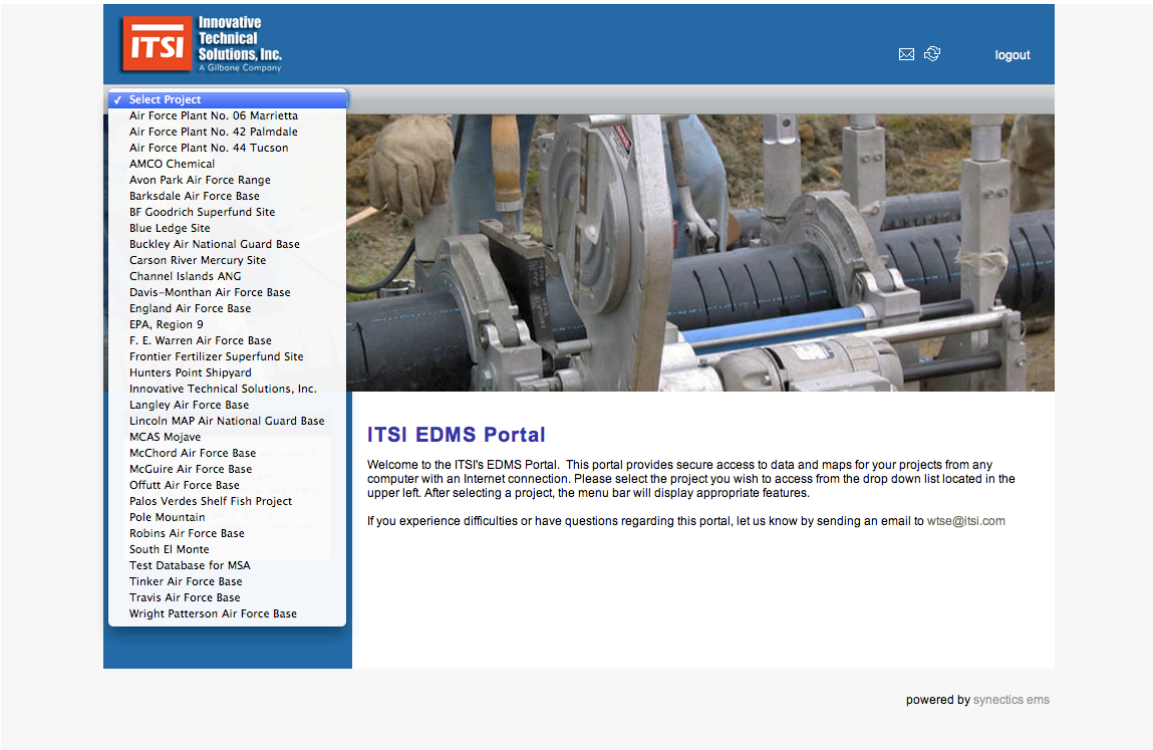
The document has now successfully been uploaded to the project library. However, at this step the document is only available to those who have approval rights to the database, not general users. To make the document available to all users, the document must be QC checked and "approved". Separate instructions are provided for the approval process.

Instructions
Approving Documents in eDMS

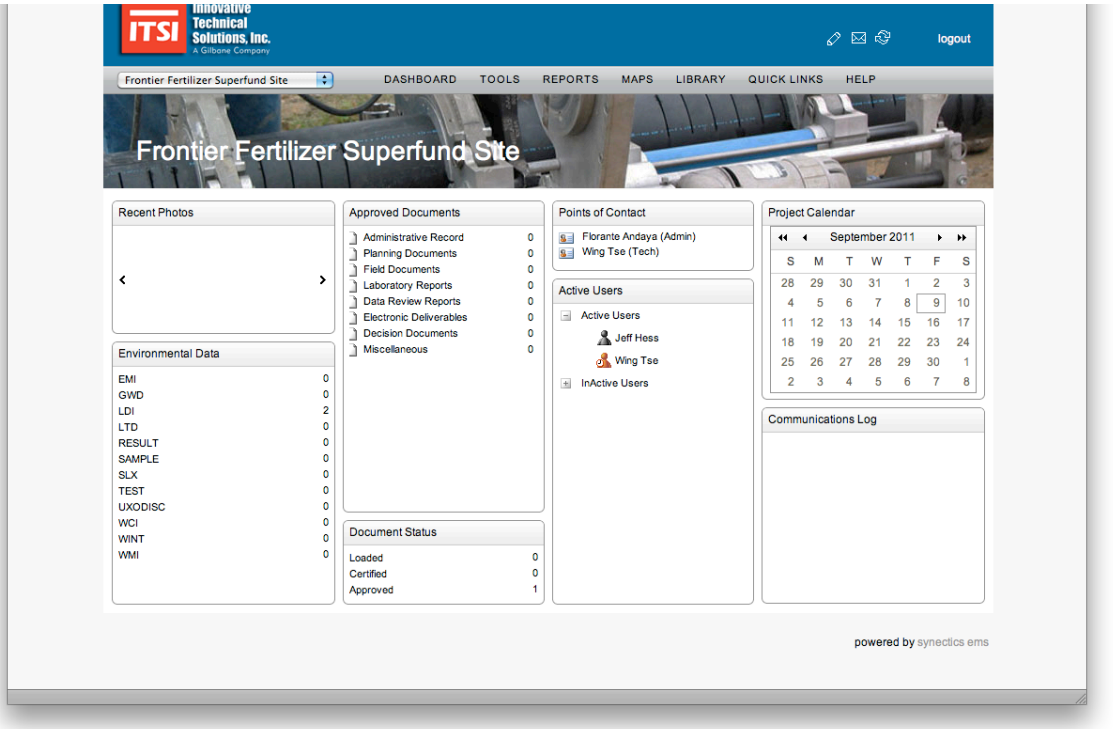
Open your browser, and go to http://edms.itsi.com



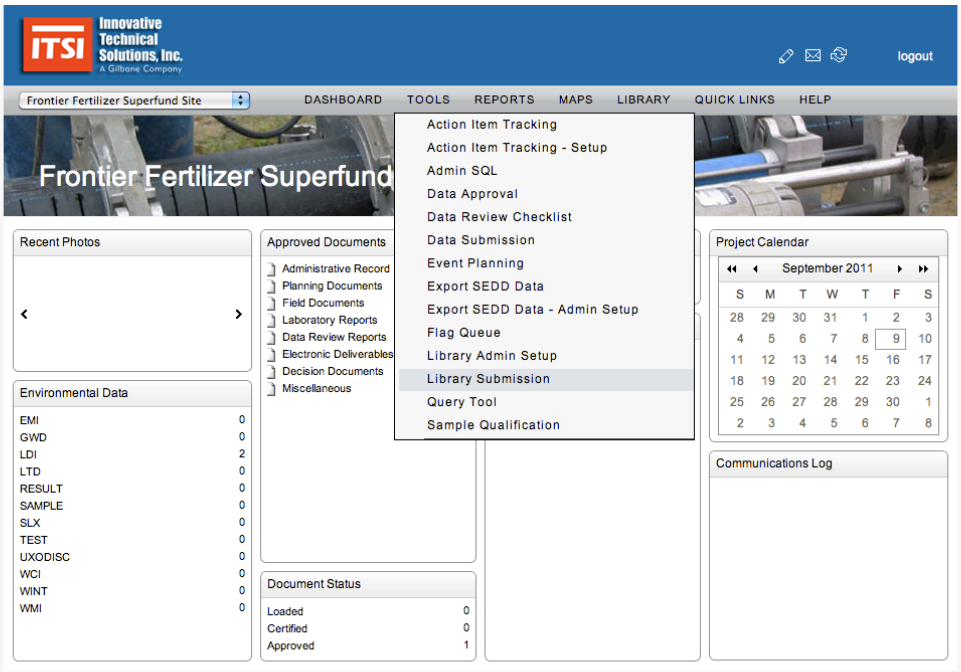
Select your project from the pull-down menu. Note, each person's list of projects will vary, as only those projects you have permissions for are shown.



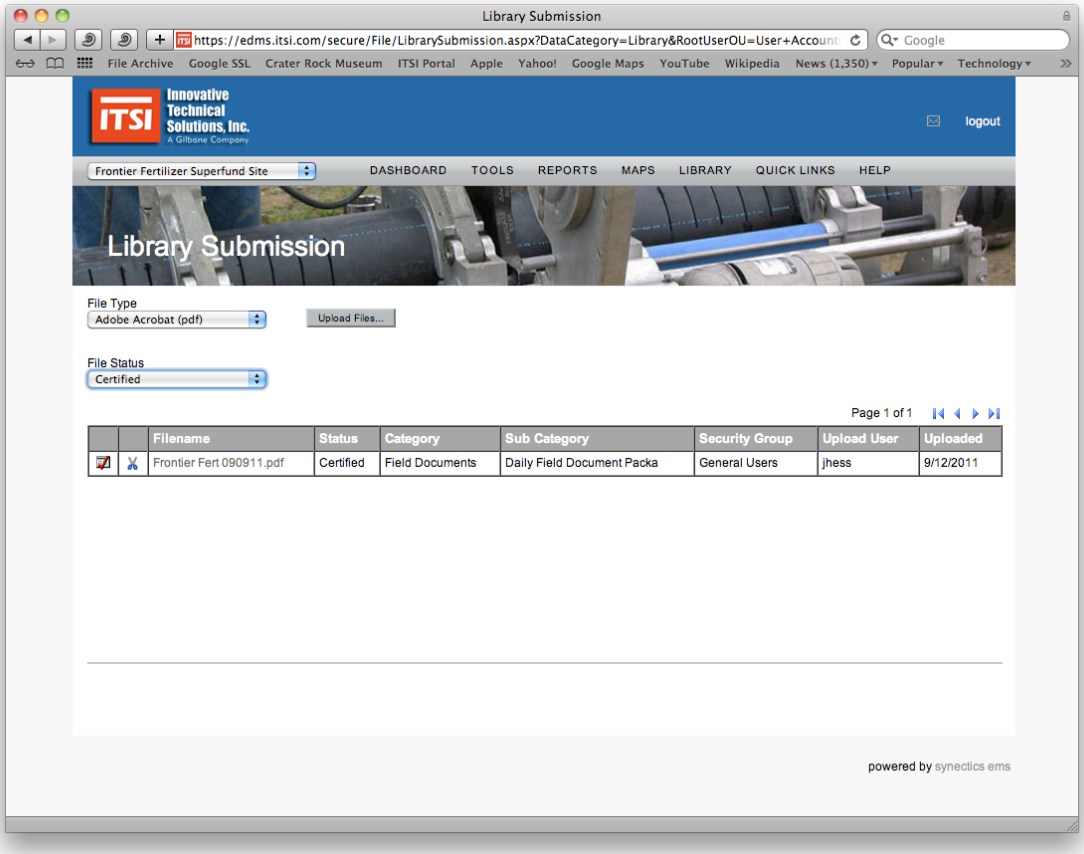
The screenshot below is of the "dashboard" for the Frontier Fertilizer project database under eDMS, as an example. The dashboard shows the status of various submittals, points of contact, project calendar, and displays recent photos uploaded to the project database.



To QC and approve a document in the library in the project database, click on the “Tools” menu and select “Library Submission”.



Select “Certified” from the “File Status” pull-down menu.



Click on the document filename. This pulls the document up in a separate window to review the contents of the document. There are two options at this point:

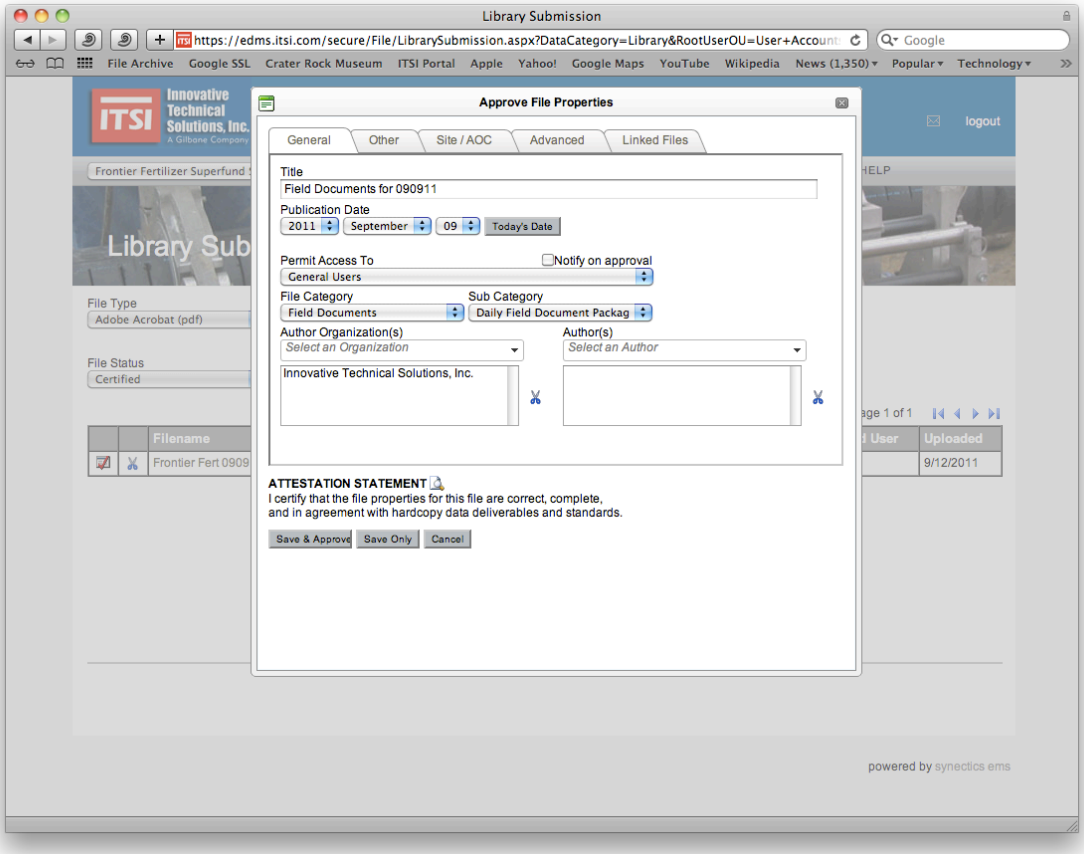
1. If there are problems with the document and it needs to be corrected or amended by the submitter, click on the box containing the scissors and “uncertify” the document. This will return it to “uncertified” status and allow for the document to be replaced with a corrected version by the original submitter. The reviewer will then need to notify the original submitter regarding the necessary corrections and that the document will need to be re-uploaded once corrected.
2. If the document is ok, then click on the far left box with the check mark. This pulls up the metadata (source data) associated with the document. Please verify the information is correct and make any changes needed to the metadata to complete the minimum required information and make it consistent with previous entries. The minimum needed metadata includes:
    a. Title of the document (this is the name the document will have in the project library, so keep this consistent for the same type of document),
    b. Date of the document (or date the field or meeting notes represent)

c. Permit access to (who can access the document, typically this is "general users" but the system does allow for the storage of confidential information available only to a select category of user)

d. Document "file category" and "sub category" (these are important, as specific searches can be performed by sub category of document, such as requesting all chain-of-custodies on the project to date)

e. Author organization (typically ITSI for our reports, memorandums, field notes etc.)

3. Once the metadata has been verified, click the "Save and Approve" button.



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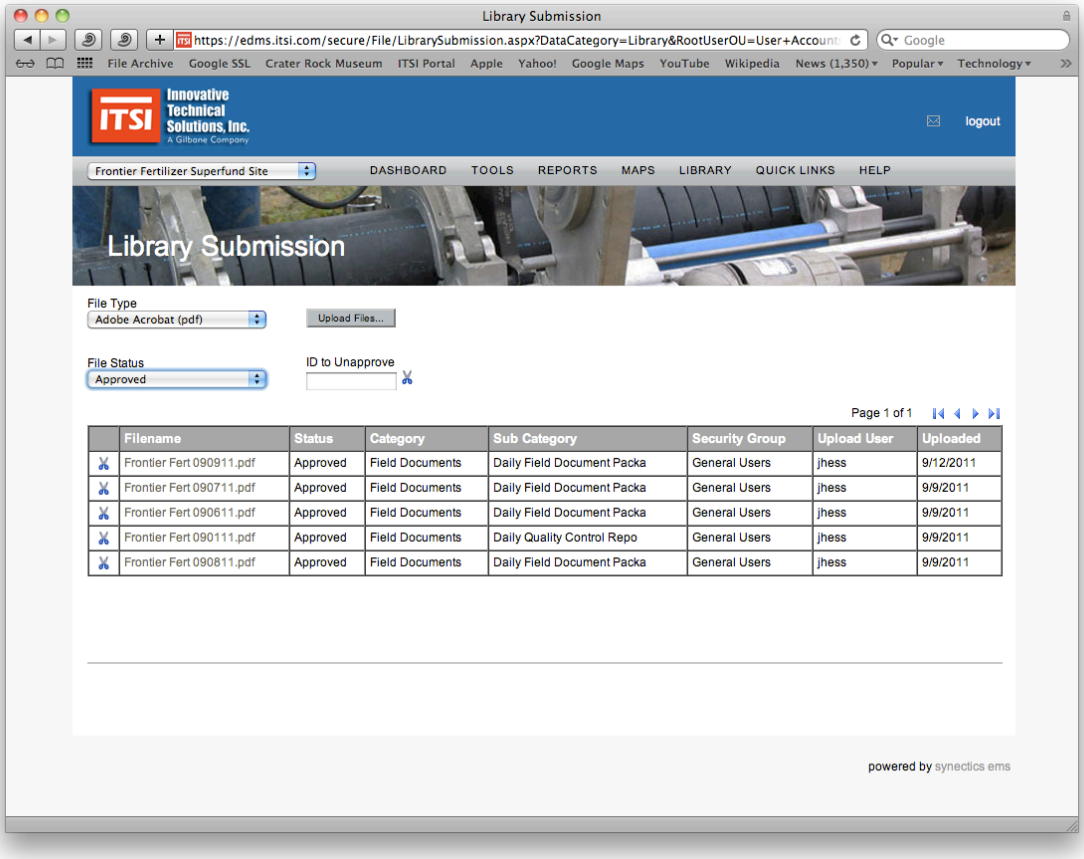

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Attachment B

Field Forms

- Daily Activity Report
- Contractor Production Report

Daily Activity Report (DAR)

ITSI Gilbane

Project Name:	Page of
Project No./Task Code:	Date:
Description of Work:	
Visitors / Subcontractors:	
Weather:	

Description of Field Activities

Prepared by:	Signature:

Contractor Production Report

(Attach Additional Sheets if Necessary)

ITSI Gilbane

Project Name:	Page of
Project No./Task Code:	Date:
Subcontractors:	

Work Performed Today

Schedule Activity No.	Work Location and Description	Employer	Number	Trade	Hours

Job Safety

Was a tailgate safety meeting held this date? (If yes, attach copy of the sign-in sheet)	☐ YES	☐ NO	Total Work Hours on Job Site Today (including any Continuation Sheets)	
Were any vehicle/heavy equipment inspections done? (If yes, attach copies of the inspections performed)	☐ YES	☐ NO	Cumulative Total of Work Hours from Previous Reports	
Was any trenching/confined space/crane/manlift work done? (If yes, attach statement or checklist showing inspections performed)	☐ YES	☐ NO	Total Work Hours from Start of Field Activity	
Were there any lost time accidents this date? (If yes, attach copy of completed accident report)	☐ YES	☐ NO		

Schedule Activity No.	List Safety Actions Taken Today/Safety Inspections Conducted	☐ Safety Requirements Have Been Met.

Equipment/Material Received Today To Be Incorporated In Job (Indicate Schedule Activity Number)

Schedule Activity No.	Submittal #	Description of Equipment/Material Received

Construction And Plant Equipment On Job Site Today (Indicate Hours Used And Schedule Activity Number)

Schedule Activity No.	Owner	Description of Construction Equipment Used Today (include Make and Model)	Hours Used

Schedule Activity No.	Remarks

Prepared by:	Signature:

ITSI Gilbane

Standard Operating Procedure

Soil: Volatile Organic Compound (VOC) Sampling

PR-TC-02.02.01.05 v1.2

Effective Date: 02 June 2010

Reviewed by: _____ Date: 02 March 2010
Kristen Carlyon, Program Chemist

Reviewed by: _____ Date: 02 March 2010
Evelyn Dawson, Program Chemist

Approved by: _____ Date: 02 March 2010
Jeffrey Hess, Program Director

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1.0	Initial Issue	NA	02 Mar 2010	NA
1.1	Addition of Terra Core System to SCDs	3.2 and 3.3	05 Oct 2011	J.Hess
1.2	Updated procedures to incorporate SW846 Update 4 changes to preservation and hold times.	Pages 3, 5-8, 11-12	30 Jul 2013	J.Hess

* Approval required for reviews and minor changes only. Substantive revisions to the technical requirements contained in the SOP require review and approval by the signatures to the SOP.

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1.0 PURPOSE AND SCOPE

The purpose of this standard operating procedure is to describe the requirements and procedures for the collection, packaging and transport of soil samples for the analysis of volatile organic compounds (VOCs). This SOP is focused on the preparation and preservation of soil samples in compliance with United States Environmental Protection Agency (USEPA) Method 5035 (USEPA, 1997) and updated USEPA Method 5035A (USEPA, 2002) and associated agency guidance documents such as the United States Department of Defense (USDoD) Quality Systems Manual, Version 5.0 (DoD, 2013).

Note: There are several approaches to the collection of VOC soil samples. However, the methods and their associated sampling and/or storage devices are not interchangeable. Also, each of the methods has limitations in their application and use, so the decision on which method to use should consider both the benefits and limitations of each method.

2.0 ACRONYMS AND DEFINITIONS

For purposes of this procedure, a number of terms and acronyms have the meanings defined below.

DQOs: data quality objectives

GPS: global positioning system

"high concentration": refers to concentrations of a volatile organic compound (VOC) greater than 200 ug/kg

"low concentration": refers to concentrations of a volatile organic compound (VOC) typically ranging from 0.5 ug/kg to 200 ug/kg

MFSD: multi-function sampling device

ml: milliliter

MS: matrix spike

MSD: matrix spike duplicate

PTFE: polytetrafluoroethylene

QAPP: Quality Assurance Project Plan

SCD: sub-coring device

USACE: United States Army Corps of Engineers

USEPA: United States Environmental Protection Agency

VOA: volatile organic analysis

VOC: volatile organic compound

3.0 PROCEDURES

The intent of this SOP is to present several acceptable procedures for the collection of VOC soil samples, consistent with EPA Method 5035A. The actual selected procedure will be specified in the project-specific QAPP. However, the following two steps are applicable to all the methods described in this SOP:

1. When the concentration of VOCs is unknown, a sample set typically is comprised of three (3) sub-samples of 5 grams of soil each.
2. To determine VOC concentrations on a dry weight basis, in the absence of an additional sample aliquot of sufficient volume to determine dry weight basis, a separate container (2-ounce jar or 40 ml vial) should be filled with soil that is co-located with each sample.

Each procedure has its own set of benefits and limitations. Selection of the appropriate procedure should be based primarily on which procedure best addresses the data quality objectives (DQOs) while considering the limitations imposed by field conditions and sampling requirements. Attachment A provides a brief discussion of some of the limitations of the specific procedures. Some of the limitations of the different procedures include:

3.1 USE OF MULTI-FUNCTION SAMPLING DEVICE

Multi-function sampling devices (MFSDs), such as the En Core® Sampler, act as both a coring tool and sample storage container, allowing for the collection of soil samples directly into the storage container with zero or minimal headspace. Currently approved MFSDs include the following:

- En Core® Sampler
- Core N' One™ soil sampling system

The procedures for the collection of the soil samples using the approved MFSDs are provided below. A soil sample typically is comprised of a minimum of 3 MFSDs containing 5 grams of soil each.

3.1.1 Encore Sampler

3.1.1.1 Required Equipment

- En Core® T-Handle
- En Core® Samplers

3.1.1.2 Sampling Procedure

1. Assemble the En Core® Sampler by holding the coring body and pushing the plunger rod down until the small o-ring rests against the tabs. Depress the locking lever on the En Core® T-handle and place the plunger end of the coring body into the open end of the T-handle. Align the two slots on the coring body with the two locking pins in the T-handle. Twist the coring body clockwise to lock the pins in the slots. Finally, check to ensure that the coring body is locked in place.

2. Collect the En Core® sample by grasping the T-Handle with the open end of the coring body facing the soil sample. Using the T-Handle, push the sampler into soil until coring body is completely full. The coring body is full when the small o-ring is centered in the viewing hole in the T-Handle. Remove the sampler from the soil. Push and twist cap on the exposed end of the coring body until the ridges on the coring body snap into the grooves of the cap. Check to ensure that cap is properly secured.

3. Prepare the sample for shipment by removing the T-Handle from the En Core® Sampler by depressing the locking lever on T-Handle and then twist and pull the En Core® Sampler from T-Handle. Lock the plunger by rotating the extended plunger rod fully counter-clockwise until the wings rest firmly against the tabs. Attach the completed circular label to the cap of the coring body.

4. Return the full En Core® Sampler to the zipper bag. Seal the bag and immediately place the bag in an ice chest filled with ice.

3.1.2 Core N' One™ Sampling System

3.1.2.1 Required Equipment

- Core N' One™ Soil Handle
- Core N' One™ Soil Capsules

3.1.2.2 Sampling Procedure

1. Remove capsule from zip lock and insert prongs into the slots of the Core N' One™ handle. Make a one-quarter turn to the right to lock the capsule in place.
2. Unscrew the capsule cap and bore the beveled edge opening into the soil. You can determine if you have taken a full 5-gram sample by holding the capsule up to the light. The dark shading of the soil should be at the top level of the cap threads.
3. Screw the cap tight. The edge of the cap should touch the center rib of the capsule.
4. Insert the capsule into the zip lock for transport to the lab.

3.1.3 Additional Analytical Requirements

Using MFSDs require specific handling procedures for the samples after collection and by the analytical laboratory.

Field preservations options include the following:

a) Place the samples in an iced cooler and chill and maintain the sample at the appropriate temperature for the specified method (as identified in the project-specific plans and/or as listed in SOP PR-TC-02.04.01.01, Sample Handling, Packaging and Shipping). Deliver the samples to the laboratory quickly to allow for analysis or extraction of the samples by the laboratory within 48 hours of sample collection time.

b) Place the samples in a freezer and chill and maintain the sample at < -7°C, and deliver the samples to the laboratory quickly to allow for analysis or extraction of the samples by the laboratory within 48 hours of sample collection time.

Although alternative a) is the normal procedure for most soils, alternative b) is necessary with biologically active soils potentially containing aromatic hydrocarbons (i.e., benzene).

Extraction options for the analytical laboratory include the following:

1) Analysis of the sample within 48 hours of sample collection.
2) Extrude core into unpreserved pre-tared VOA vial at the laboratory. For low-level analysis, the soil can be extruded, weighed and placed into a pre-tared VOA vial containing reagent-grade extractant water (the preferred low-level method, see Section 3.1.4 below). The laboratory then freezes the sample at < -7°C. The sample must then be analyzed within 14 days of the sample collection date.
3) Extrude core into preserved VOA vial at the laboratory. For low-level analysis, the soil can be extruded, weighed and preserved in a pre-tared VOA vial containing sodium bisulfate solution (not recommended, see Section 3.1.4 below). For high-level analysis, the soil can be extruded, weighed, and preserved with methanol. After extrusion of the soil into an appropriate extraction fluid, the sample must be analyzed within 14 days of the sample collection date.

Additionally, in order to determine VOC concentrations on a dry weight basis, in the absence of one or more additional sample aliquots of sufficient volume to determine dry weight basis, a separate container (2-ounce jar or 40 ml vial) should be filled with soil that is co-located to each sample collection point. Sample nomenclature that links this sample to the VOC sample containers that comprise a sample set should be used.

3.1.4 Method Incompatibilities

Biologically active samples may result in the rapid loss of aromatic hydrocarbons during the initial 48 hours after sampling, and thus should be immediately chemically preserved or frozen using dry ice.

Sample preservation with sodium bisulfate solution presents four potential problems:

i. Acid preservation may cause the chemical breakdown of certain reactive VOC compounds in the soil sample, specifically styrene, acrylonitrile, vinyl chloride, and 2- chloroethylvinyl ether.

ii. In soil samples with a high proportion of organic material, acid preservation may generate acetone as a byproduct.

iii. Calcareous soil samples may effervesce upon contact with sodium bisulfate solution and cause VOC loss.

iv. Calcareous soil samples may increase the pH of the preservation fluid above 2.0, producing a sample in an unpreserved state. Accordingly, the soils at the site should be evaluated for potential problems prior to sampling activities. In cases where

preservation by acid is a potential problem, an alternate sample collection method should be utilized.

3.2 USE OF SUB-CORING DEVICE AND FIELD PRESERVATION

An alternative to using MFSDs consists of using sub-coring devices (SCDs) and field preservation of the samples. Benefits of this method include less-expensive sampling devices (e.g., Lock N' Load™), and potentially longer holding times. However, SCDs and field preservation involves more physical handling of the samples in the field, including weighing of the samples, potentially impacting production rates. Also, preservatives for low- or high-level analysis pose significant problems themselves. This method should be used with caution and only after full consideration of the inherent problems in the method.

Approved SCDs include:

- Lock N' Load™ sampling system
- EasyDraw Syringe®
- Terra Core® Sampler

The procedures for the collection of the soil samples using the approved SCDs are provided below. A soil sample typically is comprised of a minimum of 3 field preserved vials containing 5 grams of soil each.

3.2.1 Lock N' Load™ Sampling System

3.2.1.1 Required Equipment

- Lock N' Load™ soil handle
- Lock N' Load™ soil syringe
- VOA vials with preservative (pre-tared)

3.2.1.2 Sampling Procedure

1. Insert Lock N' Load™ Syringe into Lock N' Load™ Handle at base opening. Turn the locking portion of the syringe into the O gram setting. Remove end cap from the Lock N' Load™ Syringe. Position the Lock N' Load™ Handle to the desired soil sample volume (5 grams in triplicate). To do this, slide the slot portion of the handle down the fitted track, then turn the handle one quarter to the right at the desired setting.
2. Push the syringe into the soil until the plunger portion of the syringe makes contact with the base of the Lock N' Load™ Handle.
3. Transfer the soil from the syringe into a pre-tared 40 ml VOA vial containing the appropriate preservative, if any, by turning the Lock N' Load™ Handle one quarter to the left (back to the fitted track) and pushing down. Slightly tilt the VOA vial to avoid splashing and potentially losing some of the preservative. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.2.2 EasyDraw Syringe® and PowerStop Handle®

3.2.2.1 Required Equipment

- PowerStop Handle®
- EasyDraw Syringe®
- VOA vials with preservative (pre-tared)

3.2.2.2 Sampling Procedure

1. Load Sampling Device. Insert the EasyDraw Syringe® into the appropriate slot on the Powerstop Handle® and remove end cap from syringe. For low-level analysis, insert syringe into one of the three positions of the device for collection of 5 gram samples. Use the heavy position for dense clay, the light position for dry sandy soil, and the medium position for all others.
2. Collect Sample. Push the EasyDraw Syringe® into freshly exposed soil. Continue pushing until the soil column inside the syringe has forced the plunger to the stopping point. The soil plug should be flush with the mouth of the sampler. The EasyDraw Syringe® delivers approximately 5, 10 or 13 grams. Actual weight will be determined at the laboratory.
3. Eject Sample Into Vial. Remove the syringe from the Powerstop Handle®. Insert syringe into open end of a pre-tared 40-ml VOA vial containing the appropriate preservative, if any. Extrude the sample into the vial by pushing on the syringe plunger. Slightly tilt the VOA vial to avoid splashing and potentially losing some of the preservative. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.2.3 Terra Core® Sampler

3.2.3.1 Required Equipment

- Terra Core® Sampler
- VOA vials with preservative (pre-tared)

3.2.3.2 Sampling Procedure

1. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately 5 or 10 grams of soil.
2. Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
3. Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Slightly tilt the VOA vial to avoid splashing and potentially losing some of the preservative, and

quickly place the lid back on the 40ml VOA vial. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.2.4 Additional Analytical Requirements

Using field preservation requires specific handling procedures for the samples after collection and by the analytical laboratory. Requirements vary depending on the specific preservation method, so care needs to be taken to follow the specific procedure carefully.

Preservation options include the following:

b) Field preservation with methanol. After extruding the soil samples into pre-tared 40-ml VOA vials preserved with methanol, the vials are re-weighed in the field, and then are chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. The samples must arrive at the laboratory within 48 hours of the sample collection time. The vials are weighed again at the stationary laboratory to verify that no methanol was lost during transport. The laboratory must prepare and analyze the samples within 14 days of the sample collection date. This technique applies only to high-level analysis so it should be used only if detection limits of greater than 200 ug/kg are appropriate.

c) Field preservation with sodium bisulfate solution. After extruding the soil samples into pre-tared 40-ml VOA vials preserved with sodium bisulfate solution, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. The samples must arrive at the laboratory within 48 hours of the sample collection time. The laboratory must prepare and analyze the samples within 14 days of the sample collection date. This preservation technique provides detection limits to approximately 0.5 ug/kg (low-level analysis). However, sample preservation with sodium bisulfate solution presents four potential problems:

   i. Acid preservation may cause the chemical breakdown of certain reactive VOC compounds in the soil sample, specifically styrene, acrylonitrile, vinyl chloride, and 2- chloroethylvinyl ether.

   ii. In soil samples with a high proportion of organic material, acid preservation may generate acetone as a byproduct.

   iii. Calcareous soil samples may effervesce upon contact with sodium bisulfate solution and cause VOC loss.

   iv. Calcareous soil samples may increase the pH of the preservation fluid above 2.0, producing a sample in an unpreserved state. Accordingly, the soils at the site should be evaluated for potential problems prior to sampling activities. In cases where preservation by acid is a potential problem, an alternate sample collection method should be utilized.

d) Field extraction into reagent water and analysis within 48 hours. After extruding the soil samples into pre-tared 40-ml VOA vials containing reagent-grade extractant water, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice

to ensure that the required temperature is maintained during transport to the laboratory. Upon receipt of the samples, the laboratory chills the vials to the required temperature and analyzes the samples within 48 hours of the sample collection time. This technique applies to samples for low-level and high-level analysis.

Note: Extruding soil samples into vials containing reagent-grade extractant water may have an adverse effect on sample results in that water may actually promote bacterial degradation of aromatic hydrocarbons. Likewise, some VOCs may be unstable in reagent water, such as 1,1,2,2-tetrachloroethane. Accordingly, reagent water-filled vials should only be used for chemicals that do not readily biodegrade or breakdown.

e) Field extraction into reagent water and field freezing. After extruding the soil samples into pre-tared 40-ml VOA vials containing reagent-grade extractant water, the samples are frozen to <-7°C in a cooler in the field and shipped with adequate dry ice to ensure that <-7°C is maintained during transport to the laboratory. The vials should not be frozen below -20°C due to potential problems with the vial seals. A temperature blank should be included with the samples so that the laboratory can verify the temperature upon receipt and the arrival temperature of the samples should be annotated on the chain-of-custody form. During the freezing process, the vials should be stored in a 45° angle to prevent water expansion from shattering the vials. To avoid potential rupture of the PTFE-lined septum caps, the dry ice should not directly contact the top of the vials. The laboratory must immediately freeze the sample vials to <-7°C upon receipt. The samples may be held at <-7°C for up to 7 days prior to analysis from the sample collection date. This technique applies to samples for low-level and high-level analysis. This option is used in the situations where it is difficult or impossible to deliver the samples to the laboratory within 48 hours of the sample collection time.

f) Field extraction into reagent water and laboratory freezing. After extruding the soil samples into pre-tared 40-ml VOA vials containing reagent-grade extractant water, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. The laboratory must receive and immediately freeze the vials to <-7°C within 48 hours of the sample collection time. During the freezing process, the vials should be stored in a 45° angle to prevent water expansion from shattering the vials. The samples may be held at <-7°C for up to 7 days prior to analysis from the sample collection date. The vials should not be frozen below -20°C due to potential problems with the vial seals. This technique applies to samples for low-level and high-level analysis.

Additionally, in order to determine VOC concentrations on a dry weight basis, in the absence of one or more additional sample aliquots of sufficient volume to determine dry weight basis, a separate container (2-ounce jar or 40 ml vial) should be filled with soil that is co-located to each sample collection point. Sample nomenclature that links this sample to the VOC sample containers that comprise a sample set should be used.

3.2.5 Method Incompatibilities

3.2.4.1 Aromatic Hydrocarbons

Chemicals, such as aromatic hydrocarbons (e.g., benzene), are subject to VOC loss by biodegradation under certain sampling procedures. Accordingly, to obtain aromatic hydrocarbon soil concentrations that are representative of site conditions, only a subset of the available options are available for use. To reduce the biological activity in soil contaminated with aromatic hydrocarbons, soil samples should be preserved with methanol or sodium bisulfate solution in the field, or frozen in the field at <-7°C in non-preserved VOA vials. Under no circumstances should soil samples contaminated with aromatic hydrocarbons be collected in the field with VOA vials containing reagent-grade extractant water. The introduction of unpreserved water to the soil sample may enhance the biodegradation of the aromatic hydrocarbons.

3.2.4.2 Chemical Reactions

Acid preservation of soil by sodium bisulfate solution, whether done in the field or in the stationary laboratory, may cause the chemical breakdown of certain compounds, including vinyl chloride. Some olefins, ketones, esters, ethers, and sulfides may react under low pH conditions, yielding analytical results that are not representative of soil conditions. Hence, precaution should be taken when preserving soil samples with sodium bisulfate solution when these compounds are present. If the degree of potential chemical reaction is unknown, an alternative procedure should be used.

3.2.4.3 Calcareous Soil

Calcareous soil samples may react upon contact with sodium bisulfate solution, causing VOC loss through effervescence and potentially cause failure of the VOA vial septum through pressure buildup. Additionally, when soil samples are highly calcareous in nature, the sodium bisulfate preservative solution may not be strong enough to reduce the pH of the aqueous solution to below 2.0, potentially rendering the preservative useless. If carbon dioxide is generated due to carbonate reaction with the acid, the carbon dioxide in the VOA vial may interfere with the detector of the analytical equipment. Hence, precaution should be taken when preserving soil samples with sodium bisulfate solution when carbonates are present.

3.3 USE OF SUB-CORING DEVICE AND EMPTY VIAL

An alternative to using SCDs with field preservation consists of field extruding the samples into clean VOA vials. Benefits of this method include use of less-expensive SCDs and potentially longer holding times. However, the empty vial method involves more physical handling of the samples in the field, including weighing of the samples, potentially impacting production rates. This method should be used with caution and only after full consideration of the inherent problems in the method.

Soil samples for the empty vial method are collected using a sub-coring device. Approved sub-coring devices include:

- Lock N' Load™ sampling system
- EasyDraw Syringe®
- Terra Core® Sampler

The procedures for the collection of the soil samples using the approved sub-coring devices are provided below. A soil sample typically is comprised of a minimum of 3 empty vials containing 5 grams of soil each.

3.3.1 Lock N' Load™ Sampling System

3.3.1.1 Required Equipment

- Lock N' Load™ soil handle
- Lock N' Load™ soil syringe
- VOA vials (pre-tared)

3.3.1.2 Sampling Procedure

1. Insert Lock N' Load™ Syringe into Lock N' Load™ Handle at base opening. Turn the locking portion of the syringe into the O gram setting. Remove end cap from the Lock N' Load™ Syringe. Position the Lock N' Load™ Handle to the desired soil sample volume (5 grams in triplicate). To do this, slide the slot portion of the handle down the fitted track, then turn the handle one quarter to the right at the desired setting.
2. Push the syringe into the soil until the plunger portion of the syringe makes contact with the base of the Lock N' Load™ Handle.
3. Transfer the soil from the syringe into a pre-tared empty 40 ml VOA vial by turning the Lock N' Load™ Handle one quarter to the left (back to the fitted track) and pushing down. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.3.2 EasyDraw Syringe® and PowerStop Handle®

3.3.2.1 Required Equipment

- PowerStop Handle®
- EasyDraw Syringe®
- VOA vials (pre-tared)

3.3.2.2 Sampling Procedure

1. Load Sampling Device. Insert the EasyDraw Syringe® into the appropriate slot on the Powerstop Handle® and remove end cap from syringe. For low-level analysis, insert syringe into one of the three positions of the device for collection of 5 gram samples. Use the heavy position for dense clay, the light position for dry sandy soil, and the medium position for all others.
2. Collect Sample. Push the EasyDraw Syringe® into freshly exposed soil. Continue pushing until the soil column inside the syringe has forced the plunger to the stopping point. The soil plug should be flush with the mouth of the sampler. The EasyDraw Syringe® delivers approximately 5, 10 or 13 grams. Actual weight will be determined at the laboratory.

3. Eject Sample Into Vial. Remove the syringe from the Powerstop Handle®. Insert syringe into open end of a pre-tared empty 40-ml VOA vial. Extrude the sample into the vial by pushing on the syringe plunger. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.3.3 Terra Core® Sampler

3.3.3.1 Required Equipment

- Terra Core® Sampler
- VOA vials (pre-tared)

3.3.3.2 Sampling Procedure

1. With the plunger seated in the handle, push the Terra Core® into freshly exposed soil until the sample chamber is filled. A filled chamber will deliver approximately 5 or 10 grams of soil.
2. Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
3. Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body. Place the mouth of the sampler into the 40ml VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down. Slightly tilt the VOA vial to avoid splashing and potentially losing some of the preservative, and quickly place the lid back on the 40ml VOA vial. Avoid getting dirt on the threads of the vial. Cap the vial and store the sample at the required temperature until time of analysis.

3.3.4 Additional Analytical Requirements

Using the empty vial method requires specific handling procedures for the samples after collection and by the analytical laboratory. Requirements vary depending on the specific preservation method, so care needs to be taken to follow the specific procedure carefully.

Handling options include the following:

a) Field extraction and analysis within 48 hours. After extruding the soil samples into pre-tared empty 40-ml VOA vials, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. Upon receipt of the samples, the laboratory chills the vials to the required temperature and analyzes the samples within 48 hours of the sample collection time. This technique applies to samples for low-level and high-level analysis.

b) Field extraction and laboratory freezing. After extruding the soil samples into pre-tared empty 40-ml VOA vials, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. The laboratory must receive and immediately freeze the vials to <-7°C within 48 hours of the sample collection time. The

samples may be held at <-7°C for up to 14 days prior to analysis from the sample collection date. The vials should not be frozen below -20°C due to potential problems with the vial seals. This technique applies to samples for low-level and high-level analysis.

c) Field extraction and laboratory preservation. After extruding the soil samples into pre-tared empty 40-ml VOA vials, the samples are kept chilled at the required temperature in a cooler and shipped with adequate ice to ensure that the required temperature is maintained during transport to the laboratory. The samples must arrive at the laboratory within 48 hours of the sample collection time. The laboratory then must preserve the sample using methanol. The laboratory must prepare and analyze the samples within 14 days of the sample collection date. This technique applies only to high-level analysis so it should be used only if detection limits of greater than 200 ug/kg are appropriate.

d) Field extraction and field freezing. After extruding the soil samples into pre-tared empty 40-ml VOA vials, the samples are immediately frozen to <-7°C and shipped with adequate dry ice to ensure that <-7°C is maintained during transport to the laboratory. The laboratory must receive and immediately freeze the vials to <-7°C. The samples may be held at <-7°C for up to 14 days prior to analysis from the sample collection date. The vials should not be frozen below -20°C due to potential problems with the vial seals. This technique applies to samples for low-level and high-level analysis.

Additionally, in order to determine VOC concentrations on a dry weight basis, in the absence of one or more additional sample aliquots of sufficient volume to determine dry weight basis, a separate container (2-ounce jar or 40 ml vial) should be filled with soil that is co-located to each sample collection point. Sample nomenclature that links this sample to the VOC sample containers that comprise a sample set should be used.

3.3.5 Method Incompatibilities

Biologically active samples may result in the rapid loss of aromatic hydrocarbons during the initial 48 hours after sampling, and thus should be immediately chemically preserved or frozen. Thus, the use of field freezing is required when using the empty vial method for biologically active samples suspected of containing aromatic hydrocarbons.

3.4 EQUIPMENT

Specific equipment requirements are discussed in the procedures above. In addition to the materials identified above, many of the procedures require the following:

- Appropriate clean laboratory-provided pre-tared VOA vials with selected preservative
- A scale capable of weighing 100 grams and accurate to ± 0.1 grams.

3.5 QUALITY CONTROL SAMPLES

QC samples are important to measure potential impacts to the accuracy and representativeness of the VOC samples collected. Specific QC samples important to the procedures presented in this SOP include:

- Trip blanks
- Temperature blanks

- MS/MSD samples
- Other recommended QC samples

3.5.1 Trip Blanks

Soil samples can be contaminated by diffusion of VOCs through the septum on VOA vials or through the seal on MFSDs during shipment and storage. Trip blanks are samples that accompany the environmental samples during the sampling operations and transport to the laboratory. The trip blanks may be prepared with laboratory grade methanol, sodium bisulfate solution, or reagent water, dependent on the field methods, and could also consist of laboratory-certified soil, and can be carried through sampling and handling protocols as a check on such contamination.

Generally one trip blank should be used for each field sample cooler, as specified in the QAPP. However, at a minimum, one trip blank should be used per day. The trip blank should remain unopened throughout sampling operations and labeled by date, such as TB022510-01 (for cooler no. 1 trip blank sent on February 25, 2010), or similar nomenclature as specified in the QAPP.

3.5.2 Temperature Blanks

Temperature blanks should be used so that the laboratory can verify the temperature upon receipt of the samples. In the case of field freezing, the temperature blanks should be frozen upon arrival at the laboratory. The temperature of the samples upon arrival should be annotated on the chain-of-custody form and also mentioned in the laboratory narrative that accompanies the analytical results. A temperature blank routinely consists of a vial filled with blank water (deionized water is acceptable).

3.5.3 Matrix Spike and Matrix Spike Duplicate Samples

An important measure of the performance of an analytical method relative to the specific sample matrix of interest is the matrix spike and matrix spike duplicate (MS/MSD). The MS/MSD is an important aspect of an overall quality assurance program for a project. When soil sampling, a MS/MSD sample should be collected for each analytical method at a frequency of five (5) percent of the field samples, unless otherwise specified in the site-specific QAPP. The MS/MSD sample should be prepared in a fashion similar to the other samples. Samples taken for MS/MSD should be labeled as such and specified on the chain-of-custody form. The primary purpose of MS/MSD analyses is to establish the applicability of the overall analytical approach to the specific sample matrix from the site.

Each sample set designated for MS/MSD analysis should be collected in triplicate (e.g., if using En Core® Samplers, then nine 5-gram sample containers would be required).

3.5.4 Other Field Quality Control Samples

Field quality control samples to demonstrate the integrity of the field samples should also be collected as required by the site-specific QAPP. Field duplicates should be collected at a minimum frequency of 10 percent of the samples. Field blanks and equipment rinsate blanks, if required, should be collected each day, or as specified in the site-specific QAPP.

4.0 REQUIRED DOCUMENTATION

The following records generated as a result of implementation of this procedure must be maintained as quality records.

- GPS or survey coordinates for each sample location
- Chains of Custody
- Sample collection logs, including recorded weights of samples placed in vials.
- Field notes

5.0 ATTACHMENTS

Attachment A. Limitations to VOC Soil Sampling Procedures

Attachment B. Various Options for the Collection of Soil Samples for VOC Analyses

6.0 FORMS

None.

7.0 REFERENCES

California Environmental Protection Agency, Department of Toxic Substances Control (DTSC), 2004. *Guidance Document for the Implementation of USEPA Method 5035: Methodologies for Collection, Preservation, Storage, and Preparation of Soils to be Analyzed for Volatile Organic Compounds*. November.

United States Department of Defense (USDoD), 2013. *Quality Systems Manual, Version 5.0* July.

United States Environmental Protection Agency (USEPA), Office of Solid Waste, 1997. *Method 5035, Closed-System Purge-and-Trap Extraction for Volatile Organics in Soil and Waste Samples.* June. Part of methods compendium SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Update III* (Method 5035).

USEPA, Office of Solid Waste, 2002. *Method 5035A, Closed-System Purge-and-Trap Extraction for Volatile Organics in Soil and Waste Samples.* July. Part of methods compendium SW-846, *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Update III* (Method 5035). Updated method.

ATTACHMENT A. LIMITATIONS TO VOC SOIL SAMPLING PROCEDURES

Each of the sampling and preservation procedures has their own set of benefits and limitations. Selection of the appropriate procedure should be based primarily on which procedure best addresses the data quality objectives (DQOs) while considering the limitations imposed by field conditions and sampling requirements. Some of the limitations of the different procedures include:

- Multi-Functional Sampling Devices. When the MFSDs are received by the laboratory, the soil subcores within the MFSDs are extruded into VOA vials for analysis. As the soil subcores pass from the MFSDs to the VOA vials during the extrusion process, the soil subcores are open to ambient air and VOC loss could occur. This VOC loss could yield analytical results that are potentially biased low. Users of MFSDs must recognize this limitation when evaluating the data quality objectives for their project.
- Field Chemical Preservation. Chemical preservation of VOA vials in the field with sodium bisulfate solution (low-level analysis) or methanol (high-level analysis) is considered to yield better representativeness for VOC analysis of soil. The introduction of chemical preservatives in the field inhibits VOC loss by biodegradation. Also, VOC loss due to sample handling at the laboratory is minimized in that the sample aliquot is placed in a VOA vial in the field that contains the required preservative, sodium bisulfate or methanol, and stir stick and therefore each VOA vial does not need to be reopened by the laboratory as syringes may be used through the septum cap. However, field preservation has significant limitations that may ultimately prohibit its use on some sites. One issue is that storage of methanol used in preservation may absorb non-site specific VOCs during storage and transport. When the concentration levels of VOCs are not known to be low or high (above 200 ug/kg), multiple VOCs vials containing sodium bisulfate, methanol, and no preservative, will need to be processed in the field for each sample location.
- Empty Vial Technique. The extractant fluid, whether methanol, sodium bisulfate solution, or reagent water, must be added by the stationary laboratory to the VOA vials after the soil has been sealed into the vials in the field. To do this, the PTFE-lined septum caps must be pierced for the introduction of the extraction fluid into the VOA vials. After the introduction of the extraction fluid, the vials must be stirred or sonicated to promote the partitioning of the VOCs into the extraction fluid. Upon completion of the stirring or sonication, the sample is then analyzed for VOC concentration. During the stirring or sonication, VOCs can escape from the VOA vial through the pierced septum. Hence, the Empty Vial Technique may potentially yield analytical results that are biased low. Users of the Empty Vial Technique must recognize this limitation when evaluating the data quality objectives for their project.

ATTACHMENT B. VARIOUS OPTIONS FOR THE COLLECTION OF SOIL SAMPLES FOR VOC ANALYSES

Option	Sample Collection	Sample Container	Field Preservation	Laboratory Procedure	Holding Time (DTSC/EPA)	Reporting Limt
3.1(a)1	MFSD[(1)]	MFSD	Cool to 4 ± 2°C	Analyze w/in 48 hrs of sample collection	48 hours	Low/High
3.1(a)2	MFSD	MFSD	Cool to 4 ± 2°C	Extrude sample w/in 48 hrs into unpreserved VOA and freeze to < 7°C	7 days / 14 days	Low/High
3.1(a)3	MFSD	MFSD	Cool to 4 ± 2°C	Extrude sample w/in 48 hrs into methanol preserved VOA and cool to 4±2°C	14 days	High
3.1(a)3	MFSD	MFSD	Cool to 4 ± 2°C	Extrude sample w/in 48 hrs into sodium bisulfate preserved VOA and cool to 4±2°C	14 days	Low/High
3.1(a)3	MFSD	MFSD	Cool to 4 ± 2°C	Extrude sample w/in 48 hrs into reagent-grade extractant water VOA and cool to 4±2°C	14 days	Low/High
3.1(b)	MFSD	MFSD	Freeze to < 7°C	Use of any of the above laboratory procedures and associated holding times	—[(3)] / See above	See above
3.2(a)	SCD	VOA	Preserve with methanol and cool to 4 ± 2°C	Cool sample to 4±2°C	14 days	High
3.2(b)	SCD	VOA	Preserve with sodium bisulfate and cool to 4 ± 2°C	Cool sample to 4±2°C	14 days	Low/High
3.2(c)	SCD	VOA	Extract into reagent-grade water and cool to 4 ± 2°C	Analyze w/in 48 hrs of sample collection	48 hours	Low/High
3.2(d)	SCD	VOA	Extract into reagent-grade water and freeze to < 7°C	Freeze sample to < 7°C	7 days / 14 days	Low/High
3.2(e)	SCD	VOA	Extract into reagent-grade water and cool to 4 ± 2°C	Freeze sample w/in 48 hrs to < 7°C	7 days / 14 days	Low/High
3.3(a)	SCD	VOA	Cool to 4 ± 2°C	Cool to 4±2°C	48 hours	Low/High
3.3(b)	SCD	VOA	Cool to 4 ± 2°C	Freeze sample w/in 48 hrs to < 7°C	14 days	Low/High
3.3(c)	SCD	VOA	Cool to 4 ± 2°C	Extrude sample w/in 48 hrs into methanol preserved VOA and cool to 4±2°C	14 days	High
3.3(d)	SCD	VOA	Freeze to < 7°C	Freeze to < 7°C	14 days	Low/High

[(1)] Multi-Function Sampling Device (e.g., EnCore Sampler).
[(2)] Sub-Coring Device (e.g., Lock N' Load sampling system)
[(3)] Freezing of MFSDs are not recommended by DTSC due to the potential for damage to their seals.

Standard Operating Procedure

Sample Handling, Packaging and Shipping

PR-TC-02.04.01.01 v2

Effective Date: 14 June 2013

Prepared by: _____ Date: 13 June 2013
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Review / Revision History:

Version	Changes	Affects Section/Pages	Effective Date	Approval
1.0	Initial Issue	NA	30 Sep 2009	NA
1.1	Added perchlorate to the Sample Preservation and Storage Requirements Table.	Attachment A	24 Feb 2010	J Hess
1.2	Remove references to SOPs currently under revision for inclusion of CLP procedures.	Pgs 4-5	06 Aug 2010	J Hess
2.0	Added in SW846 Revision 4	Attachment A	13 Jun 2013	NA

* Approval required for minor changes not requiring updated review and approval by signatures to the SOP.

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1.0 PURPOSE

The objective of this procedure is to establish a uniform method for the handling of environmental samples. This includes using the appropriate sample containers and preservatives, following correct chain-of-custody procedures, and using appropriate sample shipment methods.

2.0 SCOPE AND APPLICABILITY

This procedure will be used during the collection and handling of all types of environmental media, including but not limited to, groundwater, surface water, soil, sediment, and air samples.

This procedure applies to the shipping and packing of all non-hazardous samples. Non-hazardous samples are those that do not meet any hazard class definitions found in 49 CFR 107-178, including materials designated as Class 9 materials and materials that represent Reportable Quantities (hazardous substances). In general, most soil, air, and aqueous samples do not meet any of DOT's hazardous materials definitions. However, samples for which screening has shown a potential hazard sufficient to meet a DOT definition or that are derived from a source known or suspected to meet a DOT definition must be packaged and shipped in accordance with applicable DOT and/or IATA requirements.

3.0 ACRONYMS AND DEFINITIONS

For purposes of this procedure, a number of terms and acronyms have the meanings defined below.

°C: degrees Celcius

Bubble wrap: Plastic sheeting with entrained air bubbles; used for protective packaging purposes.

CFR: Code of Federal Regulations

CLP: Contract Laboratory Program

COC: Chain-of-custody

Cooler: Any hard-sided insulated container meeting DOT or IATA packaging requirements.

DOT: U.S. Department of Transportation.

IATA: International Air Transport Association.

Packing material: Styrofoam beads ("peanuts"), or equivalent

PPE: Personal protective equipment.

QAPP: Quality Assurance Project Plan

Shipping container: *see* Cooler

VOA vial: 40-mL glass vial used for the collection of samples for volatile organic analysis.

4.0 EQUIPMENT AND MATERIALS

Equipment and materials that may be required to implement this SOP include the following:

- Bubble wrap
- Packing material
- Tape (packing tape, duct tape, or other tear-resistant material)
- Large plastic trash bags
- Ziploc bags (freezer grade, gallon and quart sizes)
- Shipping containers (e.g. coolers)
- Sample container(s) as specified in the approved project plans
- Ice
- Custody seals
- "This Side Up" arrows
- Address labels and/or airbills
- Chain-of-Custody forms
- Sample Collection Forms, Daily Activity Reports, activity-specific sampling forms
- Black waterproof pen (e.g., fine-point Sharpie marker).

5.0 PROCEDURE

5.1 GENERAL

The following method outlines general considerations for sample handling in the field and maintaining sample custody after collection.

Environmental samples are collected in the field in order to evaluate whether conditions in soil gas, soil, surface water, groundwater or atmosphere are hazardous. These samples therefore, should be handled with the utmost care to maintain sample integrity, so that analytical data represent field conditions as closely as possible. In addition, sample care, custody, and control are extremely important for establishing that sample integrity was maintained between field crews and the laboratory.

General considerations for handling during sampling are:

- Always wear proper PPE when handling samples.
- Wrap sample container in a way that is both protective of the sample container and other surrounding sample containers.

- Document all collection procedures thoroughly in sampling forms (e.g. Sample Collection Form) and general field notes in the Daily Activity Report (or field logbook, when applicable). There is never "too much information".

Samples must be stabilized for transport from the field to the laboratory through the use of the proper sample containerization and preservation. This is due to the potential chemical and/or biological degradation that may occur after samples are collected. Typical sample containerization and preservation are presented in Table 1. Unless otherwise indicated in the site-specific QAPP, sample containers should be cooled immediately after completion of sampling and maintained at a temperature not to exceed the temperature specified in Attachment A until received by the laboratory.

5.2 SAMPLE CONTAINERIZATION AND PRESERVATION

The appropriate sample container types, volumes, preservatives, and holding time requirements for soil and groundwater samples for the most commonly requested analyses are listed in Attachment A, Sample Preservation and Storage Requirements.

Methods of sample preservation are intended to retard biological action, retard hydrolysis, and reduce sorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and protection from light.

All sample containers will be properly labeled and monitored for temperature control in the field and during laboratory transport and storage. Temperature blanks will be used in all coolers containing samples requiring preservation at reduced temperature.

5.3 SAMPLE IDENTIFICATION AND LABELS

All samples will be properly labeled to prevent misidentification of samples. Generally, preprinted sample labels are encouraged to enhance legibility and reduce transcription errors at the laboratory. The label will be affixed to the sample container prior to transportation to the laboratory and will generally contain the following information (except when using CLP):

- Project name, number, and location
- Site name
- Name of collector
- Date and time of collection
- Sample identification number
- Preservative, if any
- Requested test methods or analyses.

See the site-specific QAPP for any additional sample identification protocols.

5.4 CHAIN OF CUSTODY

Chain-of-custody (COC) procedures are implemented to ensure that all samples are traceable from the time that they is collected until they, or their derived data, are used. A sample is considered to be "in custody" under the following conditions:

- It is in personal possession.
- It is in personal view after being in personal possession.
- It was in personal possession when it was properly secured.
- It is in a designated secure area.

Sample custody will be documented through the use of COC forms. These forms will be used to track sample custody from the point of sample collection through sample disposal. The security of samples will be ensured by the use of the procedures described below.

5.4.1 Chain-of-Custody Forms

A COC form will be filled out for and will accompany every group of samples sent to the analytical laboratory, to document sample care, custody, and control from the time of collection to sample receipt.

The following information will be recorded on the COC form:

- COC form number
- Company name, address, and telephone number
- Company contact person
- Laboratory name, address, and telephone number
- Laboratory contact person
- Sample identification
- Date and time of collection
- Sampler's name
- Analytical method(s) requested
- Sample volume (e.g., three 40-milliliter [mL] vials)
- Sample matrix (e.g., soil or groundwater)
- Preservative (e.g., hydrochloric acid [HCl])
- Request for matrix spike analysis or other QC analysis
- Signatures of individuals releasing and accepting samples
- Times of release and acceptance of samples
- Air bill number if shipping by commercial courier

- Any comments to identify special conditions or requests.

5.4.2 Custody Seals

Custody seals will be used when samples are shipped via courier service, and must be placed on the shipping container (cooler) so that the seals have to be broken before the container can be opened. The seal must be signed and dated by the field personnel. Custody seals are not deemed necessary when the samples will be in the continuous possession of project, field, or laboratory personnel.

5.5 PACKAGING FOR SHIPMENT

Samples will be packaged for shipment as follows:

- Use tape to seal off the cooler drain on the inside and outside to prevent leakage.
- Place packing material (bubble wrap) on the bottom of the shipping container (cooler) to provide a soft impact surface.
- Place a 55-gallon or equivalent plastic bag into the cooler (to minimize the possibility of leakage during transit).
- Place each sample bottle or set of volatile organic analysis (VOA) vials in a separate plastic bag and seal the bag. Squeeze air from the bag before sealing.
- Starting with the largest glass containers, wrap each container with sufficient bubble wrap to ensure the best chance to prevent breakage of the container.
- Pack the largest glass containers in bottom of the cooler, placing packing material between the containers to partially cover the sample containers (more than halfway) to avoid breakage from bumping. Cardboard separators may be placed between the containers at the discretion of the shipper.
- Double-bag ice chips or cubes in gallon or quart freezer-grade Ziploc plastic bags and wedge the ice bags between the sample containers.
- Add bagged ice across the tops of the samples.
- Continue filling the shipping container in the same manner (e.g., using bubble-wrap and ice) with smaller sample containers/vials.
- When the container is sufficiently full (or all samples have been packed), seal the inner protective plastic bag (with twist-ties and/or packing tape), and place additional packing material on top of the bag to minimize shifting of containers during shipment.
- Tape a gallon Ziploc bag to the inside of the cooler lid, place one copy of the completed COC document for the shipment inside, and seal the bag shut.
- Tape the shipping container (cooler) shut using packing tape, duct tape, or other tear-resistant adhesive strips. Taping should be sufficient to ensure that the lid will not open during transport.

- In situations where samples will not be in the continuous possession of project, field, or laboratory personnel, place custody seals on two separate portions of the cooler, to provide evidence that the lid has not been opened prior to receipt by the intended recipient.

5.5.1 Labeling

Label the shipping container/cooler as follows:

- Attach a "This Side Up" arrow securely to each side of the cooler. Affix "fragile" or other labels on the cooler as appropriate.
- Attach a label with the name and address of the receiver and the shipper to the top of the cooler.
- If the cooler is to be shipped by overnight carrier, attach a properly completed airbill to the top of the cooler.

6.0 ATTACHMENTS

- Attachment A: Sample Preservation and Storage Requirements

7.0 FORMS

The following forms are attached:

- Chain of Custody Form

8.0 REFERENCES

ITSI, 2006. *Final Chemical Data Quality Management Plan, 8(a) Remedial Action Contract Number N68711-005-D-6403*. January.

U.S. Department of Transportation Regulations, 49 CFR Parts 108-178.

International Air Transport Association (IATA), Dangerous Goods Regulations, current edition.

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	VOC	Gasoline Range Organics (GRO) 8015B	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2 / 4 ± 2°C	14 days analysis
Water	VOC	Gasoline Range Organics (GRO) 8015C	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2/ ≤ 6 °C	14 days analysis
Water	VOC	Gasoline Range Organics (GRO) 8015D	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2/ ≤ 6 °C	14 days analysis
Water	VOC	GCMS VOCs 8260B	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2 / 4 ± 2°C	14 days analysis (7 days unpreserved)
Water	VOC	GCMS VOCs 8260C	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2/ ≤ 6 °C	14 days analysis (7 days unpreserved)[a,b]
Water	VOC	GC VOCs 8021B (SW846 Update III)	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2 / 4 ± 2°C	14 days analysis (7 days unpreserved)
Water	VOC	GC VOCs 8021B (SW846 Update IV)	3 X 40 mL VOA vials with PTFE septa	HCL to pH < 2 / ≤ 6 °C	14 days analysis (7 days unpreserved)[b]
Water	SVOC	Phenols 8041A (SW846 Update III)	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Phenols 8041A (SW846 Update IV)	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Organochlorine Pesticides 8081A	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Organochlorine Pesticides 8081B	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Polychlorinated Biphenyls (PCBs) 8082	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Polychlorinated Biphenyls (PCBs) 8082A	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	None
Water	SVOC	Organophosphorus Pesticide 8141A	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Organophosphorus Pesticide 8141B	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	SVOC	Chlorinated Herbicides 8151A (SW846 Update III)	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Chlorinated Herbicides 8151A (SW846 Update IV)	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	GCMS SVOC 8270C	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	GCMS SVOC 8270D	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Dioxins and Furans 8280A; 8290	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C, store in the dark	30 days extraction 45 days analysis (after extraction)
Water	SVOC	Dioxins and Furans 8280B; 8290A	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	None
Water	SVOC	Polycyclic Aromatic Hydrocarbons 8310 (SW846 Update III) ; 8270CSIM	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Polycyclic Aromatic Hydrocarbons 8310 (SW846 Update IV); 8270DSIM	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Nitroaromatics and Nitroamines 8330A; 8330B	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Diesel and Oil Range Organics (DRO and ORO) 8015B	2 X 1.0 liter amber glass with PTFE-lined lid	4 ± 2°C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Diesel and Oil Range Organics (DRO and ORO) 8015C	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	SVOC	Diesel and Oil Range Organics (DRO and ORO) 8015D	2 X 1.0 liter amber glass with PTFE-lined lid	≤ 6 °C	7 days extraction 40 days analysis (after extraction)
Water	Metals	ICP-AES Metals 6010B; 6010C	1 X 500 mL plastic	HNO_3 to pH < 2	6 months analysis
Water	Metals	ICP-MS Metals 6020; 6020A	1 X 500 mL plastic	HNO_3 to pH < 2	6 months analysis

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	Metals	Mercury by CVAA 7470A (SW846 Update III)	1 X 500 mL plastic	HNO_3 to pH < 2; 4 ± 2°C	28 days analysis
Water	Metals	Mercury by CVAA 7470A (SW846 Update IV)	1 X 500 mL plastic	HNO_3 to pH < 2; ≤ 6 °C	28 days analysis
Water	Inorganic	Hexavalent Chromium 7196A; 7199	1 X 250 mL plastic	4 ± 2°C	24 hours analysis
Water	Inorganic	Hexavalent Chromium 7196A; 7199	1 X 250 mL plastic	≤ 6 °C	24 hours analysis
Water	Inorganic	Anions by IC 300.0 / 9056A (S846 Update III)	1 X 250 mL plastic	4 ± 2°C	48 hours for nitrate, nitrite, and orthophosphate analysis 28 days for chloride, sulfate, bromide, and fluoride analysis
Water	Inorganic	Anions by IC 300.0 / 9056A (SW846 Update IV)	1 X 250 mL plastic	≤ 6 °C	48 hours for nitrate, nitrite, and orthophosphate analysis 28 days for chloride, sulfate, bromide, and fluoride analysis
Water	Inorganic	Nitrate and Nitrite as N Total 353.2	1 X 250 mL plastic	H_2SO_4 to pH < 2 / 4 ± 2°C	28 days analysis
Water	Inorganic	Kjeldahl Nitrogen 351.4 / SM 4500NH3-C	1 X 250 mL plastic	H_2SO_4 to pH < 2 / 4 ± 2°C	28 days analysis
Water	Inorganic	Chemical Oxygen Demand (COD) 410.4 / SM 5220D	1 X 250 mL plastic	H_2SO_4 to pH < 2 / 4 ± 2°C	28 days analysis
Water	Inorganic	Alkalinity SM 2320B / 310.1	1 X 250 mL plastic	4 ± 2°C	14 days analysis
Water	Inorganic	Total Dissolved Solids (TDS) SM 2540C / 160.1	1 X 250 mL plastic	4 ± 2°C	7 days analysis
Water	Inorganic	pH SM 4500-H+B	1 X 250 mL plastic	None	15 minutes analysis
Water	Inorganic	pH 150.1	1 X 250 mL plastic	None	24 hour analysis

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	Inorganic	Conductivity SM 2510B / 120.1	1 X 250 mL plastic	4 $\pm$ 2°C	28 days analysis
Water	Radiochem	Gross Alpha/Gross Beta 900.0	500-mL glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Gamma-Emitting Radionuclides 901.1	2 X 1-liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Radium-226 by Radon Emanation 903.1	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Gamma Radioassay HASL300 GA-01-R	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Radium-228 EPA 904.0	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Strontium-90 905.0	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Tritium 906.0	2 X 1 liter glass or plastic	None	6 months analysis[e]
Water	Radiochem	Plutonium 238 and 239/240 HASL 300-Pu-11	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Water	Radiochem	Uranium-234, -235, and -238 HASL 300 U-02-RC	2 X 1 liter glass or plastic	HNO_3 to pH < 2	6 months analysis[e]
Soil	VOC	Gasoline Range Organics (GRO) 8015B	3 X 5g EnCore® or equivalent	4 $\pm$ 2 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)
Soil	VOC	Gasoline Range Organics (GRO) 8015C	3 X 5g EnCore® or equivalent	$\leq$ 6 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)
Soil	VOC	Gasoline Range Organics (GRO) 8015D	3 X 5g EnCore® or equivalent	$\leq$ 6 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)
Soil	VOC	GCMS VOCs 8260B	3 X 5g EnCore® or equivalent	4 $\pm$ 2 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	VOC	GCMS VOCs 8260C	3 X 5g EnCore® or equivalent	≤ 6 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)[a]
Soil	VOC	GC VOCs 8021B (SW846 Update III)	3 X 5g EnCore® or equivalent	4 ± 2 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)
Soil	VOC	GC VOCs 8021B (SW846 Update IV)	3 X 5g EnCore® or equivalent	≤ 6 °C	48 hours until transfer to glass vials – 14 days analysis / 7 days if no acid (including 48 hours)
Soil	SVOC	Phenols 8041A (SW846 Update III)	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Phenols 8041A (SW846 Update IV)	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Organochlorine Pesticides 8081A	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Organochlorine Pesticides 8081B	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Polychlorinated Biphenyls (PCBs) 8082	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Polychlorinated Biphenyls (PCBs) 8082A	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	None
Soil	SVOC	Organophosphorus Pesticides 8141A	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Organophosphorus Pesticides 8141B	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Chlorinated Herbicides 8151A (SW846 Update III)	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Chlorinated Herbicides 8151A (SW846 Update IV)	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	GCMS SVOCs 8270C	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	SVOC	GCMS SVOCs 8270D	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Dioxins and Furans 8280A; 8290	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C ; store in the dark	extraction - 30 days analysis - 45 days
Soil	SVOC	Dioxins and Furans 8280B; 8290A	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	None
Soil	SVOC	Polycyclic Aromatic Hydrocarbons 8310 (SW386 Update III); 8270CSIM	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Polycyclic Aromatic Hydrocarbons 8310 (SW386 Update IV); 8270DSIM	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Nitroaromatics and Nitramines 8330A	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Nitroaromatics and Nitramines 8330B	1.5 grams of soil in specially prepared locking plastic bag	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Diesel and Oil Range Organics 8015B	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	4 ± 2 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Diesel and Oil Range Organics 8015C	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	SVOC	Diesel and Oil Range Organics 8015D	Sleeves[c] with PTFE™ end caps or 8 oz glass jar	≤ 6 °C	extraction - 14 days analysis - 40 days
Soil	Metals	ICP-AES 6010B; 6010C	Sleeves[c] with PTFE™ end caps or 4 oz glass jar	None	analysis - 6 months
Soil	Metals	ICP-MS 6020; 6020A	Sleeves[c] with PTFE™ end caps or 4 oz glass jar	None	analysis - 6 months
Soil	Metals	Mercury by CVAA 7471A	Sleeves[c] with PTFE™ end caps or 4 oz glass jar	4 ± 2 °C	analysis - 28 days
Soil	Metals	Mercury by CVAA 7471B	Sleeves[c] with PTFE™ end caps or 4 oz glass jar	≤ 6 °C	analysis - 28 days
Soil	Inorganics	Conductivity 9050A/ 9050A	1 X 4 oz glass jar	4 ± 2 °C	analysis - 28 days

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Matrix	Analytical Group	Analytical Method	Containers (number, size and type)	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	Inorganics	Hexavalent Chromium 7196A / 7199 (SW846 Update III)	1 X 4 oz glass jar	4 ± 2 °C	analysis - 24 hours
Soil	Inorganics	Hexavalent Chromium 7196A / 7199 (SW846 Update IV)	1 X 4 oz glass jar	≤ 6 °C	analysis - 24 hours
Soil	Inorganics	pH 9045D	1 X 4 oz glass jar	None	analysis - immediately
Soil	Radiochem	Gamma-Emitting Radionuclides 901.1M	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Radium-226 by Radon Emanation 903.1M	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Gamma Radioassay HASL300 GA-01-R	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Radium-228 904.0M	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Strontium-90 905.0M	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Tritium 906.0M	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Plutonium 238 and 239/240 HASL 300-Pu-11	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]
Soil	Radiochem	Uranium-234, -235, and -238 HASL 300 U-02-RC	1 X 16 oz glass or plastic jar[d]	None	6 months analysis[e]

Abbreviations and Notes:
AES = Atomic Emission Spectrometry
°C = degrees centigrade
CVAA = Cold Vapor Atomic Absorption
GC = Gas Chromatography
HCl = Hydrochloric Acid
H2SO4 = Sulfuric Acid
IC = Ion Chromatography
ICP = Inductively Coupled Plasma
mL = milliliters
MS = Mass Spectrometry
oz = ounce
SVOC = Semi-volatile Organic Compounds
VOA = Volatile Organic Analysis
VOC = Volatile Organic Compounds

Attachment A

Sample Preservation and Storage Requirements
PR-TC-02.04.01.01

Abbreviations and Notes:

[a] If vinyl chloride, sytene, or 2-chloroethyl vinyl ether are analytes of interest, collect a second set of samples without acid preservatives and analyze as soon as possible (7 day hold time).

[b] If carbonaceous materials are present (or if MTBE and other fuel oxygenate ethers are present and a high temperature sample preparative method is to be used), do not acid preserve the sample.

[c] Sleeves may be stainless steel, acetate, brass or PTFE, depending on project needs.

[d] Sample volume and container dependent on required site-specific reporting limits. See the site-specific plan for details or variances such as tuna cans.

[e] Manual for the Certification of Laboratories Analyzing Drinking Water, EPA 815-B-97-001, March 1997 Criteria and Procedures Quality Assurance

ITSI Gilbane

2730 Shadelands Drive
Walnut Creek, California 94598
(925) 946-3100 – (925) 256-8998 (fax)

Chain-of-Custody

Project Name and Number: _____
Project Manager: _____
Site Location: _____

Laboratory Name: _____
Address: _____
Contact Name: _____
Phone: _____

Date: _____
Page: _____ of _____

Sample I.D.	Sample Depth	Date	Time	No. of Containers	Sample Matrix	Analysis: / Preservative: / Container Type:	Special Instructions/Comments

Sampled By: _____

Signature: _____

Special Instructions: _____

Send Results to: _____
(w/fax #) _____

Turnaround Time: _____

Sampler:

Courier/Airbill No.:

Relinquished By/Affiliation:	Date:	Time:	Received By/Affiliation:	Date:	Time:

Standard Operating Procedure

Sample Tracking and Electronic Data Management

PR-TC-02.12.02.00 v2

Effective Date: 14 June 2013

Prepared by: Kristen Carlyon, Program Chemist — Date: 14 June 2013

Reviewed by: Wing Tse, Database Manager — Date: 14 June 2013

Approved by: Jeffrey Hess, Director Technical Services — Date: 14 June 2013

Review / Revision History:

Version	Changes	Affects Section/Pages	Effective Date	Approval*
1.0	Initial Issue		30 Sep 2009	NA
1.1	Clarification of Project Chemist responsibilities, and corrections to section numbering.	Pages 2-4	30 Sep 2009	J Hess
2.0	Reorganized procedures and responsibilities		14 Jun 2013	NA

* Approval required for minor changes not requiring updated review and approval by signatures to the SOP.

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1.0 PURPOSE AND SCOPE

The purpose of this standard operating procedure is to describe the requirements and procedures for tracking environmental samples in a manner that will provide a systematic means of notifying our electronic data management group (including our chemists, database administrators, data management specialists, and other interested parties) of upcoming sampling events, ensuring the correct samples are collected and correct analyses are requested, tracking the receipt of analytical data from the laboratory for the sampling efforts, facilitate upload of electronic data to the database from the field crew and laboratories, and provide a reference for reconciliation of laboratory invoices.

2.0 ACRONYMS AND DEFINITIONS

For purposes of this procedure, a number of terms and acronyms have the meanings defined below.

COC: chain-of-custody form
CDQMP: Chemical Data Quality Management Plan
DQO: data quality objective
EDD: electronic data deliverable
eDMS: Environmental Data Management System, ITSI's in-house environmental data management system.
ERPIMS: Environmental Restoration Program Information Management System
FSP: Field Sampling Plan
Geotracker: A database and geographic information system (GIS) hosted by the California State Water Resources Control Board (SWRCB) that provides online access to environmental data.
GPS: global positioning system
LIMS: laboratory information management system
NIRIS: Naval Installation Restoration Information Solution
ORP: oxidation-reduction potential
PID: photo-ionization detector
QAPP: Quality Assurance Project Plan
SAP: Sampling and Analysis Plan
SEDD: staged electronic data deliverable
SOP: standard operating procedure
XRF: x-ray fluorescence

3.0 ROLES AND RESPONSIBILITIES

Project Manager. Establishes and communicates the goals and objectives (DQOs) of the sampling event to the team, and provides specifics regarding the number and type of samples, analytical methods, and any special reporting requirements. Authorizes payment of laboratory and validation invoices upon successful submittal of complete EDD.

Field Personnel. Responsible for the proper collection of environmental samples according to the approved SAP or FSP/QAPP. Responsible for accurate, defensible documentation of sample collection per approved project plans and corporate SOPs.

Sample Coordinator. Responsible for tracking the samples from time of collection through laboratory acceptance. Updates the Sample Tracking Log daily. Reconciles coolers contents against COCs prior to transfer to laboratory. Uploads COC and field information, including sample coordinates and field parameters, into eDMS daily. Submit samples to the laboratory. Sends COCs, Sample Collection Logs and other field forms to project team. Resolves completeness issues with laboratory (e.g. broken bottles, missing samples, etc.).

Project Chemist (or designee). Prepares SAP or FSP/QAPP and sample tracking log. Sets up site in eDMS and portal, if necessary. Loads eQAPP and sample schedule into eDMS. Uploads project planning documents to ITSI project portal. Reviews COC and field information in eDMS. Reviews LIMS login report and resolves analytical issues with laboratory. Facilitates communication between lab and data group in upload of EDDs. Runs completeness test on EDDs against COCs to ensure all data has been received (this can be accomplished with the use of Event Planning reports). Reviews and finalizes results/validation qualifiers, releasing data for use. Updates Sample Tracking Log once samples are in the laboratory and for subsequent activities (e.g., data validation). Notify Project Manager upon successful submittal of completed EDDs.

Data Management Staff. Work with Project Chemist on setting up project and/or site, if new and updating existing projects as they evolve. Identify EDD reporting requirements (ERPIMS, NIRIS, SEDD, etc.) based on Contract and Task Order requirements. Manage any new user accounts needed based on staffing of project team. Work with Project Chemist on designation of sample IDs (and new location IDs, if required).

4.0 PROCEDURES

Systematic sample tracking and efficient data management require that the procedures presented in this SOP be followed by all parties involved in the collection and reporting of environmental data. Figure 1 outlines the generalized flow of sample information and laboratory results from initial sampling through reporting of the validated results. Although not specifically shown in Figure 1, these procedures are applicable to other field or laboratory generated environmental data from field instruments (e.g, chemical, radiological, geotechnical, water quality, and air monitoring), mobile field laboratories, and observations.

Procedures for managing the accurate collection and reporting of the data are discussed below. Roles and specific responsibilities are presented in Sections 3.1-3.3.

- **Kickoff Meeting**. A meeting is held with the project manager or task lead, the project chemist, and a representative of the data management team to communicate the goals and objectives (e.g., DQOs) of the sampling event to the team, and provide specifics regarding the number and type of samples, analytical methods, and any special reporting requirements.
- **Preparation of Sample Guidance Documents.** The SAP or FSP/QAPP is prepared by the project chemist, is reviewed by the project manager or task lead for consistency with the work plan and other project documents, and goes through both the internal and client approval process. The information contained in the approved SAP or FSP/QAPP is used to develop a Planned Sample Table / Sample Tracking Log.
- **Setup of Project Database.** If the site does not already exist in eDMS (ITSI Gilbane's web-based environmental data management system), a new database is created. If the site exists, a new project is added to the previously existing database. The quality control (QC) criteria from the SAP or QAPP is entered into eDMS, and (optionally) the information from the Planned Sample Table / Sample Tracking Log is entered into the Event Planning Tool.
    - The use of the Event Planning Tool allows for utilization of database tools such as electronic COCs, pre-printed labels, and completeness and performance reports. These are a requirement of some contracts, so be sure to complete this task if the project is under a contract requiring performance monitoring.
- **Sample Collection and Documentation**. Samples are collected in accordance with the approved site-specific project plans and chain-of-custody is properly documented.
- **Sample Tracking**. Samples are tracked from time of collection through laboratory acceptance. Issues with sample receipt (i.e., bottle breakage) are resolved. The Sample Tracking Log is updated in the field if event planning tool was not used.
- **Sample Entry**. COCs, Sample Collection Logs, and other field forms are sent from field to project team, generally by scanning the field documentation and uploading to eDMS nightly. COC and appropriate field information (e.g., depth to water, water quality parameters) is then entered into eDMS daily, including field parameters and GPS coordinates.
    - In cases where coordinates are to be surveyed and are not available daily, they are uploaded as soon as available. Good practice (and required by some clients) is to collect GPS coordinates at time of sample collection even if a subsequent survey is planned later.
- **COC Review**. COC and field information is reviewed in eDMS. Laboratory LIMS login report is reviewed and analytical/login issues resolved with laboratory. The Event Planning Tool (if used) in eDMS is updated with required information.

- **EDD Upload**. The EDDs are uploaded to the project database. Upon successful upload, the laboratory report is available for review/validation.
- **Release of Data**. Review/validation is reviewed and approved. Sample Tracking Log is updated or if Event Planning was used, completeness reports are run. Once data is approved and shown to be complete, it can be released for use.
- **Review and Publication of Data**. Once data has been released for use, various reports can be run from eDMS to view the data in a variety of formats, and to review the data relative to applicable screening criteria and/or cleanup goals. The data is also available to incorporation into GIS for figure generation.
- **Generation of Deliverable EDDs**. Deliverable EDDs (i.e. NEDDs, ERPIMs, or SEDDs) are generated and uploaded as appropriate. Project Manager is notified of completion.

4.1 FIELD STAFF RESPONSIBILITIES

4.1.1 Notification of Sampling

At the beginning of each project involving the acquisition of environmental data, a preliminary meeting will be held by the project manager, project chemist and members of the electronic data management group to discuss the data quality objectives (DQOs), sampling requirements, and plan out preparation of the SAP or FSP/QAPP (including location and sample IDs). Once fieldwork is scheduled, a meeting between the project manager, project chemist and the field personnel prior to deployment will be conducted to discuss the specific requirements of the project. Specific information regarding the number and type of samples to be collected will be presented, along with recommended field procedures, sequence of work, and identity of the primary and secondary analytical laboratories. Sample naming protocols will be discussed to insure proper sample identification in the field and on Chains-of-Custody (COCs). The electronic data management group will be notified of the start of sampling at this time.

For multi-phase or recurring projects such as quarterly monitoring, both the project chemist and electronic data management group will be notified prior to the beginning of each sampling event, and a copy of the Sample Tracking Log will be provided to all interested parties prior to the initiation of sampling.

4.1.2 Chain-of-Custody

During field sampling activities, a copy of the COC will be forwarded daily by the sample coordinator to both the ITSI Project Office (to the Project Chemist) and ITSI Corporate Office (to the electronic data management group).

- If paper COCs are used, then ITSI COCs with a unique identification number should be used and can be requested through the COC coordinator (Dan Wedeking at 925-946-3349) in ITSI's Corporate Office prior to the beginning of sampling. The location and sample IDs and the sample depths (top and bottom) for non-aqueous samples should be written on the copies of the COCs. The COCs may be uploaded to the server or emailed directly to the ITSI Offices. If upload to the server is chosen, the ITSI offices will be notified by email at the time of the first upload. In those cases where there is no internet access available, COCs are to be faxed daily and sent by FedEx at the end of each week.

- If the Event Planning tool is used in eDMS, an electronic COC can replace a hand-written COC. Several fields will be pre-populated based on the sample tracking table and the room for hand-written error is greatly reduced. Internet connectivity is required to use this feature either on site or at a hotel or office before sampling begins. The COCs may be uploaded to the server or emailed directly to the ITSI Offices. If upload to the server is chosen, the ITSI offices will be notified by email at the time of the first upload.
- If Forms II Lite is used, a copy of the output files should be forwarded electronically to the Project Chemist and electronic data management group, along with a copy of the hard copy COC from the field printer for reference.

,The data management group will enter and QC COCs daily in eDMS.

4.1.3 Sample Coordinates and Other Field Notes

Along with the COCs, the sample coordinator will forward (GPS) sample coordinates to be loaded into the Sample Tracking Log (or online data management system) for each sample collected, with the exception of waste and some process samples, or recurring sample locations where coordinates already exist (e.g., previously surveyed monitoring wells). Please confirm the existence of valid coordinates for each sample location prior to sampling, otherwise collect GPS coordinates just in case. In addition, all field notes including boring logs, water levels, and field measurements will be sent on a daily basis to the data management group for entry into the system.

4.2 PROJECT CHEMIST RESPONSIBILITIES

4.2.1 Development of SAP or FSP/QAPP and Appropriate Location and Sample IDs

The Project Chemist is responsible for preparation of the SAP or QAPP/FSP and development of appropriate location and sample IDs in consultation with the Project Manager or Task Lead. A list of location IDs and their associated sample IDs should be sent to the data manager or their designee for approval before they are incorporated in the sampling plan. The location and sample IDs should conform to the location and sample ID nomenclature requirements listed in SOP PR-TC-01.04.04.00. Once the project plans are approved by the client, the Project Chemist shall upload the eQAPP in eDMS and request that the data manager set up the site in the eDMS. The project chemist shall setup the site in the ITSI Gilbane portal and upload the work plan to the ITSI Gilbane portal.

4.2.2 Creation of Sample Tracking Log

The project chemist shall develop a Sample Tracking Log at the inception of the project. The log shall track the following items:

Pre-Sampling Post-Sampling

- Location ID
- Sample ID
- Sample matrix
- Required analyses
- Sample Date

- Date Submitted to Lab
- Laboratory Sample ID
- Status of data packages.
- Method predicted to be used for collecting samples

The project chemist shall submit the Sample Tracking Log to the data management group for use in setting up the Event Planning for each sampling event. This will allow for electronic COC use and electronic tracking of laboratory SDG status.

4.2.2.1 QC of Entry of COCs in eDMS

The project chemist (or designee) will QC the data entry of the COC information entered into eDMS. The sample identifications, analyses requested, sampling methods, matrices, dates and times of sample collections, and proper assignment of quality control samples will all be checked. The Project Chemist will also verify that the Sample Tracking Log has been updated, and will update the log if it has not been updated.

4.2.2.2 Cross-checking of Laboratory Receipt Form

Upon receipt of the samples by the laboratory, a completed chain-of-custody and laboratory receipt form shall be forwarded to the Project Chemist and crosschecked to the Sample Tracking Log (or online data management system) within 48 hours. Transcription errors and any minor differences will be resolved right away and documented through email correspondence. Major problems will be documented through the use of corrective action forms.

4.2.3 Receipt of Data and Data Uploads

As laboratory data packages are prepared and submitted to ITSI, receipt of these data packages will be recorded on the Sample Tracking Log (or online data management system). The Project Chemist will facilitate communication between the lab and data management group to successfully load and certify EDDs. If not uploaded to eDMS by the lab, the electronic data deliverables (EDDs) in acceptable format (Enhanced ERPIMS unless otherwise approved) will be forwarded to the electronic data management group right away. The completeness of the EDDs will be verified upon receipt by the electronic data management group. eDMS will screen the results against the eQAPP. After errors (if any) are resolved, the EDD is certified by the person who uploaded it.

Validation using eDMS or a third-party validator occurs at this point. The validation codes are applied to eDMS and a validation report is prepared. The Project Chemist reviews and approves the qualifiers and again updates the Sample Tracking Log. At this point the data is approved by the Project Chemist for general use.

Upon completion of the receipt of the last sample for the sampling event (for example, one complete round of groundwater monitoring), a copy of the completed Sample Tracking Log will be forwarded to the electronic data management group for organization purposes

4.2.4 Reconciliation of Invoices

Upon receipt of laboratory invoices, the Project Chemist or his designee will cross-check the invoices against the sample tracking log to verify the receipt by ITSI of all billed sample analyses, completed final data packages, and EDDs (accepted by the electronic data management group) before notifying the project manager that the invoices should be authorized for payment.

4.3 DATA MANAGEMENT GROUP RESPONSIBILITIES

4.3.1 Upload of Sample Information and Field Data to Database

The data management group will use the information in the sample tracking log and/or Event Planning tool in eDMS and the COCs as they are received in preparation for the upload of the electronic data deliverables (EDDs) directly from the laboratory or from laboratory provided electronic files.

Upon receipt of the sample-tracking log, the data management group will review the log. Any immediate potential problems (for example, the use of the dash '-' instead of an underscore '_' in the laboratory data system) that may follow in the preparation of the EDD will be identified and corrected.

4.3.1.1 Entry of COCs

The data management group will enter the COC information into eDMS. The sample identifications, analyses requested, sampling methods, matrices, sample depths, dates and times of sample collections, and proper assignment of quality control samples will be cross-checked for accuracy. The Sample Tracking Log will be updated as each COC is entered.

4.3.1.2 Entry of Other Field Data

Other data to be entered by the data management group includes water levels, field stability parameters (dissolved oxygen, ORP, turbidity, etc.), and GPS or survey coordinates. Additional data may include results of XRF field sampling, immunoassay test kit sampling, PID measurements, or other information required to be electronically provided to the client (typically any data used to make a regulatory decision), important for data review and analysis.

4.3.2 Creation of Final Data Package

The data management group will consolidate the validated EDDs from the in-house and/or third-party data validation firms with field information needed to complete the required data package. The final data package will then be submitted to the client in the required format (ERPIMS, NIRIS, Geotracker, etc.)

5.0 REQUIRED DOCUMENTATION

The following records generated as a result of implementation of this procedure must be maintained as quality records.

- Completed COCs
- Sample Collection Logs
- GPS coordinates for each sample collected

- Sample Tracking Log (if event planning not performed).
- Field notes

6.0 ATTACHMENTS

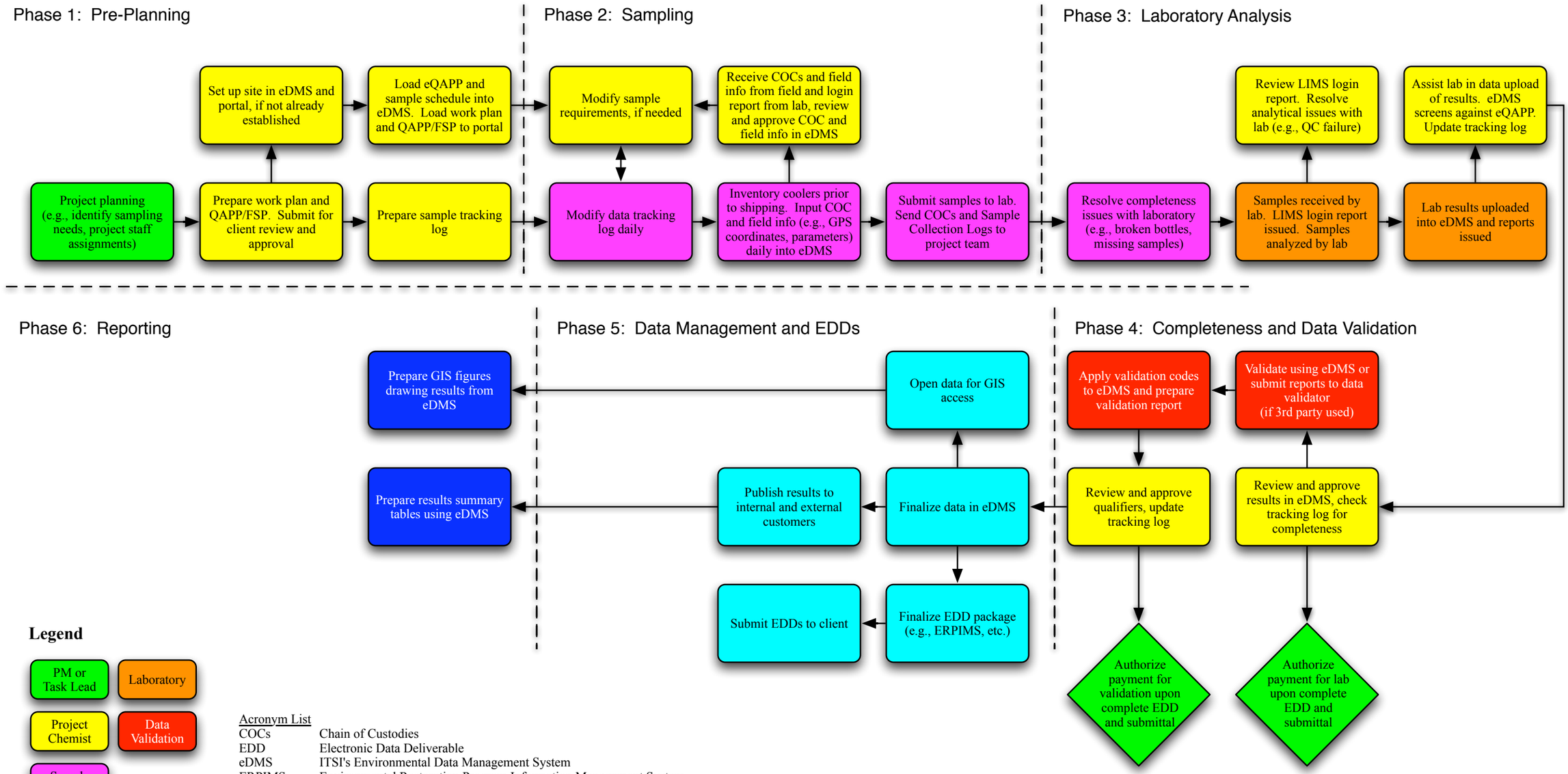
None.

7.0 FORMS

- Sample Tracking Log

8.0 REFERENCES

None.



Legend

- PM or Task Lead
- Laboratory
- Project Chemist
- Data Validation
- Sample Coordinator
- Data Manager
- Data Customer

Acronym List

COCs	Chain of Custodies
EDD	Electronic Data Deliverable
eDMS	ITSI's Environmental Data Management System
ERPIMS	Environmental Restoration Program Information Management System
eQAPP	Electronic Quality Assurance Project Plan
FSP	Field Sampling Plan
GIS	Geographic Information Systems
GPS	Global Positioning System
LIMS	Laboratory Information Management System
PM	Project Manager
QAPP	Quality Assurance Project Plan
QC	Quality Control

Figure 1

ITSI Gilbane Data Management Workflow

Sample Tracking Log

Event	Location ID	Sample Type	Field QC	Date Sampled	Time	Sample ID	Date Shipped	Date Received	Chain of Custody	Laboratory Work Order No.	Laboratory Sample No.	Analyses					Report Received	EDD Received	Data on eDMS	Notes
												TPH-DRO & MO by EPA 8015B	VOCs by EPA 8260	SVOCs by EPA 8270C	Title 22 Metals by 6010/6020/7000	Percent Moisture by ASTM D2216				

SAP Appendix B: DoD QSM GEL Laboratory Limits

Precision and Accuracy Data
VOA Waters 15-OCT-2012 - 15-OCT-2013
Client Type: DOD QSM

Parameter	LCS	LCSD	PS	PSD	SURR
1,1,1,2-Tetrachloroethane	80 - 130 ME 75 - 135	0 - 30.0	80 - 130 ME 75 - 135	0 - 30.0	NA
1,1,1-Trichloroethane	65 - 130 ME 55 - 145	0 - 30.0	65 - 130 ME 55 - 145	0 - 30.0	NA
1,1,2,2-Tetrachloroethane	65 - 130 ME 55 - 140	0 - 30.0	65 - 130 ME 55 - 140	0 - 30.0	NA
1,1,2-Trichloroethane	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
1,1-Dichloroethane	70 - 135 ME 60 - 145	0 - 30.0	70 - 135 ME 60 - 145	0 - 30.0	NA
1,1-Dichloroethylene	70 - 130 ME 55 - 140	0 - 30.0	70 - 130 ME 55 - 140	0 - 30.0	NA
1,1-Dichloropropene	75 - 130 ME 65 - 140	0 - 30.0	75 - 130 ME 65 - 140	0 - 30.0	NA
1,2,3-Trichlorobenzene	55 - 140 ME 45 - 155	0 - 30.0	55 - 140 ME 45 - 155	0 - 30.0	NA
1,2,3-Trichloropropane	75 - 125 ME 65 - 130	0 - 30.0	75 - 125 ME 65 - 130	0 - 30.0	NA
1,2,4-Trichlorobenzene	65 - 135 ME 55 - 145	0 - 30.0	65 - 135 ME 55 - 145	0 - 30.0	NA
1,2,4-Trimethylbenzene	75 - 130 ME 65 - 140	0 - 30.0	75 - 130 ME 65 - 140	0 - 30.0	NA
1,2-Dibromo-3-chloropropane	50 - 130 ME 35 - 145	0 - 30.0	50 - 130 ME 35 - 145	0 - 30.0	NA
1,2-Dibromoethane	80 - 120 ME 75 - 125	0 - 30.0	80 - 120 ME 75 - 125	0 - 30.0	NA
1,2-Dichlorobenzene	70 - 120 ME 60 - 130	0 - 30.0	70 - 120 ME 60 - 130	0 - 30.0	NA
1,2-Dichloroethane	70 - 130 ME 60 - 140	0 - 30.0	70 - 130 ME 60 - 140	0 - 30.0	NA
1,2-Dichloroethane-d4	NA	NA	NA	NA	70 - 120
1,2-Dichloroethylene	77 - 123 ME 72 - 128	0 - 20.0 ME 0 - 25.0	67 - 127 ME 62 - 132	0 - 20.0 ME - 25.0	NA
1,2-Dichloroethylene (total)	35 - 163 ME 14 - 185	0 - 20.0 ME 0 - 25.0	60 - 120 ME 50 - 130	0 - 20.0 ME 0 - 25.0	NA
1,2-Dichloropropane	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
1,3,5-Trimethylbenzene	75 - 130 ME 65 - 140	0 - 30.0	75 - 130 ME 65 - 140	0 - 30.0	NA
1,3-Dichlorobenzene	75 - 125 ME 65 - 130	0 - 30.0	75 - 125 ME 65 - 130	0 - 30.0	NA
1,3-Dichloropropane	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
1,3-Dichloropropylene	80 - 126 ME 82 - 132	0 - 20.0 ME 0 - 25.0	70 - 130 ME 60 - 140	0 - 20.0 ME 0 - 25.0	NA

Precision and Accuracy Data

VOA Waters 15-OCT-2012 - 15-OCT-2013

Client Type: DOD QSM

Parameter	LCS	LCSD	PS	PSD	SURR
1,3-Dichloropropylene(total)	78 - 126 ME 73 - 131	0 - 20.0 ME 0 - 25.0	68 - 132 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
1,4-Dichlorobenzene	75 - 125 ME 65 - 130	0 - 30.0	75 - 125 ME 65 - 130	0 - 30.0	NA
1,4-Dioxane	62 - 134 ME 50 - 146	0 - 20.0 ME 0 - 25.0	44 - 159 ME 24 - 178	0 - 20.0 ME 0 - 25.0	NA
1-Chlorohexane	66 - 131 ME 56 - 141	0 - 20.0 ME 0 - 25.0	70 - 130 ME 60 - 140	0 - 20.0 ME 0 - 25.0	NA
2,2-Dichloropropane	70 - 135 ME 60 - 150	0 - 30.0	70 - 135 ME 60 - 150	0 - 30.0	NA
2-Butanone	30 - 150 ME 10 - 170	0 - 30.0	30 - 150 ME 10 - 170	0 - 30.0	NA
2-Chloro-1,1,1-trifluoroethane	71 - 132 ME 61 - 142	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
2-Chloro-1,3-butadiene	45 - 159 ME 26 - 178	0 - 20.0 ME 0 - 25.0	39 - 130 ME 19 - 144	0 - 20.0 ME 0 - 25.0	NA
2-Chloroethylvinyl ether	42 - 134 ME 27 - 150	0 - 20.0 ME 0 - 25.0	46 - 127 ME 30 - 138	0 - 20.0 ME 0 - 25.0	NA
2-Chlorotoluene	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
2-Hexanone	55 - 130 ME 45 - 140	0 - 30.0	55 - 130 ME 45 - 140	0 - 30.0	NA
2-Nitropropane	55 - 163 ME 37 - 181	0 - 20.0 ME 0 - 25.0	66 - 148 ME 53 - 161	0 - 20.0 ME 0 - 25.0	NA
4-Chlorotoluene	75 - 130 ME 65 - 135	0 - 30.0	75 - 130 ME 65 - 135	0 - 30.0	NA
4-Isopropyltoluene	75 - 130 ME 65 - 140	0 - 30.0	75 - 130 ME 65 - 140	0 - 30.0	NA
4-Methyl-2-pentanone	60 - 135 ME 45 - 145	0 - 30.0	60 - 135 ME 45 - 145	0 - 30.0	NA
Acetone	40 - 140 ME 20 - 160	0 - 30.0	40 - 140 ME 20 - 160	0 - 30.0	NA
Acetonitrile	64 - 127 ME 54 - 137	0 - 20.0 ME 0 - 25.0	60 - 133 ME 48 - 145	0 - 20.0 ME 0 - 25.0	NA
Acrolein	28 - 152 ME 7 - 173	0 - 20.0 ME 0 - 25.0	30 - 167 ME 15 - 191	0 - 20.0 ME 0 - 25.0	NA
Acrylonitrile	64 - 131 ME 53 - 142	0 - 20.0 ME 0 - 25.0	65 - 135 ME 54 - 146	0 - 20.0 ME 0 - 25.0	NA
Allyl chloride	60 - 135 ME 47 - 148	0 - 20.0 ME 0 - 25.0	61 - 136 ME 48 - 149	0 - 20.0 ME 0 - 25.0	NA
Benzene	80 - 120 ME 75 - 130	0 - 30.0	80 - 120 ME 75 - 130	0 - 30.0	NA
Benzyl chloride	63 - 156 ME 48 - 172	0 - 20.0 ME 0 - 25.0	47 - 162 ME 28 - 181	0 - 20.0 ME 0 - 25.0	NA
	75 - 125		75 - 125		

Precision and Accuracy Data
VOA Waters 15-OCT-2012 - 15-OCT-2013
Client Type: DOD QSM

Parameter	LCS	LCSD	PS	PSD	SURR
Bromobenzene	ME 70 - 130	0 - 30.0	ME 70 - 130	0 - 30.0	NA
Bromochloromethane	65 - 130 ME 55 - 140	0 - 30.0	65 - 130 ME 55 - 140	0 - 30.0	NA
Bromodichloromethane	75 - 120 ME 70 - 130	0 - 30.0	75 - 120 ME 70 - 130	0 - 30.0	NA
Bromofluorobenzene	NA	NA	NA	NA	75 - 120
Bromoform	70 - 130 ME 60 - 140	0 - 30.0	70 - 130 ME 60 - 140	0 - 30.0	NA
Bromomethane	30 - 145 ME 10 - 165	0 - 30.0	30 - 145 ME 10 - 165	0 - 30.0	NA
Carbon disulfide	35 - 160 ME 15 - 185	0 - 30.0	35 - 160 ME 15 - 185	0 - 30.0	NA
Carbon tetrachloride	65 - 140 ME 55 - 150	0 - 30.0	65 - 140 ME 55 - 150	0 - 30.0	NA
Chlorobenzene	80 - 120 ME 75 - 130	0 - 30.0	80 - 120 ME 75 - 130	0 - 30.0	NA
Chloroethane	60 - 135 ME 50 - 145	0 - 30.0	60 - 135 ME 50 - 145	0 - 30.0	NA
Chloroform	65 - 135 ME 50 - 150	0 - 30.0	65 - 135 ME 50 - 150	0 - 30.0	NA
Chloromethane	40 - 125 ME 25 - 140	0 - 30.0	40 - 125 ME 25 - 140	0 - 30.0	NA
Chlorotrifluoroethylene	31 - 167 ME 9 - 189	0 - 20.0 ME 0 - 25.0	70 - 130 ME 60 - 140	0 - 20.0 ME 0 - 25.0	NA
Cyclohexane	78 - 129 ME 69 - 137	0 - 20.0 ME 0 - 25.0	70 - 130 ME 60 - 140	0 - 20.0 ME 0 - 25.0	NA
Cyclohexanone	54 - 146 ME 38 - 162	0 - 20.0 ME 0 - 25.0	50 - 128 ME 39 - 141	0 - 20.0 ME 0 - 25.0	NA
Cyclohexene	76 - 123 ME 68 - 131	0 - 20.0 ME 0 - 25.0	56 - 134 ME 43 - 147	0 - 20.0 ME 0 - 25.0	NA
Dibromochloromethane	60 - 135 ME 45 - 145	0 - 30.0	60 - 135 ME 45 - 145	0 - 30.0	NA
Dibromomethane	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
Dichlorodifluoromethane	30 - 155 ME 10 - 175	0 - 30.0	30 - 155 ME 10 - 175	0 - 30.0	NA
Ethyl acetate	65 - 129 ME 54 - 140	0 - 20.0 ME 0 - 25.0	61 - 134 ME 49 - 147	0 - 20.0 ME 0 - 25.0	NA
Ethyl ether	74 - 120 ME 67 - 123	0 - 20.0 ME 0 - 25.0	69 - 121 ME 61 - 130	0 - 20.0 ME 0 - 25.0	NA
Ethyl methacrylate	66 - 132 ME 56 - 143	0 - 20.0 ME 0 - 25.0	73 - 132 ME 63 - 142	0 - 20.0 ME 0 - 25.0	NA
Ethyl tert-butyl ether	72 - 134 ME 61 - 145	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
	75 - 125		75 - 125		

Precision and Accuracy Data

VOA Waters 15-OCT-2012 - 15-OCT-2013

Client Type: DOD QSM

Parameter	LCS	LCSD	PS	PSD	SURR
Ethylbenzene	ME 65 - 135	0 - 30.0	ME 65 - 135	0 - 30.0	NA
Hexachlorobutadiene	50 - 140 ME 35 - 160	0 - 30.0	50 - 140 ME 35 - 160	0 - 30.0	NA
Iodomethane	80 - 134 ME 71 - 143	0 - 20.0 ME 0 - 25.0	69 - 147 ME 56 - 160	0 - 20.0 ME 0 - 25.0	NA
Isobutyl alcohol	60 - 136 ME 47 - 149	0 - 20.0 ME 0 - 25.0	59 - 146 ME 45 - 161	0 - 20.0 ME 0 - 25.0	NA
Isopropyl Alcohol	79 - 137 ME 69 - 147	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
Isopropyl ether	80 - 120 ME 76 - 126	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
Isopropylbenzene	75 - 125 ME 65 - 135	0 - 30.0	75 - 125 ME 65 - 135	0 - 30.0	NA
Methacrylonitrile	64 - 132 ME 53 - 143	0 - 20.0 ME 0 - 25.0	63 - 141 ME 50 - 154	0 - 20.0 ME 0 - 25.0	NA
Methyl acetate	65 - 122 ME 56 - 131	0 - 20.0 ME 0 - 25.0	41 - 143 ME 24 - 160	0 - 20.0 ME 0 - 25.0	NA
Methyl methacrylate	66 - 129 ME 56 - 139	0 - 20.0 ME 0 - 25.0	70 - 130 ME 60 - 140	0 - 20.0 ME 0 - 25.0	NA
Methyl tert-amyl ether	70 - 138 ME 59 - 149	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
Methylcyclohexane	78 - 126 ME 70 - 134	0 - 20.0 ME 0 - 25.0	68 - 130 ME 58 - 141	0 - 20.0 ME 0 - 25.0	NA
Methylene chloride	55 - 140 ME 40 - 155	0 - 30.0	55 - 140 ME 40 - 155	0 - 30.0	NA
Naphthalene	55 - 140 ME 40 - 150	0 - 30.0	55 - 140 ME 40 - 150	0 - 30.0	NA
Pentachloroethane	73 - 149 ME 61 - 162	0 - 20.0 ME 0 - 25.0	65 - 160 ME 49 - 176	0 - 20.0 ME 0 - 25.0	NA
Propionitrile	67 - 135 ME 56 - 146	0 - 20.0 ME 0 - 25.0	66 - 141 ME 53 - 154	0 - 20.0 ME 0 - 25.0	NA
Styrene	65 - 135 ME 55 - 145	0 - 30.0	65 - 135 ME 55 - 145	0 - 30.0	NA
Tetrachloroethylene	45 - 150 ME 25 - 165	0 - 30.0	45 - 150 ME 25 - 165	0 - 30.0	NA
Tetrahydrofuran	59 - 127 ME 48 - 139	0 - 20.0 ME 0 - 25.0	61 - 134 ME 48 - 146	0 - 20.0 ME 0 - 25.0	NA
Toluene	75 - 120 ME 70 - 130	0 - 30.0	75 - 120	0 - 30.0	NA
Toluene-d8	NA	NA	NA	NA	85 - 120
Trichloroethylene	70 - 125 ME 60 - 135	0 - 30.0	70 - 125	0 - 30.0	NA
Trichlorofluoromethane	60 - 145 ME 45 - 160	0 - 30.0	60 - 145 ME 45 - 160	0 - 30.0	NA
	65 - 157	0 - 20.0	58 - 169	0 - 20.0	

Precision and Accuracy Data

VOA Waters 15-OCT-2012 - 15-OCT-2013

Client Type: DOD QSM

Parameter	LCS	LCSD	PS	PSD	SURR
Trichlorotrifluoroethane	ME 49 - 173	ME 0 - 25.0	ME 39 - 188	ME 0 - 25.0	NA
Vinyl acetate	75 - 144 ME 64 - 155	0 - 20.0 ME 0 - 25.0	50 - 143 ME 40 - 152	0 - 20.0 ME 0 - 25.0	NA
Vinyl chloride	50 - 145 ME 35 - 165	0 - 30.0	50 - 145 ME 35 - 165	0 - 30.0	NA
Xylenes (total)	59 - 136 ME 47 - 148	0 - 20.0 ME 0 - 25.0	40 - 147 ME 22 - 164	0 - 20.0 ME 0 - 25.0	NA
bis(2-Chloroisopropyl)ether	52 - 137 ME 38 - 151	0 - 20.0 ME 0 - 25.0	63 - 138 ME 50 - 151	0 - 20.0 ME 0 - 25.0	NA
cis-1,2-Dichloroethylene	70 - 125 ME 60 - 135	0 - 30.0	70 - 125 ME 60 - 135	0 - 30.0	NA
cis-1,3-Dichloropropylene	70 - 130 ME 60 - 140	0 - 30.0	70 - 130 ME 60 - 140	0 - 30.0	NA
cis-1,4-Dichloro-2-butene	66 - 138 ME 54 - 150	0 - 20.0 ME 0 - 25.0	60 - 147 ME 45 - 162	0 - 20.0 ME 0 - 25.0	NA
m,p-Xylenes	75 - 130 ME 65 - 135	0 - 30.0	75 - 130 ME 65 - 135	0 - 30.0	NA
n-Butyl alcohol	66 - 138 ME 54 - 150	0 - 20.0 ME 0 - 25.0	53 - 150 ME 37 - 166	0 - 20.0 ME 0 - 25.0	NA
n-Butylbenzene	70 - 135 ME 55 - 150	0 - 30.0	70 - 135 ME 55 - 150	0 - 30.0	NA
n-Propylbenzene	70 - 130 ME 65 - 140	0 - 30.0	70 - 130 ME 65 - 140	0 - 30.0	NA
o-Xylene	80 - 120 ME 75 - 130	0 - 30.0	80 - 120 ME 75 - 130	0 - 30.0	NA
sec-Butylbenzene	70 - 125 ME 65 - 135	0 - 30.0	70 - 125 ME 65 - 135	0 - 30.0	NA
tert-Butyl Alcohol	71 - 149 ME 58 - 162	0 - 20.0 ME 0 - 25.0	70 - 130 ME 65 - 135	0 - 20.0 ME 0 - 25.0	NA
tert-Butyl methyl ether	65 - 125 ME 55 - 135	0 - 30.0	65 - 125 ME 55 - 135	0 - 30.0	NA
tert-Butylbenzene	70 - 130 ME 60 - 140	0 - 30.0	70 - 130 ME 60 - 140	0 - 30.0	NA
trans-1,2-Dichloroethylene	60 - 140 ME 45 - 150	0 - 30.0	60 - 140 ME 45 - 150	0 - 30.0	NA
trans-1,3-Dichloropropylene	55 - 140 ME 40 - 155	0 - 30.0	55 - 140 ME 40 - 155	0 - 30.0	NA
trans-1,4-Dichloro-2-butene	70 - 138 ME 59 - 149	0 - 20.0 ME 0 - 25.0	64 - 150 ME 50 - 164	0 - 20.0 ME 0 - 25.0	NA

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
1,1'-Biphenyl	0 - 30.0 ME 0 - 35.0	28 - 115 ME 14 - 130	0 - 30.0 ME 0 - 35.0	32 - 99 ME 21 - 110	0 - 30.0 ME 0 - 35.0	NA
1,2,4,5-Tetrachlorobenzene	NA	36 - 106 ME 24 - 118	0 - 30.0 ME 0 - 35.0	30 - 101 ME 18 - 113	0 - 30.0 ME 0 - 35.0	NA
1,2,4-Trichlorobenzene	0 - 30.0 ME 0 - 35.0	45 - 110 ME 30 - 120	0 - 30.0	45 - 110 ME 30 - 120	0 - 30.0	NA
1,2-Dichlorobenzene	0 - 30.0 ME 0 - 35.0	45 - 95 ME 35 - 105	0 - 30.0	45 - 95 ME 35 - 105	0 - 30.0	NA
1,2-Diphenylhydrazine	0 - 30.0 ME 0 - 35.0	31 - 117 ME 16 - 132	0 - 30.0 ME 0 - 35.0	28 - 114 ME 14 - 129	0 - 30.0 ME 0 - 35.0	NA
1,3,5-Trinitrobenzene	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1,3-Dichlorobenzene	0 - 30.0 ME 0 - 35.0	40 - 100 ME 30 - 110	0 - 30.0	40 - 100 ME 30 - 110	0 - 30.0	NA
1,4-Dichlorobenzene	0 - 30.0 ME 0 - 35.0	35 - 105 ME 25 - 115	0 - 30.0	35 - 105 ME 25 - 115	0 - 30.0	NA
1,4-Dinitrobenzene	NA	45 - 101 ME 35 - 110	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1,4-Dioxane	0 - 30.0 ME 0 - 35.0	40 - 72 ME 34 - 77	0 - 30.0 ME 0 - 35.0	17 - 63 ME 9 - 71	0 - 30.0 ME 0 - 35.0	NA
1,4-Naphthoquinone	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1-Hexanol	NA	40 - 165 ME 19 - 186	0 - 30.0 ME 0 - 35.0	30 - 163 ME 15 - 187	0 - 30.0 ME 0 - 35.0	NA
1-Methylnaphthalene	0 - 30.0 ME 0 - 35.0	31 - 122 ME 16 - 137	0 - 30.0 ME 0 - 35.0	25 - 118 ME 9 - 134	0 - 30.0 ME 0 - 35.0	NA
1-Naphthylamine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1-Nitropyrene	NA	43 - 149 ME 26 - 166	0 - 30.0 ME 0 - 35.0	26 - 155 ME 5 - 177	0 - 30.0 ME 0 - 35.0	NA
2,2'-Dichlorobenzil	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
2,3,4,6-Tetrachlorophenol	NA	40 - 119 ME 27 - 133	0 - 30.0 ME 0 - 35.0	32 - 116 ME 18 - 131	0 - 30.0 ME 0 - 35.0	NA
2,3-Dichloroaniline	0 - 30.0 ME 0 - 35.0	39 - 98 ME 29 - 108	0 - 30.0 ME 0 - 35.0	34 - 100 ME 23 - 110	0 - 30.0 ME 0 - 35.0	NA
2,4,5-Trichlorophenol	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
2,4,6-Tribromophenol	NA	NA	NA	NA	NA	35 - 125
2,4,6-Trichlorophenol	0 - 30.0 ME 0 - 35.0	45 - 110 ME 30 - 120	0 - 30.0	45 - 110 ME 30 - 120	0 - 30.0	NA
2,4-Dichlorophenol	0 - 30.0 ME 0 - 35.0	45 - 110 ME 35 - 120	0 - 30.0	45 - 110 ME 35 - 120	0 - 30.0	NA
2,4-Dimethylphenol	0 - 30.0 ME 0 - 35.0	30 - 105 ME 20 - 115	0 - 30.0	30 - 105 ME 20 - 115	0 - 30.0	NA
2,4-Dinitrophenol	0 - 30.0 ME 0 - 35.0	15 - 130 ME 10 - 150	0 - 30.0	15 - 130 ME 10 - 150	0 - 30.0	NA
2,4-Dinitrotoluene	0 - 30.0 ME 0 - 35.0	50 - 115 ME 35 - 130	0 - 30.0	50 - 115 ME 35 - 130	0 - 30.0	NA
2,4-Toluene diisocyanate	NA	50 - 150 ME 45 - 155	NA	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
2,6-Dichlorophenol	NA	35 - 108 ME 23 - 121	0 - 30.0 ME 0 - 35.0	30 - 103 ME 17 - 115	0 - 30.0 ME 0 - 35.0	NA

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
2,6-Dinitrotoluene	0 - 30.0 ME 0 - 35.0	50 - 110 ME 35 - 125	0 - 30.0	50 - 110 ME 35 - 125	0 - 30.0	NA
2-Acetylaminofluorene	NA	42 - 120 ME 29 - 133	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
2-Chloronaphthalene	0 - 30.0 ME 0 - 35.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
2-Chlorophenol	0 - 30.0 ME 0 - 35.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
2-Fluorobiphenyl	NA	NA	NA	NA	NA	45 - 105
2-Fluorophenol	NA	NA	NA	NA	NA	35 - 105
2-Methyl-4,6-dinitrophenol	0 - 30.0 ME 0 - 35.0	30 - 135 ME 10 - 155	0 - 30.0	30 - 135 ME 10 - 155	0 - 30.0	NA
2-Methylnaphthalene	0 - 30.0 ME 0 - 35.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
2-Naphthylamine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
2-Nitrophenol	0 - 30.0 ME 0 - 35.0	40 - 110 ME 30 - 120	0 - 30.0	40 - 110 ME 30 - 120	0 - 30.0	NA
2-Picoline	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
3,3'-Dichlorobenzidine	0 - 30.0 ME 0 - 35.0	10 - 130 ME 0 - 145	0 - 30.0	10 - 130 ME 0 - 145	0 - 30.0	NA
3,3'-Dimethylbenzidine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
3-Methylcholanthrene	NA	41 - 106 ME 30 - 116	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
4-Aminobiphenyl	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
4-Bromophenylphenylether	0 - 30.0 ME 0 - 35.0	45 - 115 ME 35 - 130	0 - 30.0	45 - 115 ME 35 - 130	0 - 30.0	NA
4-Chloro-3-methylphenol	0 - 30.0 ME 0 - 35.0	45 - 115 ME 35 - 125	0 - 30.0	45 - 115 ME 35 - 125	0 - 30.0	NA
4-Chloroaniline	0 - 30.0 ME 0 - 35.0	Oct-95 ME 0 - 110	0 - 30.0	Oct-95 ME 0 - 110	0 - 30.0	NA
4-Chlorophenylphenylether	0 - 30.0 ME 0 - 35.0	45 - 110 ME 35 - 120	0 - 30.0	45 - 110 ME 35 - 120	0 - 30.0	NA
4-Chlorothioanisole	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
4-Chlorothiophenol	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
4-Nitrophenol	0 - 30.0 ME 0 - 35.0	15 - 140 ME 10 - 160	0 - 30.0	15 - 140 ME 10 - 160	0 - 30.0	NA
4-Nitroquinoline-1-oxide	NA	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
5-Methylchrysene	NA	49 - 117 ME 37 - 128	0 - 30.0 ME 0 - 35.0	35 - 119 ME 20 - 133	0 - 30.0 ME 0 - 35.0	NA
5-Nitro-o-toluidine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
7,12Dimethylbenz(a)anthracene	NA	25 - 124 ME 9 - 140	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
7H-Dibenzo(c,g)carbazole	NA	30 - 163 ME 15 - 188	0 - 30.0 ME 0 - 35.0	30 - 144 ME 15 - 167	0 - 30.0 ME 0 - 35.0	NA
	0 - 30.0	45 - 110		45 - 110		

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Acenaphthene	ME 0 - 35.0	ME 35 - 120	0 - 30.0	ME 35 - 120	0 - 30.0	NA
Acenaphthylene	0 - 30.0 ME 0 - 35.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
Acetophenone	0 - 30.0 ME 0 - 35.0	27 - 126 ME 11 - 142	0 - 30.0 ME 0 - 35.0	28 - 109 ME 15 - 122	0 - 30.0 ME 0 - 35.0	NA
Aniline	0 - 30.0 ME 0 - 35.0	15 - 120 ME -3 - 137	0 - 30.0 ME 0 - 35.0	23 - 108 ME 8 - 122	0 - 30.0 ME 0 - 35.0	NA
Anthracene	0 - 30.0 ME 0 - 35.0	55 - 105 ME 45 - 115	0 - 30.0	55 - 105 ME 45 - 115	0 - 30.0	NA
Aramite	NA	27 - 122 ME 11 - 138	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Atrazine	0 - 30.0 ME 0 - 35.0	30 - 123 ME 15 - 139	0 - 30.0 ME 0 - 35.0	32 - 115 ME 18 - 129	0 - 30.0 ME 0 - 35.0	NA
Benzaldehyde	0 - 30.0 ME 0 - 35.0	38 - 79 ME 31 - 86	0 - 30.0 ME 0 - 35.0	34 - 89 ME 25 - 98	0 - 30.0 ME 0 - 35.0	NA
Benzidine	0 - 30.0 ME 0 - 35.0	11 - 123 ME 5 - 141	0 - 30.0 ME 0 - 35.0	29 - 105 ME 16 - 118	0 - 30.0 ME 0 - 35.0	NA
Benzo(a)anthracene	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Benzo(a)pyrene	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Benzo(b)fluoranthene	0 - 30.0 ME 0 - 35.0	45 - 115 ME 35 - 125	0 - 30.0	45 - 115 ME 35 - 125	0 - 30.0	NA
Benzo(ghi)perylene	0 - 30.0 ME 0 - 35.0	40 - 125 ME 25 - 140	0 - 30.0	40 - 125 ME 25 - 140	0 - 30.0	NA
Benzo(j)fluoranthene	NA	53 - 187 ME 31 - 209	NA	58 - 196 ME 35 - 219	0 - 30.0 ME 0 - 35.0	NA
Benzo(k)fluoranthene	0 - 30.0 ME 0 - 35.0	45 - 125 ME 30 - 135	0 - 30.0	45 - 125 ME 30 - 135	0 - 30.0	NA
Benzoic acid	0 - 30.0 ME 0 - 35.0	0 - 110.0 ME 0 - 130.0	0 - 30.0	0 - 110.0 ME 0 - 130.0	0 - 30.0	NA
Benzyl alcohol	0 - 30.0 ME 0 - 35.0	20 - 125 ME 10 - 140	0 - 30.0	20 - 125 ME 10 - 140	0 - 30.0	NA
Butylbenzylphthalate	0 - 30.0 ME 0 - 35.0	50 - 125 ME 35 - 135	0 - 30.0	50 - 125 ME 35 - 135	0 - 30.0	NA
Caprolactam	0 - 30.0 ME 0 - 35.0	34 - 116 ME 20 - 130	0 - 30.0 ME 0 - 35.0	30 - 109 ME 16 - 122	0 - 30.0 ME 0 - 35.0	NA
Carbazole	0 - 30.0 ME 0 - 35.0	45 - 115 ME 30 - 130	0 - 30.0	45 - 115 ME 30 - 130	0 - 30.0	NA
Chlorobenzilate	0 - 30.0 ME 0 - 35.0	33 - 134 ME 17 - 151	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Chrysene	0 - 30.0 ME 0 - 35.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA
Di-n-butylphthalate	0 - 30.0 ME 0 - 35.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA
Di-n-octylphthalate	0 - 30.0 ME 0 - 35.0	40 - 130 ME 25 - 145	0 - 30.0	40 - 130 ME 25 - 145	0 - 30.0	NA
Diallate	NA	37 - 112 ME 24 - 124	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Dibenz(a,h)acridine	NA	44 - 128 ME 30 - 142	NA	25 - 131 ME 7 - 149	0 - 30.0 ME 0 - 35.0	NA
Dibenzo(a,e)pyrene	0 - 30.0 ME 0 - 35.0	34 - 113 ME 21 - 126	0 - 30.0 ME 0 - 35.0	60 - 140 ME 50 - 150	0 - 30.0 ME 0 - 35.0	NA

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Dibenzo(a,h)anthracene	0 - 30.0 ME 0 - 35.0	40 - 125 ME 25 - 140	0 - 30.0	40 - 125 ME 25 - 140	0 - 30.0	NA
Dibenzo(a,h)pyrene	NA	23 - 162 ME 0 - 186	0 - 30.0 ME 0 - 35.0	30 - 173 ME 15 - 202	0 - 30.0 ME 0 - 35.0	NA
Dibenzo(a,i)pyrene	NA	30 - 154 ME 15 - 177	0 - 30.0 ME 0 - 35.0	30 - 157 ME 15 - 184	0 - 30.0 ME 0 - 35.0	NA
Dibenzo(a,j)acridine	NA	48 - 131 ME 34 - 145	NA	31 - 130 ME 14 - 147	0 - 30.0 ME 0 - 35.0	NA
Dibenzo(a,l)pyrene	NA	38 - 162 ME 17 - 182	0 - 30.0 ME 0 - 35.0	30 - 166 ME 15 - 193	0 - 30.0 ME 0 - 35.0	NA
Dibenzofuran	0 - 30.0 ME 0 - 35.0	50 - 105 ME 40 - 110	0 - 30.0	50 - 105 ME 40 - 110	0 - 30.0	NA
Diethylphthalate	0 - 30.0 ME 0 - 35.0	50 - 115 ME 40 - 125	0 - 30.0	50 - 115 ME 40 - 125	0 - 30.0	NA
Dimethoate	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Dimethylphthalate	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Dinoseb	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Diphenyl disulfide	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Diphenyl sulfide	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Diphenylamine	0 - 30.0 ME 0 - 35.0	50 - 115 ME 40 - 125	0 - 30.0	50 - 115 ME 40 - 125	0 - 30.0	NA
Disulfoton	NA	46 - 92 ME 38 - 100	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Ethyl Methanesulfonate	NA	38 - 106 ME 26 - 117	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Ethyl methacrylate	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Famphur	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Fluoranthene	0 - 30.0 ME 0 - 35.0	55 - 115 ME 45 - 125	0 - 30.0	55 - 115 ME 45 - 125	0 - 30.0	NA
Fluorene	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 115	0 - 30.0	50 - 110 ME 40 - 115	0 - 30.0	NA
Hexachlorobenzene	0 - 30.0 ME 0 - 35.0	45 - 120 ME 35 - 130	0 - 30.0	45 - 120 ME 35 - 130	0 - 30.0	NA
Hexachlorobutadiene	0 - 30.0 ME 0 - 35.0	40 - 115 ME 25 - 130	0 - 30.0	40 - 115 ME 25 - 130	0 - 30.0	NA
Hexachlorocyclopentadiene	0 - 30.0 ME 0 - 35.0	25 - 111 ME 11 - 126	0 - 30.0 ME 0 - 35.0	31 - 93 ME 21 - 104	0 - 30.0 ME 0 - 35.0	NA
Hexachloroethane	0 - 30.0 ME 0 - 35.0	35 - 110 ME 20 - 120	0 - 30.0	35 - 110 ME 20 - 120	0 - 30.0	NA
Hexachlorophene	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Hexachloropropene	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Hydroxymethyl phthalimide	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
	0 - 30.0	40 - 120		40 - 120		

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Indeno(1,2,3-cd)pyrene	ME 0 - 35.0	ME 25 - 135	0 - 30.0	ME 25 - 135	0 - 30.0	NA
Isodrin	NA	35 - 112 ME 22 - 125	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Isophorone	0 - 30.0 ME 0 - 35.0	45 - 110 ME 30 - 125	0 - 30.0	45 - 110 ME 30 - 125	0 - 30.0	NA
Isosafrole	NA	30 - 126 ME 14 - 142	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Kepone	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methapyrilene	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methoxychlor	NA	35 - 104 ME 23 - 116	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methyl methacrylate	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methyl methanesulfonate	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methyl parathion	NA	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Methyl-N-nitrosomethylamine	0 - 30.0 ME 0 - 35.0	20 - 115 ME 10 - 130	0 - 30.0	20 - 115 ME 10 - 130	0 - 30.0	NA
N-Nitrosodi-n-butylamine	NA	35 - 95 ME 25 - 105	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosodiethylamine	NA	36 - 95 ME 27 - 105	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosodipropylamine	0 - 30.0 ME 0 - 35.0	40 - 115 ME 30 - 125	0 - 30.0	40 - 115 ME 30 - 125	0 - 30.0	NA
N-Nitrosomethylethylamine	NA	34 - 97 ME 23 - 107	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosomorpholine	NA	40 - 105 ME 29 - 116	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosopiperidine	NA	36 - 96 ME 25 - 107	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosopyrrolidine	NA	32 - 110 ME 19 - 123	0 - 30.0 ME 0 - 35.0	30 - 104 ME 17 - 116	0 - 30.0 ME 0 - 35.0	NA
Naphthalene	0 - 30.0 ME 0 - 35.0	40 - 105 ME 30 - 120	0 - 30.0	40 - 105 ME 30 - 120	0 - 30.0	NA
Nitrobenzene	0 - 30.0 ME 0 - 35.0	40 - 115 ME 30 - 125	0 - 30.0	40 - 115 ME 30 - 125	0 - 30.0	NA
Nitrobenzene-d5	NA	NA	NA	NA	NA	35 - 100
Octachlorostyrene	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Parathion	NA	46 - 103 ME 36 - 112	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachlorobenzene	NA	43 - 100 ME 34 - 109	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachloroethane	NA	29 - 110 ME 15 - 123	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachloronitrobenzene	NA	38 - 125 ME 24 - 139	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachlorophenol	0 - 30.0 ME 0 - 35.0	25 - 120 ME 10 - 135	0 - 30.0	25 - 120 ME 10 - 135	0 - 30.0	NA
		45 - 117	0 - 30.0	10 - 150	0 - 30.0	

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Phenacetin	NA	ME 33 - 129	ME 0 - 35.0	ME 5 - 155	ME 0 - 35.0	NA
Phenanthrene	0 - 30.0 ME 0 - 35.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Phenol	0 - 30.0 ME 0 - 35.0	40 - 100 ME 30 - 110	0 - 30.0	40 - 100 ME 30 - 110	0 - 30.0	NA
Phenol-d5	NA	NA	NA	NA	NA	40 - 100
Phenyl sulfone	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Phorate	NA	39 - 107 ME 27 - 119	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Phthalic acid	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Pronamide	NA	45 - 95 ME 36 - 103	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pyrene	0 - 30.0 ME 0 - 35.0	45 - 125 ME 35 - 135	0 - 30.0	45 - 125 ME 35 - 135	0 - 30.0	NA
Pyridine	0 - 30.0 ME 0 - 35.0	13 - 126 ME 5 - 144	0 - 30.0 ME 0 - 35.0	15 - 115 ME -2 - 131	0 - 30.0 ME 0 - 35.0	NA
Quinoline	NA	47 - 103 ME 38 - 113	0 - 30.0 ME 0 - 35.0	36 - 99 ME 26 - 110	0 - 30.0 ME 0 - 35.0	NA
Safrole	NA	35 - 100 ME 24 - 110	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Sulfotepp	NA	39 - 108 ME 27 - 120	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Thionazin	NA	50 - 113 ME 40 - 123	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Thiophenol	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
Tributylphosphate	0 - 30.0 ME 0 - 35.0	36 - 130 ME 20 - 146	0 - 30.0 ME 0 - 35.0	24 - 128 ME 6 - 145	0 - 30.0 ME 0 - 35.0	NA
Triethylphosphorothioate	NA	42 - 86 ME 34 - 93	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
a,a-Dimethylphenethylamine	NA	36 - 84 ME 28 - 92	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
alpha-Terpineol	0 - 30.0 ME 0 - 35.0	35 - 103 ME 23 - 114	0 - 30.0 ME 0 - 35.0	32 - 100 ME 21 - 111	0 - 30.0 ME 0 - 35.0	NA
bis(2-Chloroethoxy)methane	0 - 30.0 ME 0 - 35.0	45 - 110 ME 30 - 120	0 - 30.0	45 - 110 ME 30 - 120	0 - 30.0	NA
bis(2-Chloroethyl) ether	0 - 30.0 ME 0 - 35.0	40 - 105 ME 25 - 115	0 - 30.0	40 - 105 ME 25 - 115	0 - 30.0	NA
bis(2-Chloroisopropyl)ether	0 - 30.0 ME 0 - 35	20 - 115 ME 10 - 130	0 - 30.0	20 - 115 ME 10 - 130	0 - 30.0	NA
bis(2-Ethylhexyl)phthalate	0 - 30.0 ME 0 - 35.0	45 - 125 ME 35 - 140	0 - 30.0	45 - 125 ME 35 - 140	0 - 30.0	NA
bis(Chloromethyl)ether	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
bis(p-Chlorophenyl)disulfide	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
bis(p-Chlorophenyl)sulfone	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA
m,p-Cresols	0 - 30.0 ME 0 - 35.0	40 - 105 ME 30 - 120	0 - 30.0	40 - 105 ME 30 - 120	0 - 30.0	NA
		49 - 102	0 - 30.0	50 - 150	0 - 30.0	

Precision and Accuracy Data
BNA Solids 15-NOV-2012 - 01-NOV-2013
Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
m-Dinitrobenzene	NA	ME 41 - 110	ME 0 - 35.0	ME 40 - 155	ME 0 - 35.0	NA
m-Nitroaniline	0 - 30.0 ME 0 - 35.0	25 - 110 ME 15 - 125	0 - 30.0	25 - 110 ME 15 - 125	0 - 30.0	NA
m-Toluidine	NA	50 - 150 ME 15 - 155	0 - 30.0	50 - 150 ME 45 - 155	50 - 30 ME - 35	NA
n-Decane	0 - 30.0 ME 0 - 35.0	31 - 97 ME 20 - 108	0 - 30.0 ME 0 - 35.0	30 - 95 ME 19 - 105	0 - 30.0 ME 0 - 35.0	NA
n-Octadecane	0 - 30.0 ME 0 - 35.0	31 - 112 ME 18 - 126	0 - 30.0 ME 0 - 35.0	25 - 123 ME 9 - 140	0 - 30.0 ME 0 - 35.0	NA
o-Cresol	0 - 30.0 ME 0 - 35.0	40 - 105 ME 30 - 115	0 - 30.0	40 - 105 ME 30 - 115	0 - 30.0	NA
o-Nitroaniline	0 - 30.0 ME 0 - 35.0	45 - 120 ME 30 - 130	0 - 30.0	45 - 120 ME 30 - 130	0 - 30.0	NA
o-Toluidine	NA	17 - 149 ME 5 - 171	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-(Dimethylamino)azobenzene	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-Benzoquinone	NA	60 - 140 ME 50 - 150	NA	60 - 140 ME 50 - 150	NA	NA
p-Nitroaniline	0 - 30.0 ME 0 - 35.0	35 - 115 ME 20 - 125	0 - 30.0	35 - 115 ME 20 - 125	0 - 30.0	NA
p-Phenylenediamine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-Terphenyl-d14	NA	NA	NA	NA	NA	30 - 125
p-Toluidine	NA	50 - 150 ME 45 - 155	0 - 30.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	NA

Precision and Accuracy Data

BNA Waters 15-OCT-2012 - 15-OCT-2013

Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
1,1'-Biphenyl	0 - 20.0 ME 0 - 25.0	42 - 96 ME 33 - 105	0 - 30.0 ME 0 - 35.0	31 - 102 ME 20 - 114	0 - 30.0 ME 0 - 35.0	NA
1,2,4,5-Tetrachlorobenzene	0 - 20.0 ME 0 - 25.0	40 - 93 ME 32 - 101	0 - 30.0 ME 0 - 35.0	32 - 94 ME 21 - 105	0 - 30.0 ME 0 - 35.0	NA
1,2,4-Trichlorobenzene	0 - 20.0 ME 0 - 25.0	35 - 105 ME 25 - 120	0 - 30.0	35 - 105 ME 25 - 120	0 - 30.0	NA
1,2-Dichlorobenzene	0 - 20.0 ME 0 - 25.0	35 - 100 ME 20 - 115	0 - 30.0	35 - 100 ME 20 - 115	0 - 30.0	NA
1,2-Diphenylhydrazine	0 - 20.0 ME 0 - 25.0	55 - 115 ME 45 - 120	0 - 30.0	55 - 115 ME 45 - 120	0 - 30.0	NA
1,3,5-Trinitrobenzene	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1,3-Dichlorobenzene	0 - 20.0 ME 0 - 25.0	30 - 100 ME 20 - 110	0 - 30.0	30 - 100 ME 20 - 110	0 - 30.0	NA
1,4-Dichlorobenzene	0 - 20.0 ME 0 - 25.0	30 - 100 ME 20 - 110	0 - 30.0	30 - 100 ME 20 - 110	0 - 30.0	NA
1,4-Dinitrobenzene	NA	48 - 122 ME 36 - 134	0 - 20.0 ME 0 - 25.0	NA	NA	NA
1,4-Dioxane	0 - 20.0 ME 0 - 25.0	41 - 69 ME 36 - 73	0 - 30.0 ME 0 - 35.0	26 - 90 ME 15 - 100	0 - 30.0 ME 0 - 35.0	NA
1,4-Naphthoquinone	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1-Hexanol	0 - 20.0 ME 0 - 25.0	63 - 165 ME 46 - 182	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
1-Methylnaphthalene	0 - 20.0 ME 0 - 25.0	38 - 105 ME 27 - 116	0 - 30.0 ME 0 - 35.0	29 - 107 ME 16 - 120	0 - 30.0 ME 0 - 35.0	NA
1-Naphthylamine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
1-Nitropyrene	0 - 20.0 ME 0 - 25.0	48 - 137 ME 33 - 152	0 - 20.0 ME 0 - 25.0	35 - 171 ME 12 - 194	0 - 30.0 ME - 35.0	NA
2,3,4,6-Tetrachlorophenol	0 - 20.0 ME 0 - 25.0	46 - 119 ME 34 - 131	0 - 30.0 ME 0 - 35.0	33 - 123 ME 17 - 139	0 - 30.0 ME 0 - 35.0	NA
2,3-Dichloroaniline	0 - 20.0 ME 0 - 25.0	46 - 114 ME 35 - 125	0 - 30.0 ME 0 - 35.0	39 - 114 ME 26 - 127	0 - 30.0 ME 0 - 35.0	NA
2,4,5-Trichlorophenol	0 - 20.0 ME 0 - 25.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
2,4,6-Tribromophenol	NA	NA	NA	NA	NA	40 - 125
2,4,6-Trichlorophenol	0 - 20.0 ME 0 - 25.0	50 - 115 ME 40 - 125	0 - 30.0	50 - 115 ME 40 - 125	0 - 30.0	NA
2,4-Dichlorophenol	0 - 20.0 ME 0 - 25.0	50 - 105 ME 40 - 115	0 - 30.0	50 - 105 ME 40 - 115	0 - 30.0	NA
2,4-Dimethylphenol	0 - 20.0 ME 0 - 25.0	30 - 110 ME 15 - 125	0 - 30.0	30 - 110 ME 15 - 125	0 - 30.0	NA
2,4-Dinitrophenol	0 - 20.0 ME 0 - 25.0	15 - 140 ME 10 - 160	0 - 30.0	15 - 140 ME 10 - 160	0 - 30.0	NA
2,4-Dinitrotoluene	0 - 20.0 ME 0 - 25.0	50 - 120 ME 40 - 130	0 - 30.0	50 - 120 ME 40 - 130	0 - 30.0	NA
2,4-Toluene diisocyanate	NA	50 - 150 ME 45 - 155	NA	50 - 150 ME 45 - 155	0 - 25.0 ME 0 - 30.0	NA

Precision and Accuracy Data

BNA Waters 15-OCT-2012 - 15-OCT-2013

Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
2,6-Dichlorophenol	0 - 20.0 ME 0 - 25.0	43 - 108 ME 32 - 119	0 - 30.0 ME 0 - 35.0	38 - 112 ME 25 - 125	0 - 30.0 ME 0 - 35.0	NA
2,6-Dinitrotoluene	0 - 20.0 ME 0 - 25.0	50 - 115 ME 35 - 130	0 - 30.0	50 - 115 ME 35 - 130	0 - 30.0	NA
2-Acetylaminofluorene	0 - 20.0 ME 0 - 25.0	42 - 135 ME 27 - 150	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
2-Chloronaphthalene	0 - 20.0 ME 0 - 25.0	50 - 105 ME 40 - 115	0 - 30.0	50 - 105 ME 40 - 115	0 - 30.0	NA
2-Chlorophenol	0 - 20.0 ME 0 - 25.0	35 - 105 ME 25 - 115	0 - 30.0	35 - 105 ME 25 - 115	0 - 30.0	NA
2-Ethoxyethanol	NA	10 - 150 ME 5 - 155	0 - 20.0 ME 0 - 25.0	NA	NA	NA
2-Fluorobiphenyl	0 - 20.0 ME 0 - 25.0	NA	NA	NA	NA	50 - 110
2-Fluorophenol	0 - 20.0 ME 0 - 25.0	NA	NA	NA	NA	20 - 110
2-Methyl-4,6-dinitrophenol	0 - 20.0 ME 0 - 25.0	40 - 130 ME 25 - 145	0 - 30.0	40 - 130 ME 25 - 145	0 - 30.0	NA
2-Methylnaphthalene	0 - 20.0 ME 0 - 25.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
2-Naphthylamine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
2-Nitrophenol	0 - 20.0 ME 0 - 25.0	40 - 115 ME 25 - 125	0 - 30.0	40 - 115 ME 25 - 125	0 - 30.0	NA
2-Picoline	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
3,3'-Dichlorobenzidine	0 - 20.0 ME 0 - 25.0	20 - 110 ME 10 - 125	0 - 30.0	20 - 110 ME 10 - 125	0 - 30.0	NA
3,3'-Dimethylbenzidine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
3-Methylcholanthrene	0 - 20.0 ME 0 - 25.0	27 - 139 ME 9 - 157	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
4,4'-Methylenebis(2-chloroaniline)	NA	44 - 142 ME 27 - 159	0 - 30.0 ME 0 - 35.0	NA	NA	NA
4-Aminobiphenyl	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
4-Bromophenylphenylether	0 - 20.0 ME 0 - 25.0	50 - 115 ME 40 - 125	0 - 30.0	50 - 115 ME 40 - 125	0 - 30.0	NA
4-Chloro-3-methylphenol	0 - 20.0 ME 0 - 25.0	45 - 110 ME 35 - 120	0 - 30.0	45 - 110 ME 35 - 120	0 - 30.0	NA
4-Chloroaniline	0 - 20.0 ME 0 - 25.0	15 - 110 ME 10 - 125	0 - 30.0	15 - 110 ME 10 - 125	0 - 30.0	NA
4-Chlorophenylphenylether	0 - 20.0 ME 0 - 25.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
4-Nitrophenol	0 - 20.0 ME 0 - 25.0	0 - 125.0 ME 0 - 145.0	0 - 30.0	0 - 125.0 ME 0 - 145.0	0 - 30.0	NA
4-Nitroquinoline-1-oxide	0 - 20.0 ME 0 - 25.0	24 - 144 ME 4 - 164	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
5-Methylchrysene	0 - 20.0 ME 0 - 25.0	59 - 108 ME 51 - 116	0 - 20.0 ME 0 - 25.0	61 - 107 ME 54 - 115	0 - 30.0 ME - 35.0	NA

Precision and Accuracy Data

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Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
5-Nitro-o-toluidine	0 - 20.0 ME 0 - 25.0	42 - 116 ME 30 - 128	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
7,12Dimethylbenz(a)anthracene	0 - 20.0 ME 0 - 25.0	35 - 126 ME 20 - 141	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
7H-Dibenzo(c,g)carbazole	0 - 20.0 ME 0 - 25.0	43 - 118 ME 30 - 131	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Acenaphthene	0 - 20.0 ME 0 - 25.0	45 - 110 ME 35 - 120	0 - 30.0	45 - 110 ME 35 - 120	0 - 30.0	NA
Acenaphthylene	0 - 20.0 ME 0 - 25.0	50 - 105 ME 40 - 115	0 - 30.0	50 - 105 ME 40 - 115	0 - 30.0	NA
Acetophenone	0 - 20.0 ME 0 - 25.0	45 - 114 ME 34 - 126	0 - 30.0 ME 0 - 35.0	40 - 119 ME 27 - 132	0 - 30.0 ME 0 - 35.0	NA
Aniline	0 - 20.0 ME 0 - 25.0	38 - 105 ME 27 - 116	0 - 30.0 ME 0 - 35.0	28 - 108 ME 15 - 121	0 - 30.0 ME 0 - 35.0	NA
Anthracene	0 - 20.0 ME 0 - 25.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA
Aramite	0 - 20.0 ME 0 - 25.0	38 - 113 ME 25 - 126	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Atrazine	0 - 20.0 ME 0 - 25.0	47 - 115 ME 36 - 127	0 - 30.0 ME 0 - 35.0	36 - 119 ME 22 - 133	0 - 30.0 ME 0 - 35.0	NA
Benzaldehyde	0 - 20.0 ME 0 - 25.0	37 - 94 ME 28 - 103	0 - 30.0 ME 0 - 35.0	25 - 99 ME 12 - 112	0 - 30.0 ME 0 - 35.0	NA
Benzidine	0 - 20.0 ME 0 - 25.0	19 - 124 ME 2 - 142	0 - 30.0 ME 0 - 35.0	10 - 125 ME 5 - 145	0 - 30.0 ME 0 - 35.0	NA
Benzo(a)anthracene	0 - 20.0 ME 0 - 25.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA
Benzo(a)pyrene	0 - 20.0 ME 0 - 25.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA
Benzo(b)fluoranthene	0 - 20.0 ME 0 - 25.0	45 - 120 ME 35 - 130	0 - 30.0	45 - 120 ME 35 - 130	0 - 30.0	NA
Benzo(ghi)perylene	0 - 20.0 ME 0 - 25.0	40 - 125 ME 25 - 135	0 - 30.0	40 - 125 ME 25 - 135	0 - 30.0	NA
Benzo(j)fluoranthene	0 - 20.0 ME 0 - 25.0	39 - 195 ME 12 - 222	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Benzo(k)fluoranthene	0 - 20.0 ME 0 - 25.0	45 - 125 ME 30 - 135	0 - 30.0	45 - 125 ME 30 - 135	0 - 30.0	NA
Benzoic acid	0 - 20.0 ME 0 - 25.0	0 - 125.0 ME 0 - 150.0	0 - 30.0	0 - 125.0 ME 0 - 150.0	0 - 30.0	NA
Benzyl alcohol	0 - 20.0 ME 0 - 25.0	30 - 110 ME 15 - 125	0 - 30.0	30 - 110 ME 15 - 125	0 - 30.0	NA
Butylbenzylphthalate	0 - 20.0 ME 0 - 25.0	45 - 115 ME 35 - 130	0 - 30.0	45 - 115 ME 35 - 130	0 - 30.0	NA
Caprolactam	0 - 20.0 ME 0 - 25.0	Oct-81 ME 5 - 86	0 - 30.0 ME 0 - 35.0	21 - 73 ME 13 - 82	0 - 30.0 ME 0 - 35.0	NA
Carbazole	0 - 20.0 ME 0 - 25.0	50 - 115 ME 35 - 130	0 - 30.0	50 - 115 ME 35 - 130	0 - 30.0	NA
Chlorobenzilate	0 - 20.0 ME 0 - 25.0	64 - 130 ME 53 - 141	NA	NA	NA	NA
Chrysene	0 - 20.0 ME 0 - 25.0	55 - 110 ME 45 - 120	0 - 30.0	55 - 110 ME 45 - 120	0 - 30.0	NA

Precision and Accuracy Data

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Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Di-n-butylphthalate	0 - 20.0 ME 0 - 25.0	55 - 115 ME 45 - 125	0 - 30.0	55 - 115 ME 45 - 125	0 - 30.0	NA
Di-n-octylphthalate	0 - 20.0 ME 0 - 25.0	35 - 135 ME 20 - 155	0 - 30.0	35 - 135 ME 20 - 155	0 - 30.0	NA
Diallate	0 - 20.0 ME 0 - 25.0	52 - 104 ME 43 - 113	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Dibenz(a,h)acridine	0 - 20.0 ME 0 - 25.0	51 - 121 ME 39 - 133	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Dibenzo(a,e)pyrene	NA	30 - 170 ME 15 - 196	NA	NA	NA	NA
Dibenzo(a,h)anthracene	0 - 20.0 ME 0 - 25.0	40 - 125 ME 30 - 140	0 - 30.0	40 - 125 ME 30 - 140	0 - 30.0	NA
Dibenzo(a,h)pyrene	0 - 20.0 ME 0 - 25.0	30 - 176 ME 15 - 202	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Dibenzo(a,i)pyrene	0 - 20.0 ME 0 - 25.0	30 - 160 ME 15 - 183	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Dibenzo(a,j)acridine	0 - 20.0 ME 0 - 25.0	55 - 124 ME 43 - 135	0 - 20.0 ME 0 - 25.0	62 - 129 ME 51 - 140	0 - 30.0 ME - 35.0	NA
Dibenzo(a,l)pyrene	0 - 20.0 ME 0 - 25.0	41 - 146 ME 24 - 163	0 - 20.0 ME 0 - 25.0	50 - 150 ME 45 - 155	0 - 30.0 ME - 35.0	NA
Dibenzofuran	0 - 20.0 ME 0 - 25.0	55 - 105 ME 45 - 115	0 - 30.0	55 - 105 ME 45 - 115	0 - 30.0	NA
Diethylphthalate	0 - 20.0 ME 0 - 25.0	40 - 120 ME 30 - 130	0 - 30.0	40 - 120 ME 30 - 130	0 - 30.0	NA
Dimethoate	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Dimethylphthalate	0 - 20.0 ME 0 - 25.0	25 - 125 ME 10 - 145	0 - 30.0	25 - 125 ME 10 - 145	0 - 30.0	NA
Dinoseb	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Diphenylamine	0 - 20.0 ME 0 - 25.0	50 - 110 ME 35 - 120	0 - 30.0	50 - 110 ME 35 - 120	0 - 30.0	NA
Disulfoton	0 - 20.0 ME 0 - 25.0	59 - 110 ME 50 - 119	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Ethyl Methanesulfonate	0 - 20.0 ME 0 - 25.0	35 - 109 ME 22 - 121	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Ethyl methacrylate	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Famphur	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Fluoranthene	0 - 20.0 ME 0 - 25.0	55 - 115 ME 45 - 125	0 - 30.0	55 - 115 ME 45 - 125	0 - 30.0	NA
Fluorene	0 - 20.0 ME 0 - 25.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Hexachlorobenzene	0 - 20.0 ME 0 - 25.0	50 - 110 ME 40 - 120	0 - 30.0	50 - 110 ME 40 - 120	0 - 30.0	NA
Hexachlorobutadiene	0 - 20.0 ME 0 - 25.0	25 - 105 ME 15 - 115	0 - 30.0	25 - 105 ME 15 - 115	0 - 30.0	NA
Hexachlorocyclopentadiene	0 - 20.0 ME 0 - 25.0	38 - 79 ME 32 - 85	0 - 30.0 ME 0 - 35.0	25 - 75 ME 17 - 83	0 - 30.0 ME 0 - 35.0	NA

Precision and Accuracy Data

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Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Hexachloroethane	0 - 20.0 ME 0 - 25.0	30 - 95 ME 15 - 105	0 - 30.0	30 - 95 ME 15 - 105	0 - 30.0	NA
Hexachlorophene	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Hexachloropropene	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Indeno(1,2,3-cd)pyrene	0 - 20.0 ME 0 - 25.0	45 - 125 ME 30 - 140	0 - 30.0	45 - 125 ME 30 - 140	0 - 30.0	NA
Isodrin	0 - 20.0 ME 0 - 25.0	30 - 162 ME 15 - 186	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Isophorone	0 - 20.0 ME 0 - 25.0	50 - 110 ME 40 - 125	0 - 30.0	50 - 110 ME 40 - 125	0 - 30.0	NA
Isosafrole	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Kepone	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methapyrilene	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methoxychlor	0 - 20.0 ME 0 - 25.0	43 - 126 ME 29 - 139	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Methyl methacrylate	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Methyl methanesulfonate	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Methyl parathion	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
N-Methyl-N-nitrosomethylamine	0 - 20.0 ME 0 - 25.0	25 - 110 ME 10 - 125	0 - 30.0	25 - 110 ME 10 - 125	0 - 30.0	NA
N-Nitrosodi-n-butylamine	0 - 20.0 ME 0 - 25.0	43 - 95 ME 34 - 104	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosodiethylamine	0 - 20.0 ME 0 - 25.0	36 - 118 ME 22 - 131	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
N-Nitrosodipropylamine	0 - 20.0 ME 0 - 25.0	35 - 130 ME 20 - 145	0 - 30.0	35 - 130 ME 20 - 145	0 - 30.0	NA
N-Nitrosomethylethylamine	0 - 20.0 ME 0 - 25.0	40 - 116 ME 28 - 128	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
N-Nitrosomorpholine	0 - 20.0 ME 0 - 25.0	46 - 126 ME 32 - 140	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosopiperidine	0 - 20.0 ME 0 - 25.0	40 - 103 ME 30 - 113	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
N-Nitrosopyrrolidine	0 - 20.0 ME 0 - 25.0	42 - 105 ME 32 - 116	0 - 30.0 ME 0 - 35.0	40 - 113 ME 27 - 125	0 - 30.0 ME 0 - 35.0	NA
Naphthalene	0 - 20.0 ME 0 - 25.0	40 - 100 ME 30 - 115	0 - 30.0	40 - 100 ME 30 - 115	0 - 30.0	NA
Nitrobenzene	0 - 20.0 ME 0 - 25.0	45 - 110 ME 35 - 120	0 - 30.0	45 - 110 ME 35 - 120	0 - 30.0	NA
Nitrobenzene-d5	NA	NA	NA	NA	NA	40 - 110
Parathion	0 - 20.0 ME 0 - 25.0	53 - 120 ME 41 - 131	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA

Precision and Accuracy Data

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Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
Pentachlorobenzene	0 - 20.0 ME 0 - 25.0	60 - 110 ME 51 - 118	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachloroethane	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachloronitrobenzene	0 - 20.0 ME 0 - 25.0	61 - 119 ME 51 - 128	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pentachlorophenol	0 - 20.0 ME 0 - 25.0	40 - 115 ME 25 - 130	0 - 30.0	40 - 115 ME 25 - 130	0 - 30.0	NA
Phenacetin	0 - 20.0 ME 0 - 25.0	58 - 114 ME 48 - 124	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Phenanthrene	0 - 20.0 ME 0 - 25.0	50 - 115 ME 40 - 130	0 - 30.0	50 - 115 ME 40 - 130	0 - 30.0	NA
Phenol	0 - 20.0 ME 0 - 25.0	0 - 115.0 ME 0 - 135.0	0 - 30.0	0 - 115.0 ME 0 - 135.0	0 - 30.0	NA
Phenol-d5	NA	NA	NA	NA	NA	10 - 115 ME 0 -
Phorate	0 - 20.0 ME 0 - 25.0	35 - 154 ME 15 - 174	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Pronamide	0 - 20.0 ME 0 - 25.0	57 - 110 ME 49 - 118	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Pyrene	0 - 20.0 ME 0 - 25.0	50 - 130 ME 35 - 140	0 - 30.0	50 - 130 ME 35 - 140	0 - 30.0	NA
Pyridine	0 - 20.0 ME 0 - 25.0	25 - 96 ME 13 - 108	0 - 30.0 ME 0 - 35.0	21 - 93 ME 10 - 105	0 - 30.0 ME 0 - 35.0	NA
Quinoline	0 - 20.0 ME 0 - 25.0	55 - 108 ME 47 - 117	0 - 20.0 ME 0 - 25.0	51 - 111 ME 41 - 121	0 - 30.0 ME - 35.0	NA
Safrole	0 - 20.0 ME 0 - 25.0	53 - 97 ME 46 - 104	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Sulfotepp	0 - 20.0 ME 0 - 25.0	52 - 112 ME 42 - 122	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
Thionazin	0 - 20.0 ME 0 - 25.0	58 - 119 ME 48 - 129	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
Tributylphosphate	0 - 20.0 ME 0 - 25.0	44 - 120 ME 31 - 132	0 - 30.0 ME 0 - 35.0	27 - 131 ME 10 - 148	0 - 30.0 ME 0 - 35.0	NA
Triethylphosphorothioate	0 - 20.0 ME 0 - 25.0	45 - 101 ME 35 - 111	NA	10 - 150 ME 5 - 155	0 - 30.0 ME - 35.0	NA
a,a-Dimethylphenethylamine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
alpha-Terpineol	0 - 20.0 ME 0 - 25.0	40 - 105 ME 29 - 116	0 - 30.0 ME 0 - 35.0	31 - 108 ME 18 - 120	0 - 30.0 ME 0 - 35.0	NA
bis(2-Chloroethoxy)methane	0 - 20.0 ME 0 - 25.0	45 - 105 ME 35 - 115	0 - 30.0	45 - 105 ME 35 - 115	0 - 30.0	NA
bis(2-Chloroethyl) ether	0 - 20.0 ME 0 - 25.0	35 - 110 ME 25 - 120	0 - 30.0	35 - 110 ME 25 - 120	0 - 30.0	NA
bis(2-Chloroisopropyl)ether	0 - 20.0 ME 0 - 25.0	25 - 130 ME 10 - 150	0 - 30.0	25 - 130 ME 10 - 150	0 - 30.0	NA
bis(2-Ethylhexyl)phthalate	0 - 20.0 ME 0 - 25.0	40 - 125 ME 30 - 140	0 - 30.0	40 - 125 ME 30 - 140	0 - 30.0	NA
m,p-Cresols	0 - 20.0 ME 0 - 25.0	30 - 110 ME 20 - 125	0 - 30.0	30 - 110 ME 20 - 125	0 - 30.0	NA

Precision and Accuracy Data

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Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
m-Dinitrobenzene	0 - 20.0 ME 0 - 25.0	56 - 115 ME 46 - 125	NA	50 - 150 ME 40 - 155	0 - 30.0 ME 0 - 35.0	NA
m-Nitroaniline	0 - 20.0 ME 0 - 25.0	20 - 125 ME 10 - 145	0 - 30.0	20 - 125 ME 10 - 145	0 - 30.0	NA
m-Toluidine	NA	33 - 118 ME 19 - 133	NA	NA	NA	NA
n-Decane	0 - 20.0 ME 0 - 25.0	35 - 82 ME 27 - 90	0 - 30.0 ME 0 - 35.0	24 - 84 ME 14 - 94	0 - 30.0 ME 0 - 35.0	NA
n-Octadecane	0 - 20.0 ME 0 - 25.0	35 - 115 ME 22 - 128	0 - 30.0 ME 0 - 35.0	26 - 114 ME 11 - 129	0 - 30.0 ME 0 - 35.0	NA
o-Cresol	0 - 20.0 ME 0 - 25.0	40 - 110 ME 25 - 120	0 - 30.0	40 - 110 ME 25 - 120	0 - 30.0	NA
o-Nitroaniline	0 - 20.0 ME 0 - 25.0	50 - 115 ME 35 - 125	0 - 30.0	50 - 115 ME 35 - 125	0 - 30.0	NA
o-Toluidine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-(Dimethylamino)azobenzene	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-Cresol	0 - 20.0 ME 0 - 25.0	NA	NA	NA	NA	NA
p-Nitroaniline	0 - 20.0 ME 0 - 25.0	35 - 120 ME 20 - 130	0 - 30.0	35 - 120 ME 20 - 130	0 - 30.0	NA
p-Phenylenediamine	0 - 20.0 ME 0 - 25.0	10 - 150 ME 5 - 155	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA
p-Terphenyl-d14	NA	NA	NA	NA	NA	50 - 135
p-Toluidine	NA	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	10 - 150 ME 5 - 155	0 - 30.0 ME 0 - 35.0	NA

Precision and Accuracy Data
PCB Soxtherm 3541/8082 15-OCT-2012 - 15-OCT-
Client Type:DOD

Parameter	LCS	LCSD	MS	MSD	SURR
4cmx	NA	NA	NA	NA	37 - 121 ME 26 - 131
Aroclor-1016	40 - 140	0 - 30.0 ME 0 - 35.0	40 - 140 ME 15 -	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1221	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1232	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1242	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1248	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1254	32 - 125 ME 19 - 138	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1260	60 - 130	0 - 30.0 ME 0 - 35.0	60 - 130 ME 9 -	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1262	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1268	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-Total	NA	0 - 30.0 ME 0 - 35.0	NA	0 - 30.0 ME 0 - 35.0	NA
Decachlorobiphenyl	NA	NA	NA	NA	60 - 125

Precision and Accuracy Data

PCB SPE 3535/8082 15-OCT-2012 - 15-OCT-2013

Client Type:

Parameter	Duplicate	LCS	LCSD	MS	MSD	SURR
4cmx	NA	NA	NA	NA	NA	42 - 120 130
Aroclor-1016	0 - 30.0	25 - 145	0 - 30.0 ME 0 - 35.0	25 - 145	0 - 30.0 ME 0 - 38.0	NA
Aroclor-1221	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1232	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1242	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1248	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1254	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 45.0	NA
Aroclor-1260	0 - 30.0	30 - 145	0 - 30.0 ME 0 - 35.0	30 - 145	0 - 30.0 ME 0 - 40.0	NA
Aroclor-1262	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-1268	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 35.0	NA
Aroclor-Total	0 - 30.0	70 - 130	0 - 30.0 ME 0 - 35.0	50 - 150	0 - 30.0 ME 0 - 40.0	NA
l	NA	NA	NA	NA	NA	40 - 135

Precision and Accuracy Data

Metals Solid 01-JAN-2012 - 01-JAN-2013

Client Type:

Parameter	Duplicate	LCS	LCSD	MS	MSD	PS	PSD	SDILT
Aluminate	NA	NA	NA	NA	NA	75 - 125 ME 70 - 130	0 - 20.0	NA
Aluminum	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Antimony	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Arsenic	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Barium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Beryllium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Boron	0 - 20.0	80 - 120 ME 75 - 125	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	0 - 10.0
Cadmium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Calcium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Chromium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Cobalt	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Copper	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Iron	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Lead	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Magnesium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Manganese	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Mercury	0 - 20.0	80 - 120	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Molybdenum	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Nickel	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Phosphorous	0 - 20.0	80 - 120 ME 75 - 125	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	0 - 10.0
Potassium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Selenium	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Silver	0 - 20.0	75 - 120 ME 70 - 120	0 - 20.0	75 - 120 ME 70 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Sodium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
		80 - 120		75 - 125		75 - 125		

Precision and Accuracy Data

Metals Solid 01-JAN-2012 - 01-JAN-2013

Client Type:

Parameter	Duplicate	LCS	LCSD	MS	MSD	PS	PSD	SDILT
Strontium	0 - 20.0	ME 75 - 125	0 - 20.0	ME 70 - 130	0 - 20.0	ME 70 - 130	0 - 20.0	0 - 10.0
Sulfur	0 - 20.0	80 - 120 ME 75 - 125	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	0 - 10.0
Thallium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Tin	0 - 20.0	80 - 120 ME 75 - 125	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	0 - 10.0
Total Uranium	NA	80 - 120 ME 75 - 125	NA	75 - 125 ME 70 - 130	NA	NA	NA	0 - 10.0
Vanadium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Zinc	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Zirconium	0 - 20.0	80 - 120 ME 75 - 125	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	75 - 125 ME 70 - 130	0 - 20.0	0 - 10.0

Precision and Accuracy Data

Metals Liquid 14-JAN-2002 - 21-AUG-2013

Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	PS	PSD	SDILT
Aluminum	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Antimony	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Arsenic	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Barium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Beryllium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Boron	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Cadmium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Calcium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Chromium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Cobalt	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Copper	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Iron	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Lead	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Lithium	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Magnesium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Manganese	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Mercury	0 - 20.0	80 - 120	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Molybdenum	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Nickel	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Phosphorous	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Potassium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Selenium	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Silver	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	80 - 120 ME 75 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Sodium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0

Precision and Accuracy Data

Metals Liquid 14-JAN-2002 - 21-AUG-2013

Client Type: DOD QSM

Parameter	Duplicate	LCS	LCSD	MS	MSD	PS	PSD	SDILT
Strontium	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Sulfur	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Thallium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Tin	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Total Uranium	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	NA
Vanadium	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Zinc	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	80 - 120 ME 80 - 120	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0
Zirconium	0 - 20.0	80 - 120	0 - 20.0	75 - 125	0 - 20.0	75 - 125	0 - 20.0	0 - 10.0

Precision and Accuracy Data
GRO Solids 15-OCT-2012 - 15-OCT-2013

Client Type: QSM

Parameter	LCS	LCSD	PS	PSD	SURR
Bromofluorobenzene	NA	NA	NA	NA	60 - 140
Organics	57 - 146	0 - 50.0	57 - 146	0 - 50.0	NA

GRO Liquids 15-OCT-2012 - 15-OCT-2013
Client Type: DOD
QSM

Parameter	LCS	LCSD	PS	PSD	SURR
Bromofluorobenzene	NA	NA	NA	NA	75 - 125
Organics	67 - 136	0 - 30.0	67 - 136	0 - 30.0	NA

Precision and Accuracy Data

FID Solids 15-OCT-2012 - 15-OCT-2013

Parameter	LCS	LCSD	MS	MSD	SURR
Diesel Range Organics	55 - 120 ME 44 - 131	0 - 30.0 ME 0 - 35.0	26 - 138 ME 7 - 157	0 - 32.0 ME 0 - 39.0	NA
o-Terphenyl	NA	NA	NA	NA	30 - 136 ME 15 - 157
Motor Oil	50 - 150	0 - 30.0 ME 0 - 35.0	50 - 150 ME 45 - 155	0 - 30.0 ME 0 - 35.0	

Precision and Accuracy Data

FID SPE 3535/8015 15-OCT-2012 - 15-OCT-2013

Parameter	LCS	LCSD	MS	MSD	SURR
Diesel Range Organics	45 - 110 ME 35 - 121	0 - 32.0 ME 0 - 40.0	45 - 124 ME 35 - 146	0 - 20.0	NA
Motor Oil	50 - 150	0 - 30.0	50 - 150	0 - 30.0	NA
o-Terphenyl	NA	NA	NA	NA	25 - 131 ME 4 - 149

SAP Appendix C: Laboratory Standard Operating Procedures

Provided on CD

NOTIFICATION: THIS PAGE CONTAINS SENSITIVE BUT UNCLASSIFIED INFORMATION WHICH IS PROTECTED BY THE FREEDOM OF INFORMATION ACT

FOIA Exemption 4 (5 USC 552(b)(4))
Privileged/Confidential Trade Secrets, Commercial, Financial Information

Pages 347 to 656

YOU MAY APPEAL THIS DECISION

Based on the redaction, this constitutes a partial denial of your request. Because your request has been denied in part, you are advised of your right to appeal this determination in writing.

Please refer to the accompanying correspondence from the FOIA Office for directions and information about the appeal process.

SAP Appendix D: Example Chain-of-Custody

011275

ITSI Gilbane

2730 Shadelands Drive
Walnut Creek, California 94598
(925) 946-3100 (925) 256-8998 (fax)

Local Address: _____

Chain-Of-Custody

Project Name and Number: _____ Laboratory Name: _____ Date: _____

Project Manager: _____ Address: _____ Contact Name: _____ Page: _____ of _____

Site Location: _____ Phone: _____

Sample I.D.	Date	Time	Sample Depth	No. of Containers	Sample Matrix	Analysis: / Preservative: / Container Type:	Special Instructions/Comments

Sampled By: _____

Signature: _____

Special Instructions: _____

Send Results to: (w/fax #) _____

Turnaround Time: _____

Sampler:

Relinquished By/Affiliation:	Date:	Time:

Courier/Airbill No.:

Received By/Affiliation:	Date:	Time:

Original – Laboratory Yellow – Field/Office

Graphics/Stationery/chain_custody0513.ai

SAP Appendix E: Laboratory DOD ELAP Certificates

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

CURTIS & TOMPKINS, LLC.[1]
2323 5th Street
Berkeley, CA, 94710
Carolyn Brizzolara Phone: (510) 204 2237
carolyn.brizzolara@ctberk.com

ENVIRONMENTAL

Valid To: February 28, 2014 Certificate Number: 2943.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.2 of the DoD Quality Systems Manual for Environmental Laboratories) accreditation is granted to this laboratory to perform recognized EPA methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Atomic Absorption/ICP-AES Spectrometry, ICP/MS, Gas Chromatography, Gas Chromatography/Mass Spectrometry, Gravimetry, High Performance Liquid Chromatography, Ion Chromatography, Misc.- Electronic Probes (pH, O_2), Oxygen Demand, Hazardous Waste Characteristics Tests, Spectrophotometry (Visible), Spectrophotometry (Automated), IR Spectrometry, Titrimetry, Total Organic Carbon

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Metals						
Aluminum	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Antimony	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Arsenic	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Barium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Beryllium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B

5301 Buckeystown Pike, Suite 350 | Frederick, Maryland 21704-8373 | Phone: 301 644 3248 | Fax: 301 662 2974 | www.A2LA.org

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Cadmium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Calcium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Chromium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Cobalt	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Copper	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Iron	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Lead	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Magnesium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Manganese	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Mercury	- - - - -	- - - - -	EPA 7470A	EPA 7470A	EPA 7470A / 7471A / 7471B	EPA 7470A / 7471A / 7471B
Molybdenum	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Nickel	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Potassium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Selenium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Silver	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Sodium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Thallium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Vanadium	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Zinc	- - - - -	- - - - -	EPA 6010B / 6010C / 6020 / 6020A	EPA 200.8 / 3010A	EPA 6010B / 6010C / 6020 6020A	EPA 3050B
Nutrients						
Ammonia (as N)	- - - - -	- - - - -	SM 4500NH3-D	SM 4500NH3-D	SM 4500NH3-D	SM 4500NH3-D
Kjeldahl Nitrogen	- - - - -	- - - - -	SM 4500NH3-C	SM 4500NH3-C	SM 4500NH3-C	SM 4500NH3-C
Nitrate (as N)	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Nitrite (as N)	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Perchlorate	- - - - -	- - - - -	EPA 314.0	EPA 314.0	- - - - -	- - - - -
Total phosphorus	- - - - -	- - - - -	SM 4500P-E	SM 4500P-E	- - - - -	- - - - -
Demands						
Biochemical Oxygen Demand	- - - - -	- - - - -	SM 5210B	SM 5210B	- - - - -	- - - - -
Chemical Oxygen Demand	- - - - -	- - - - -	SM 5220D	SM 5220D	- - - - -	- - - - -
Total Organic Carbon	- - - - -	- - - - -	SM 5310C	SM 5310C	- - - - -	- - - - -
Wet Chemistry						
Alkalinity	SM 2320B	SM 2320B	SM 2320B	SM 2320B	- - - - -	- - - - -
Bromide	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Chloride	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Cyanide	- - - - -	- - - - -	SM 4500 CN-E / EPA 9010B / 9014	SM 4500 CN-E / EPA 9010B / 9014	SM 4500 CN-E / EPA 9010B / 9014	SM 4500 CN-E / EPA 9010B / 9014
Amenable Cyanide	- - - - -	- - - - -	SM 4500 CN-E / EPA 9010B / 9014	SM 4500 CN-E / EPA 9010B / 9014	EPA 9010B / 9014	EPA 9010B / 9014
Ferrous Iron	- - - - -	- - - - -	SM 3500Fe-B	SM 3500Fe-B	- - - - -	- - - - -
Flash Point	- - - - -	- - - - -	EPA 1010	EPA 1010	- - - - -	- - - - -
Fluoride	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Hexavalent Chromium	- - - - -	- - - - -	EPA 7196A / 7199 / SM 3500Cr-B,C	EPA 7196A / 7199 / SM 3500Cr-B,C	EPA 3060 / 7196A	EPA 3060 / 7196A
pH	- - - - -	- - - - -	EPA 9040B / SM 4500-H^+ B	EPA 9040B / SM 4500-H^+ B	EPA 9045C	EPA 9045C
Specific Conductance	- - - - -	- - - - -	SM 2510 B	SM 2510 B	- - - - -	- - - - -

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Sulfate	- - - - -	- - - - -	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056	EPA 300.0 / 9056
Sulfide	- - - - -	- - - - -	SM 4500S2-D	SM 4500S2-D	SM 9034	SM 9030B
Total Dissolved Solids	- - - - -	- - - - -	SM 2540C	SM 254C	- - - - -	- - - - -
Total Suspended Solids	- - - - -	- - - - -	SM 2540D	SM 2540 D	- - - - -	- - - - -
Purgeable Organics (volatiles)						
Gas Range Organics (GRO)	- - - - -	- - - - -	EPA 8015B / 8015D	EPA 5030B / 5030C	EPA 8015B / 8015D	EPA 5030B / 5030C / 5035 / 5035A
Acetone	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Benzene	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
Bromobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Bromochloromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Bromodichloromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Bromoform	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Bromomethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
2-Butanone	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Tert-Butyl Alcohol (TBA)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
n-Buytlbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
sec-Butylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
tert-Butylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Carbon Disulfide	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Carbon Tetrachloride	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Chlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Chloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Chloroform	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Chloromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
2-Chlorotoluene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
4-Chlorotoluene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Dibromochloromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2-Dibromo-3-chloropropane (DBCP)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Dibromomethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2 Dibromomethane (EDB)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2-Dichlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,3-Dichlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,4-Dichlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Dichlorodifluoromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1-Dichloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2-Dichloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
1,1-Dichloroethene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
cis-1,2-Dichloroethene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
trans-1,2-Dichloroethene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2-Dichloropropane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,3-Dichloropropane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
2,2-Dichloropropane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1-Dichloropropene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
cis-1,3-Dichloropropene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
trans-1,3-Dichloropropene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Ethyl Benzene	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
Ethyl tert-Butyl Ether (ETBE)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1,2-Trichloro-1,2,2-Trifluoroethane (Freon 113)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
2-Hexanone	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Hexachlorobutadiene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Isopropylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Isopropyl Ether (DIPE)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Para-Isopropyltoluene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Methylene Chloride	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
4-Methyl-2-pentanone	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Methyl tert-amyl Ether (TAME)	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Methyl tert-butyl ether (MTBE)	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
Naphthalene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
n-Propylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Styrene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1,1,2-Tetrachloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1,2,2-Tetrachloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Tetrachloroethene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Toluene	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
1,2,3-Trichlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2,4-Trichlorobenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1,1-Trichloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,1,2-Trichloroethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Trichloroethene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Trichlorofluoromethane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
1,2,3-Trichloropropane	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,2,4-Trimethylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
1,3,5-Trimethylbenzene	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Vinyl acetate	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
Vinyl chloride	- - - - -	- - - - -	EPA 8260B / 8260C	EPA 5030B / 5030C	EPA 8260B / 8260C	EPA 5030B / 5030C / 5035 / 5035A
m,p-Xylene	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
o-Xylene	- - - - -	- - - - -	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C	EPA 8260B / 8260C / 8021B	EPA 5030B / 5030C / 5035 / 5035A
Extractable Organics (semivolatiles)						
DRO	- - - - -	- - - - -	EPA 8015B / 8015D	EPA 3520C	EPA 8015B / 8015C / 8015D/	EPA 3550B / 3550C / 3546
Acenaphthene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Acenaphthylene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Anthracene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Benzoic Acid	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270 C 8270D	EPA 3550B / 3550C
Benzo (a) Anthracene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Benzo (b) Fluoranthene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Benzo (k) Fluoranthene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Benzo (ghi) Fluoranthene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Benzo (a) Pyrene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 / 8270 C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Benzyl Alcohol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Bis (2-chloroethoxy) Methane	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Bis (2-chloroethyl) Ether	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Bis (2-chloroisopropyl) Ether	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Bis (2-ethylhexyl) Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Bromophenyl-Phenylether	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Butyl Benzyl Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Chloroaniline	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Chloro-3-methylphenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2-Chloronaphthalene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
2-Chlorophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Chlorophenyl Phenyl Ether	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Chrysene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Dibenzo (a,h) Anthracene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Dibenzofuran	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
1,2-Dichlorobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
1,3-Dichlorobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
1,4-Dichlorobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
3,3'-Dichlorobenzidine	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4-Dichlorophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Diethyl Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4-Dimethylphenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Dimethyl Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Di-n-butyl Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Di-n-octyl Phthalate	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
4,6-Dinitro-2-methylphenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4-Dinitrophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4-Dinitrotoluene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,6-Dinitrotoluene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
1,4 - Dioxane			EPA 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
1,2-Diphenylhydrazine reported as Azobenzene due to breakdown	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Fluoroanthene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Fluorene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Hexachlorobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Hexachlorobutadiene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Hexachloro cyclopentadiene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Hexachloroethane	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Indeno (1,2,3-cd) pyrene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
Isophorone	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
1-Methylnaphthalene	- - - - -	- - - - -	EPA 8270C-SIM / 8270D-DIM	EPA 3520C	EPA 8270C-SIM / 8270D-DIM	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
2-Methylnaphthalene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
2-Methylphenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Methylphenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Naphthalene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
2-Nitroaniline	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
3-Nitroaniline	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Nitroaniline	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Nitrobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2-Nitrophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
4-Nitrophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
N-Nitrosodi-n-propylamine	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
N-Nitrosodimethylamine	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
N-Nitrosodiphenylamine	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Pentachlorophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Phenanthrene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Phenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Pyrene	- - - - -	- - - - -	EPA 8310 / 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3520C	EPA 8310 8270C / 8270D / 8270C-SIM / 8270D-SIM	EPA 3550B / 3550C
1,2,4-Trichlorobenzene	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4,5-Trichlorophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
2,4,6-Trichlorophenol	- - - - -	- - - - -	EPA 8270C / 8270D	EPA 3520C	EPA 8270C / 8270D	EPA 3550B / 3550C
Pesticides/PCBs						
Aldrin	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
alpha-BHC	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
beta-BHC	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
delta-BHC	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
gamma-BHC	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Chlordane (technical)	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
alpha-Chlordane	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
gamma-Chlordane	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
4,4'-DDD	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
4,4'-DDE	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
4,4',-DDT	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Dieldrin	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Endosulfan I	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Endosulfan II	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Endonsulfan Sulfate	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Endrin	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Endrin Aldehyde	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Endrin Ketone	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Heptachlor	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Heptachlor Epoxide	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Methoxychlor	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
PCB-1016 (Arochlor)	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1221	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1232	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1242	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1248	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1254	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
PCB-1260	- - - - -	- - - - -	EPA 8082 / 8082A	EPA 3520C	EPA 8082 / 8082A	EPA 3550B / 3550C
Toxaphene	- - - - -	- - - - -	EPA 8081A / 8081B	EPA 3520C	EPA 8081A / 8081B	EPA 3550B / 3550C
Nitroaromatics & Nitramines						
2-Amino-4,6-dinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
4-Amino-2,6-dinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
3,5-Dinitroaniline	- - - - -	- - - - -	----------	----------	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
1,3-Dinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
2,4-Dinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
2,6-Dinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
HMX	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
Nitroglycerine	- - - - -	- - - - -	----------	----------	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
Nitrobenzene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
2-Nitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
3-Nitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
4-Nitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
Pentaerythritol (PETN)	- - - - -	- - - - -	----------	----------	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
RDX	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
Tetryl	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
1,3,5-Trinitrobenzene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
2,4,6-Trinitrotoluene	- - - - -	- - - - -	EPA 8330 / 8330A	EPA 3535	EPA 8330 / 8330A / 8330A Modified	EPA 8330 / 8330A
Hazardous Waste Characteristics						

Parameter/Analyte	Potable Water	Potable Water Prep Methods	Nonpotable Water	Nonpotable Water Prep Methods	Solid Hazardous Waste	Solid Hazardous Waste Prep Methods
Synthetic Precipitation Leaching Procedure (SPLP)	- - - - -	- - - - -	- - - - -	- - - - -	EPA 1312	EPA1312
Toxicity Characteristic Leaching Procedure (TCLP)	- - - - -	- - - - -	- - - - -	- - - - -	EPA 1311	EPA 1311
Air						
Carbon Dioxide	- - - - -	- - - - -	RSK-175	RSK-175	- - - - -	- - - - -
Ethane	- - - - -	- - - - -	RSK-175	RSK-175		
Ethene	- - - - -	- - - - -	RSK-175	RSK-175	- - - - -	- - - - -
Methane	- - - - -	- - - - -	RSK-175	RSK-175	- - - - -	- - - - -
Acetylene	- - - - -	- - - - -	RSK-175	RSK-175	- - - - -	- - - - -

Parameter/Analyte	Air Analysis
1,1,1-Trichloroethane	TO-15
1,1,2,2-Tetrachloroethane	TO-15
1,1,2-Trichloroethane	TO-15
1,1-Dichloroethane	TO-15
1,1-Dichloroethene	TO-15
1,2,4-Trichlorobenzene	TO-15
1,2,4-Trimethylbenzene	TO-15
1,2-Dibromoethane	TO-15
1,2-Dichlorobenzene	TO-15
1,2-Dichloroethane	TO-15
1,2-Dichloropropane	TO-15
1,3,5-Trimethylbenzene	TO-15
1,3-Butadiene	TO-15
1,3-Dichlorobenzene	TO-15
1,4-Dichlorobenzene	TO-15
2-Butanone	TO-15
2-Hexanone	TO-15
4-Ethyltoluene	TO-15
4-Methyl-2-Pentanone	TO-15
Acetone	TO-15
Acrolein	TO-15
Benzene	TO-15
Benzyl chloride	TO-15
Bromodichloromethane	TO-15
Bromoform	TO-15
Bromomethane	TO-15
Carbon Disulfide	TO-15
Carbon Tetrachloride	TO-15
Chlorobenzene	TO-15
Chloroethane	TO-15
Chloroform	TO-15
Chloromethane	TO-15
Cyclohexane	TO-15

Parameter/Analyte	Air Analysis
Dibromochloromethane	TO-15
Ethyl Acetate	TO-15
Ethylbenzene	TO-15
Freon 113	TO-15
Freon 114	TO-15
Freon 12	TO-15
Hexachlorobutadiene	TO-15
MTBE	TO-15
Methylene Chloride	TO-15
Napthalene	TO-15
Propylene	TO-15
Styrene	TO-15
Tetrachloroethene	TO-15
Tetrahydrofuran	TO-15
Toluene	TO-15
Trichloroethene	TO-15
Trichlorofluoromethane	TO-15
Vinyl Acetate	TO-15
Vinyl Chloride	TO-15
cis-1,2-Dichloroethene	TO-15
cis-1,3-Dichloropropene	TO-15
m,p-Xylenes	TO-15
n-Heptane	TO-15
n-Hexane	TO-15
o-Xylene	TO-15
trans-1,2-Dichloroethene	TO-15
trans-1,3-Dichloropropene	TO-15

Gamma Spectroscopy Parameter/Analyte	Solid Hazardous Waste
Actinium – 228	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Americium – 241	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Bismuth – 212	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Bismuth – 214	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Cesium – 137	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Cobalt – 60	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Europium – 152	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Europium – 154	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 210	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 212	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 214	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Protactinium – 234M	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Radium – 226	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Thallium - 208	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Thorium – 232	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Uranium - 235	Modified EPA Method 901.1/DoE HASL 300 Ga-01

1. **This accreditation covers testing performed at the main laboratory listed above and the following satellite laboratory listed below for the following tests:**

201A & 201B Fischer Ave
Hunters Point Naval Ship Yard
San Francisco, CA 94124

Gamma Spectroscopy Parameter/Analyte	Solid/Wipe Analysis
Actinium – 228	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Americium – 241	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Bismuth – 212	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Bismuth – 214	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Cesium – 137	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Cobalt – 60	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Europium – 152	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Europium – 154	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 210	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 212	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Lead – 214	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Potassium – 40	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Protactinium – 234M	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Radium – 226	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Thallium - 208	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Thorium – 232	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Thorium – 234	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Uranium - 235	Modified EPA Method 901.1/DoE HASL 300 Ga-01
Gross Alpha Beta Spectroscopy Gas Proportional Counter	
Alpha & Beta Radiation	Modified EPA Method 9310

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

CURTIS & TOMPKINS, LLC

Berkeley, CA

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.2 of the DoD Quality System Manual for Environmental Laboratories (QSM); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 10th day of January 2012.

President & CEO
For the Accreditation Council
Certificate Number 2943.01
Valid to February 28, 2014

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005

GEL LABORATORIES, LLC
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ENVIRONMENTAL

Valid To: June 30, 2015 Certificate Number: 2567.01

In recognition of the successful completion of the A2LA evaluation process, (including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.2 of the DoD Quality Systems Manual for Environmental Laboratories (QSM) accreditation is granted to this laboratory to perform the following radiochemical tests in various matrices, including soils, drinking water, wastewater, groundwater, fiber air filters, vegetation, animal tissues and milk.

	Preparation SOP	Analytical SOP
Alpha Spectrometry: Alpha: Am-241, Am-243, Cf-252, Cm-242, Cm-243/244, Cm-245/246, Np-237, Po-208, Po-209, Po-210, Pu-236, Pu-238, Pu-239/240, Pu-241, Pu-242, Pu-244, Th-228, Th-229, Th-230, Th-232, U-232, U-233/234, U-235/236, U-238	GL-RAD-A-011, GL-RAD-A-016, GL-RAD-A-032, GL-RAD-A-035, GL-RAD-A-036, GL-RAD-A-038	GL-RAD-I-009
Radon Emanation: Ra-226	GL-RAD-A-008, GL-RAD-A-028	GL-RAD-I-007
Gamma Spectrometry: Gamma: 46 to 1836 keV, I-129, I-131, Ni-59	GL-RAD-A-006, GL-RAD-A-013, GL-RAD-A-022	GL-RAD-I-001
Kinetic Phosphorescence Analyzer Total Uranium	GL-RAD-A-023	GL-RAD-B-018

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	Preparation SOP	Analytical SOP
Gas Flow Proportional Counting: Beta: Cl-36, I-131, Pb-210, Ra-228, Sr-89, Sr-90, Total Radium	GL-RAD-A-004, GL-RAD-A-009, GL-RAD-A-010, GL-RAD-A-017, GL-RAD-A-018, GL-RAD-A-029, GL-RAD-A-030, GL-RAD-A-033, GL-RAD-A-044, GL-RAD-A-054	GL-RAD-I-006, GL-RAD-I-015, GL-RAD-I-016
Gross Alpha/Gross Beta:	GL-RAD-A-001, GL-RAD-A-001B, GL-RAD-A-001C GL-RAD-A-001D GL-RAD-A-056	GL-RAD-I-006, GL-RAD-I-015, GL-RAD-I-016
48 hour Gross Alpha	GL-RAD-A-047	GL-RAD-I-006, GL-RAD-I-015, GL-RAD-I-016
Liquid Scintillation Spectrometry: Beta: C-14, Ca-45, Fe-55, H-3, Ni-63, P-32, Pm-147, Pu-241, S-35, Se-79, Tc-99 Alpha: Rn-222	GL-RAD-A-002, GL-RAD-A-003, GL-RAD-A-005, GL-RAD-A-007, GL-RAD-A-019, GL-RAD-A-020, GL-RAD-A-022, GL-RAD-A-031, GL-RAD-A-035, GL-RAD-A-040, GL-RAD-A-048, GL-RAD-A-049, GL-RAD-A-050	GL-RAD-I-004, GL-RAD-I-014, GL-RAD-I-017
ICP-MS Uranium Isotopes Tc-99	 GL-MA-E-008 GL-RAD-A-005 GL-RAD-A-055	 GL-MA-E-014 GL-RAD-B-034

Additionally, in recognition of the successful completion of the A2LA evaluation process, including an assessment of the laboratory's compliance with ISO IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.1), accreditation is granted to this laboratory to perform recognized EPA, Standard Methods for the Examination of Water and Wastewater, ASTM, Department of Energy (DOE), California and Connecticut test methods using the following testing technologies and in the analyte categories identified below:

Testing Technologies

Atomic Absorption/ICP-AES Spectrometry, ICP/MS, Gas Chromatography, Gas Chromatography/Mass Spectrometry, Gravimetry, High Performance Liquid Chromatography, Ion Chromatography, Methylene Blue Active Substances, Misc.-Electronic Probes (pH, O_2), Oxygen Demand, Hazardous Waste Characteristics Tests, Spectrophotometry (Visible), Spectrophotometry (Automated), IR Spectrometry, Titrimetry, Total Organic Carbon, Total Organic Halide, Turbidity, Liquid Chromatography/Mass Spectrometer/Mass Spectrometer and Various Radiochemistry Techniques

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Metals		
Aluminum	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Antimony	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C
Arsenic	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Barium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Beryllium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Boron	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Boron-10	EPA 6020/A	EPA 6020/A
Cadmium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Calcium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Chromium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Cobalt	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Copper	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Iron	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Lead	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Lithium	EPA 200.8, 6020/A	EPA 6020/A
Magnesium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Manganese	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Mercury	EPA 1631E, 7470/A, 245.1, 245.2	EPA 7470/A, 7471A/B
Molybdenum	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Nickel	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Phosphorous	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Potassium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Selenium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Silicon[1]	EPA 200.7, 6010B/C modified	EPA 6010B/C modified
Silica as SiO2	EPA 200.7, 6010B/C	EPA 6010B/C
Silver	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C
Sodium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Strontium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Thallium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Thorium	EPA 6020/A	EPA 6020/A
Tin	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C
Titanium	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
Tungsten	EPA 6020/A	EPA 6020/A
Uranium	ASTM D5174-02/97, DOE U-02, EPA 200.8,EPA 6020/A	DOE U-02, EPA 6020/A
Vanadium	EPA 200.7, 6010B/C	EPA 6010B/C
Zinc	EPA 200.7, 200.8, 6010B/C 6020/A	EPA 6010B/C, 6020/A
General Chemistry		
Acidity	SM 2310 B, EPA 305.1	----------
Adsorbable Organic Halogens (AOX)	EPA 1650	----------
Alkalinity	SM 2320B, EPA 310.1	----------
Ammenable Cyanide	EPA 9012A/B, EPA 335.1	EPA 9012A/B

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Ammonia Nitrogen	EPA 350.1	----------
Biochemical oxygen demand	SM 5210 B, EPA 405.1	----------
Bromide	EPA 9056A, EPA 300.0	EPA 9056A[3]
Carbonaceous BOD	SM 5210 B	----------
Chemical Oxygen Demand (COD)	EPA 410.4	----------
Chloride	EPA 9056A, EPA 300.0	EPA 9056A[3]
Chlorine (residual)	SM 4500Cl-G, EPA 330.5	----------
Chromium VI	EPA 7196A, SM 3500Cr-D	EPA 7196A
Color	SM 2120B, EPA 110.2	----------
Corrosivity toward Steel	----------	EPA 1110/A
Cyanide	EPA 9012A/B, 335.3, 335.4, SM4500-CN C/G	EPA 9012A/B
Density	----------	ASTM D 5057
Extractable Organic Halides (EOX)	----------	EPA 9023
Filterable residue	SM 2540C	----------
Fluoride	EPA 9056A, EPA 300.0	EPA 9056A[3]
Ignitability	EPA 1010, 1020A/B	EPA 1010, 1020A/B
Hardness	SM 2340B/C, EPA 130.2 , EPA 200.7	----------
Kjeldahl Nitrogen	EPA 351.2	----------
MBAS/Surfactants	SM 5540C, EPA 425.1	----------
Nitrate (as N)	EPA 9056A, EPA 300.0	EPA 9056A[3]
Nitrate-nitrite (as N)	EPA 9056A, EPA 300.0	EPA 9056A[3]
Nitrite (as N)	EPA 9056A, EPA 300.0	EPA 9056A[3]
Nonfilterable residue	SM 2540D	----------
Oil & Grease	EPA 1664A	EPA 1664A
Organic Nitrogen	TKN – Ammonia, EPA 351.2 – EPA 350.1	----------
Orthophosphate (as P)	EPA 9056A, EPA 300.0	EPA 9056A[3]
Paint Filter Liquids Test	----------	EPA 9095B
Perchlorate	EPA 314.0, 6850	EPA 6850
pH	SM 4500-H^+ B, EPA 9040B/C, 9041A, EPA 150.1	EPA 9040B/C, 9045C/D
Reactive Cyanide	Sec 7.3.3 SW846	Sec 7.3.3 SW846
Reactive Sulfide	Sec 7.3.4 SW846	Sec 7.3.4 SW846
Residue-Volatile	SM 2540E, EPA 160.4	----------
Residue-Settleable	SM 2540F	----------
Specific conductance	EPA 9050A, EPA 120.1	----------
Sulfate	EPA 9056A, EPA 300.0	EPA 9056A[3]
Sulfite	SM 4500-SO3 B	----------
Sulfide	EPA 9030B/9034, EPA 376.2, SM4500 S2 D	EPA 9030B/9034
Total, fixed, and volatile residue	SM 2540G	----------
Total Nitrate-Nitrite	EPA 353.2	----------
Total Organic Carbon (TOC)	EPA 9060/A, SM 5310D, 415.1	EPA 9060/A[2]
Total Organic Halides (TOX)	EPA 9020B	EPA 9020B[2]
Total Petroleum Hydrocarbons	EPA 1664A	EPA 1664A
Total Phenolics	EPA 9066, EPA 420.4	EPA 9066
Total Phosphorous	EPA 365.4	----------
Total residue	SM 2540B	----------

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Turbidity	EPA 180.1, SM 2130	EPA 180.1, SM 2130
Organic Analytes		
1,2-Dibromo-3-chloropropane (DBCP)	EPA 504.1, 624, 8011, 8260B	EPA 8260B
1,2 Dibromoethane (EDB)	EPA 504.1, 624, 8011, 8260B	EPA 8260B
Purgeable Organics (Volatiles)		
1,1,1,2-Tetrachloroethane	EPA 624, 8260B	EPA 8260B
1,1,1-Trichloroethane	EPA 624, 8260B	EPA 8260B
1,1,2,2-Tetrachloroethane	EPA 624, 8260B	EPA 8260B
1,1,2-Trichloro-1,2,2-trifluoroethane	EPA 624, 8260B	EPA 8260B
1,1,2-Trichloroethane	EPA 624, 8260B	EPA 8260B
1,1-Dichloroethane	EPA 624, 8260B	EPA 8260B
1,1-Dichloroethene	EPA 624, 8260B	EPA 8260B
1,1-Dichloropropene	EPA 624, 8260B	EPA 8260B
1,2,3-Trichlorobenzene	EPA 624, 8260B	EPA 8260B
1,2,3-Trichloropropane	EPA 624, 8260B	EPA 8260B
1,2,4-Trichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,2,4-Trimethylbenzene	EPA 624, 8260B	EPA 8260B
1,2-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,2-Dichloroethane	EPA 624, 8260B	EPA 8260B
1,2-Dichloropropane	EPA 624, 8260B	EPA 8260B
1,3,5-Trimethylbenzene	EPA 624, 8260B	EPA 8260B
1,3-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,3-Dichloropropane	EPA 624, 8260B	EPA 8260B
1,4-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,4-Dioxane	EPA 624, 8260B	EPA 8260B
2,2-Dichloropropane	EPA 624, 8260B	EPA 8260B
2-Butanone (Methyl Ethyl Ketone)	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
2-Chloroethyl vinyl ether	EPA 624, 8260B	EPA 8260B
2-Chlorotoluene	EPA 624, 8260B	EPA 8260B
2-Hexanone	EPA 624, 8260B	EPA 8260B
2-Nitropropane	EPA 624, 8260B	EPA 8260B
4-Chlorotoluene	EPA 624, 8260B	EPA 8260B
4-Isopropyltoluene	EPA 624, 8260B	EPA 8260B
4-Methyl-2-pentanone	EPA 624, 8260B	EPA 8260B
Acetone	EPA 624, 8260B	EPA 8260B
Acetonitrile	EPA 624, 8260B	EPA 8260B
Acrolein (Propenal)	EPA 624, 8260B	EPA 8260B
Acrylonitrile	EPA 624, 8260B	EPA 8260B
Allyl Chloride	EPA 624, 8260B	EPA 8260B
Benzene	EPA 624, 8260B	EPA 8260B
Benzyl chloride	EPA 624, 8260B	EPA 8260B
Bromobenzene	EPA 624, 8260B	EPA 8260B
Bromochloromethane	EPA 624, 8260B	EPA 8260B
Bromodichloromethane	EPA 624, 8260B	EPA 8260B
Bromoform	EPA 624, 8260B	EPA 8260B
Bromomethane	EPA 624, 8260B	EPA 8260B
Carbon disulfide	EPA 624, 8260B	EPA 8260B
Carbon tetrachloride	EPA 624, 8260B	EPA 8260B
Chlorobenzene	EPA 624, 8260B	EPA 8260B
Chloroethane	EPA 624, 8260B	EPA 8260B
Chloroform	EPA 624, 8260B	EPA 8260B

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Chloromethane	EPA 624, 8260B	EPA 8260B
Chloroprene	EPA 624, 8260B	EPA 8260B
cis-1,2-Dichloroethene	EPA 624, 8260B	EPA 8260B
cis-1,3-Dichloropropene	EPA 624, 8260B	EPA 8260B
cis-1,4-Dichloro-2-butene	EPA 624, 8260B	EPA 8260B
Cyclohexane	EPA 8260B	EPA 8260B
Cyclohexanone	EPA 8260B	EPA 8260B
Dibromochloromethane	EPA 624, 8260B	EPA 8260B
Dibromomethane	EPA 624, 8260B	EPA 8260B
Dichlorodifluoromethane	EPA 624, 8260B	EPA 8260B
Diethyl ether	EPA 624, 8260B	EPA 8260B
Ethyl Acetate	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
Ethyl Benzene	EPA 624, 8260B	EPA 8260B
Ethyl methacrylate	EPA 624, 8260B	EPA 8260B
Hexachlorobutadiene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
Iodomethane	EPA 624, 8260B	EPA 8260B
Isobutyl Alcohol	EPA 8015B/C, 624, 8260B	EPA 8260B
Isopropylbenzene	EPA 624, 8260B	EPA 8260B
m+p-Xylene	EPA 624, 8260B	EPA 8260B
Methacrylonitrile	EPA 624, 8260B	EPA 8260B
Methyl Acetate	EPA 8260B	EPA 8260B
Methyl methyacrylate	EPA 624, 8260B	EPA 8260B
Methyl tert butyl ether (MTBE)	EPA 624, 8260B	EPA 8260B
Methylcyclohexane	EPA 8260B	EPA 8260B
Methylene chloride	EPA 624, 8260B	EPA 8260B
Naphthalene	EPA 624, 8260B, 625, 8270C/D, 8310	EPA 8260B, 8270C/D, 8310
n-Butyl alcohol	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
n-Butylbenzene	EPA 624, 8260B	EPA 8260B
n-Propylbenzene	EPA 624, 8260B	EPA 8260B
o-Xylene	EPA 624, 8260B	EPA 8260B
Pentachloroethane	EPA 624, 8260B, 8270C/D	EPA 8260B, 8270C/D
Propionitrile	EPA 624, 8260B	EPA 8260B
Sec-Butylbenzene	EPA 624, 8260B	EPA 8260B
Styrene	EPA 624, 8260B	EPA 8260B
tert-Butyl Alcohol	EPA 8260B	EPA 8260B
Tert-Butylbenzene	EPA 624, 8260B	EPA 8260B
Tetrachloroethene	EPA 624, 8260B	EPA 8260B
Toluene	EPA 624, 8260B	EPA 8260B
trans-1,2-Dichloroethene	EPA 624, 8260B	EPA 8260B
trans-1,3-Dichloropropene	EPA 624, 8260B	EPA 8260B
trans-1,4-Dichloro-2-butene	EPA 624, 8260B	EPA 8260B
Trichloroethene	EPA 624, 8260B	EPA 8260B
Trichlorofluoromethane	EPA 624, 8260B	EPA 8260B
Trihalomethanes	EPA 624, 8260B	EPA 8260B
Vinyl acetate	EPA 624, 8260B	EPA 8260B
Vinyl chloride	EPA 624, 8260B	EPA 8260B
Xylenes, total	EPA 624, 8260B	EPA 8260B
Semivolatile Compounds		
1,2,4,5-Tetrachlorobenzene	EPA 625, 8270C/D	EPA 8270C/D
1,2,4-Trichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
1,2-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,2-Diphenylhydrazine	EPA 625, 8270C/D	EPA 8270C/D
1,3,5-Trinitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
1,3-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,3-Dinitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
1,4-Dichlorobenzene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
1,4-Dinitrobenzene	EPA 625, 8270C/D	EPA 8270C/D
1,4-Naphthoquinone	EPA 625, 8270C/D	EPA 8270C/D
1,4-Phenylenediamine	EPA 625, 8270C/D	EPA 8270C/D
1-Methylnaphthalene	EPA 625, 8270C/D	EPA 8270C/D
1-Naphthylamine	EPA 625, 8270C/D	EPA 8270C/D
2,3,4,6-Tetrachlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2,3-Dichloroaniline	EPA 625, 8270C/D	EPA 8270C/D
2,4,5-Trichlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2,4,6-Trichlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2,4-Dichlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2,4-Dimethylphenol	EPA 625, 8270C/D	EPA 8270C/D
2,4-Dinitrophenol	EPA 625, 8270C/D	EPA 8270C/D
2,4-Dinitrotoluene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
2,6-Dichlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2,6-Dinitrotoluene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
2-Acetylaminofluorene	EPA 625, 8270C/D	EPA 8270C/D
2-Chloronaphthalene	EPA 625, 8270C/D	EPA 8270C/D
2-Chlorophenol	EPA 625, 8270C/D	EPA 8270C/D
2-Methyl-4,6-Dinitrophenol	EPA 625, 8270C/D	EPA 8270C/D
2-Methylnaphthalene	EPA 625, 8270C/D	EPA 8270C/D
2-Methylphenol (o-cresol)	EPA 625, 8270C/D	EPA 8270C/D
2-Naphthylamine	EPA 625, 8270C/D	EPA 8270C/D
2-Nitroaniline	EPA 625, 8270C/D	EPA 8270C/D
2-Nitrophenol	EPA 625, 8270C/D	EPA 8270C/D
2-Picoline (2-Methylpyridine)	EPA 625, 8270C/D	EPA 8270C/D
3,3'-Dichlorobenzidine	EPA 625, 8270C/D	EPA 8270C/D
3,3'-Dimethylbenzidine	EPA 625, 8270C/D	EPA 8270C/D
3/4-Methylphenols(m/p cresols)	EPA 625, 8270C/D	EPA 8270C/D
3-Methylcholanthrene	EPA 625, 8270C/D	EPA 8270C/D
3-Nitroaniline	EPA 625, 8270C/D	EPA 8270C/D
4,4-Dichlorodiphenyl sulfone	EPA 8270C/D	EPA 8270C/D
4,4-Dichlorophenyl disulfide	EPA 8270C/D	EPA 8270C/D
4-Aminobiphenyl	EPA 625, 8270C/D	EPA 8270C/D
4-Bromophenyl phenyl ether	EPA 625, 8270C/D	EPA 8270C/D
4-Chloro-3-methylphenol	EPA 625, 8270C/D	EPA 8270C/D
4-Chloroaniline	EPA 625, 8270C/D	EPA 8270C/D
4-Chlorophenyl phenyl ether	EPA 625, 8270C/D	EPA 8270C/D
4-Nitroaniline	EPA 625, 8270C/D	EPA 8270C/D
4-Nitrophenol	EPA 625, 8270C/D	EPA 8270C/D
5-Nitro-o-toluidine	EPA 625, 8270C/D	EPA 8270C/D
7,12-Dimethylbenz(a)anthracene	EPA 625, 8270C/D	EPA 8270C/D
Acenaphthene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Acenaphthylene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Acetophenone	EPA 625, 8270C/D	EPA 8270C/D
Alpha-,alpha-Dimethylphenethylamine	EPA 625, 8270C/D	EPA 8270C/D

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
alpha-Terpineol	EPA 625, 8270C/D	EPA 8270C/D
Aniline	EPA 625, 8270C/D	EPA 8270C/D
Anthracene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Aramite	EPA 625, 8270C/D	EPA 8270C/D
Atrazine	EPA 625, 8270C/D	EPA 8270C/D
Benzaldehyde	EPA 8270C/D	EPA 8270C/D
Benzidine	EPA 625, 8270C/D	EPA 8270C/D
Benzo (a) anthracene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Benzo (a) pyrene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Benzo (b) fluoranthene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Benzo (ghi) perylene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Benzo (k) fluoranthene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Benzoic acid	EPA 625, 8270C/D	EPA 8270C/D
Benzyl alcohol	EPA 625, 8270C/D	EPA 8270C/D
Biphenyl	EPA 8270C/D	EPA 8270C/D
Bis (2-chloroethoxy) methane	EPA 625, 8270C/D	EPA 8270C/D
Bis (2-chloroethyl) ether	EPA 625, 8270C/D	EPA 8270C/D
Bis (2-chloroisopropyl) ether	EPA 625, 8270C/D	EPA 8270C/D
Bis (2-ethylhexyl) phthalate	EPA 625, 8270C/D	EPA 8270C/D
Butyl benzyl phthalate	EPA 625, 8270C/D	EPA 8270C/D
Caprolactam	EPA 8270C/D	EPA 8270C/D
Carbazole	EPA 625, 8270C/D	EPA 8270C/D
Chlorobenzilate	EPA 625, 8270C/D	EPA 8270C/D
Chrysene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Diallate	EPA 625, 8270C/D	EPA 8270C/D
Dibenzo (a,e) pyrene	EPA 625, 8270C/D	EPA 8270C/D
Dibenzo (a,h) anthracene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Dibenzofuran	EPA 625, 8270C/D	EPA 8270C/D
Diethyl phthalate	EPA 625, 8270C/D	EPA 8270C/D
Dimethoate	EPA 625, 8270C/D	EPA 8270C/D
Dimethyl phthalate	EPA 625, 8270C/D	EPA 8270C/D
Di-n-butyl phthalate	EPA 625, 8270C/D	EPA 8270C/D
Di-n-octyl phthalate	EPA 625, 8270C/D	EPA 8270C/D
Diphenyl Disulfide	EPA 8270C/D	EPA 8270C/D
Diphenyl sulfide	EPA 8270C/D	EPA 8270C/D
Diphenyl sulfone	EPA 8270C/D	EPA 8270C/D
Diphenylamine	EPA 625, 8270C/D	EPA 8270C/D
Disulfoton	EPA 625, 8270C/D	EPA 8270C/D
Ethyl methanesulfonate	EPA 625, 8270C/D	EPA 8270C/D
Famphur	EPA 625, 8270C/D	EPA 8270C/D
Fluorene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Fluoroanthene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Hexachlorobenzene	EPA 625, 8270C/D	EPA 8270C/D
Hexachlorobutadiene	EPA 624, 8260B, 625, 8270C/D	EPA 8260B, 8270C/D
Hexachlorocyclopentadiene	EPA 625, 8270C/D	EPA 8270C/D
Hexachloroethane	EPA 625, 8270C/D	EPA 8270C/D
Hexachlorophene	EPA 625, 8270C/D	EPA 8270C/D
Hexachloropropene	EPA 625, 8270C/D	EPA 8270C/D
Indeno (1,2,3-cd) pyrene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Isodrin	EPA 625, 8270C/D	EPA 8270C/D
Isophorone	EPA 625, 8270C/D	EPA 8270C/D

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Isosafrole	EPA 625, 8270C/D	EPA 8270C/D
Kepone	EPA 625, 8270C/D	EPA 8270C/D
Methapyrilene	EPA 625, 8270C/D	EPA 8270C/D
Methyl methanesulfonate	EPA 625, 8270C/D	EPA 8270C/D
Methyl Parathion	EPA 625, 8270C/D	EPA 8270C/D
Naphthalene	EPA 624, 8260B, 625, 8270C/D, 8310	EPA8260B, 8270C/D, 8310
n-Decane	EPA 625, 8270C/D	EPA 8270C/D
Nitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
Nitroquinoline-1-oxide	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodietheylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodimethylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodimethylethylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodi-n-butylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodi-n-propylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosodiphenylamine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosomorpholine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosopiperidine	EPA 625, 8270C/D	EPA 8270C/D
N-Nitrosopyrrolidine	EPA 625, 8270C/D	EPA 8270C/D
n-Octadecane	EPA 625, 8270C/D	EPA 8270C/D
o,o,o-Triethyl phosphorothioate	EPA 625, 8270C/D	EPA 8270C/D
Octachlorostyrene	EPA 8270C/D	EPA 8270C/D
o-Toluidine	EPA 625, 8270C/D	EPA 8270C/D
Parathion, ethyl	EPA 625, 8270C/D	EPA 8270C/D
p-Benzoquinone	EPA 625, 8270C/D	EPA 8270C/D
p-Dimethylaminoazobenzene	EPA 625, 8270C/D	EPA 8270C/D
Pentachlorobenzene	EPA 625, 8270C/D	EPA 8270C/D
Pentachloroethane	EPA 624, 8260B, 8270C/D	EPA 8260B, 8270C/D
Pentachloronitrobenzene	EPA 625, 8270C/D	EPA 8270C/D
Pentachlorophenol	EPA 625, 8270C/D, 8151A	EPA 8270C/D, 8151A
Phenacetin	EPA 625, 8270C/D	EPA 8270C/D
Phenanthrene	EPA 625, 8270C/D, 8310	EPA 8270C/D, 8310
Phenol	EPA 625, 8270C/D	EPA 8270C/D
Phorate	EPA 625, 8270C/D	EPA 8270C/D
Pronamide (Kerb)	EPA 625, 8270C/D	EPA 8270C/D
Pyrene	EPA 625/8270C/8270D/8310	EPA 8270C/8270D/8310
Pyridine	EPA 625, 8270C/D	EPA 8270C/D
Safrole	EPA 625, 8270C/D	EPA 8270C/D
Sulfotepp	EPA 625, 8270C/D	EPA 8270C/D
Thionazin (Zinophos)	EPA 625, 8270C/D	EPA 8270C/D
Thiophenol (Benzenethiol)	EPA 8270C/D	EPA 8270C/D
Tributyl Phosphate	EPA 8270C/D	EPA 8270C/D
Pesticides & PCBs		
2,4'-DDD	EPA 8081A/B	EPA 8081A/B
2,4'-DDE	EPA 8081A/B	EPA 8081A/B
2,4'-DDT	EPA 8081A/B	EPA 8081A/B
4,4'-DDT	EPA 608, 8081A/B	EPA 8081A/B
4,4'-DDD	EPA 608, 8081A/B	EPA 8081A/B
4,4'-DDE	EPA 608, 8081A/B	EPA 8081A/B
Aldrin	EPA 608, 8081A/B	EPA 8081A/B
alpha-BHC	EPA 608, 8081A/B	EPA 8081A/B

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
alpha-Chlordane	EPA 608, 8081A/B	EPA 8081A/B
beta-BHC	EPA 608, 8081A/B	EPA 8081A/B
Chlordane (technical)	EPA 608, 8081A/B	EPA 8081A/B
cis-Nonachlor	EPA 8081A/B	EPA 8081A/B
delta-BHC	EPA 608, 8081A/B	EPA 8081A/B
Dieldrin	EPA 608, 8081A/B	EPA 8081A/B
Endonsulfan sulfate	EPA 608, 8081A/B	EPA 8081A/B
Endosulfan I	EPA 608, 8081A/B	EPA 8081A/B
Endosulfan II	EPA 608, 8081A/B	EPA 8081A/B
Endrin	EPA 608, 8081A/B	EPA 8081A/B
Endrin aldehyde	EPA 608, 8081A/B	EPA 8081A/B
Endrin ketone	EPA 608, 8081A/B	EPA 8081A/B
gamma-BHC	EPA 608, 8081A/B	EPA 8081A/B
gamma-Chlordane	EPA 608, 8081A/B	EPA 8081A/B
Heptachlor	EPA 608, 8081A/B	EPA 8081A/B
Heptachlor epoxide	EPA 608, 8081A/B	EPA 8081A/B
Hexachlorobenzene	EPA 8081A/B	EPA 8081A/B
Methoxychlor	EPA 608, 8081A/B	EPA 8081A/B
Mirex	EPA 8081A/B	EPA 8081A/B
Oxychlordane	EPA 8081A/B	EPA 8081A/B
Toxaphene	EPA 608, 8081A/B	EPA 8081A/B
trans-Nonachlor	EPA 8081A/B	EPA 8081A/B
PCB-1016 (Aroclor)	EPA 608, 8082/A	EPA 8082/A
PCB-1221	EPA 608, 8082/A	EPA 8082/A
PCB-1232	EPA 608, 8082/A	EPA 8082/A
PCB-1242	EPA 608, 8082/A	EPA 8082/A
PCB-1248	EPA 608, 8082/A	EPA 8082/A
PCB-1254	EPA 608, 8082/A	EPA 8082/A
PCB-1260	EPA 608, 8082/A	EPA 8082/A
PCB-1262	EPA 608, 8082/A	EPA 8082/A
PCB-1268	EPA 608, 8082/A	EPA 8082/A
BZ# 18 2,2',5-trichlorobiphenyl	EPA 8082/A	EPA 8082A
BZ# 8 2,4'-dichlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#101 2,2',4,5,5'-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#105 2,3,3',4,4'-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#118 2,3',4,4',5-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#126 3,3',4,4',5-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#128 2,2',3,3',4,4'-hexachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#138 2,2',3,4,4',5'-hexachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#153 2,2',4,4',5,5'-hexachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#156 2,3,3',4,4',5-hexachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#169 3,3',4,4',5,5'-hexachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#170 2,2',3,3',4,4',5-heptachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#180 2,2',3,4,4',5,5'-heptachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#183 2,2',3,4,4',5',6-	EPA 8082/A	EPA 8082A

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
heptachlorobiphenyl		
BZ#184 2,2',3,4,4',6,6'-heptachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#187 2,2',3,4',5,5',6-heptachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#195 2,2',3,3',4,4',5,6-octachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#206 2,2',3,3',4,4',5,5',6-nonachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#209 decachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#28 2,4,4'-trichlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#44 2,2',3,5'-tetrachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#52 2,2',5,5'-tetrachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#66 2,3',4,4'-tetrachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#77 3,3',4,4'-tetrachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#87 2,2',3,4,5'-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
BZ#90 2,2',3,4',5-pentachlorobiphenyl	EPA 8082/A	EPA 8082A
Total Aroclors	EPA 608, 8082/A	EPA 8082/A
FID Compounds		
2-Butanone (Methyl Ethyl Ketone)	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
Diesel Range Organics (DRO)	EPA 8015B/C, CA-LUFT, CT-ETPH, FL-PRO	EPA 8015B/C, CA-LUFT, CT-ETPH, FL-PRO
Ethanol	EPA 8015B/C	EPA 8015B/C
Ethyl acetate	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
Ethylene Glycol	EPA 8015B/C	EPA 8015B/C
Gas Range Organics (GRO)	EPA 8015B/C, CA-LUFT, FL-PRO	EPA 8015B/C, CA-LUFT, FL-PRO
Isobutyl Alcohol	EPA 624, 8015B/C, 8260B	EPA 8015B/C, 8260B
Isopropyl Alcohol (2-Propanol)	EPA 8015B/C	EPA 8015B/C
Methanol	EPA 8015B/C	EPA 8015B/C
n-Butyl alcohol	EPA 8015B/C, 624, 8260B	EPA 8015B/C, 8260B
Herbicides		
2,4-D	EPA 8151A	EPA 8151A
2,4-DB	EPA 8151A	EPA 8151A
Dalapon	EPA 8151A	EPA 8151A
Dicamba	EPA 8151A	EPA 8151A
Dichloroprop	EPA 8151A	EPA 8151A
Dinoseb	EPA 8151A	EPA 8151A
MCPA	EPA 8151A	EPA 8151A
MCPP	EPA 8151A	EPA 8151A
2,4,5-T	EPA 8151A	EPA 8151A
2,4,5-TP (Silvex)	EPA 8151A	EPA 8151A
Pentachlorophenol	EPA 8151A	EPA 8151A
Nitrosamines, Nitroaromatics		
1,3,5-Trinitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
1,3-Dinitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
2,4,6-Trinitrotoluene	EPA 8330A/B	EPA 8330A/B
2,4-Dinitrotoluene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
2,6-Dinitrotoluene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
2-Amino-4,6-Dinitrotoluene	EPA 8330A/B	EPA 8330A/B
2-Nitrotoluene	EPA 8330A/B	EPA 8330A/B
3,5-Dinitroaniline	EPA 8330B	EPA 8330B
3-Nitrotoluene	EPA 8330A/B	EPA 8330A/B

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
4-Amino-2,6-Dinitrotoluene	EPA 8330A/B	EPA 8330A/B
4-Nitrotoluene	EPA 8330A/B	EPA 8330A/B
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	EPA 8330A/B	EPA 8330A/B
Nitrobenzene	EPA 625, 8270C/D, 8330A/B	EPA 8270C/D, 8330A/B
Nitroglycerin	EPA 8330A/B	EPA 8330A/B
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	EPA 8330A/B	EPA 8330A/B
Pentaerythritoltetranitrate (PETN)	EPA 8330A/B	EPA 8330A/B
Tetryl (methyl-2,4,6-trinitrophenylnitramine)	EPA 8330A/B	EPA 8330A/B
Metals on Filters	Air Filters	
Aluminum	NIOSH 7303/EPA 6010B	
Antimony	NIOSH 7303/EPA 6010B	
Arsenic	NIOSH 7303/EPA 6010B	
Barium	NIOSH 7303/EPA 6010B	
Beryllium	NIOSH 7303/EPA 6010B	
Cadmium	NIOSH 7303/EPA 6010B	
Calcium	NIOSH 7303/EPA 6010B	
Chromium	NIOSH 7303/EPA 6010B	
Cobalt	NIOSH 7303/EPA 6010B	
Copper	NIOSH 7303/EPA 6010B	
Iron	NIOSH 7303/EPA 6010B	
Lead	NIOSH 7303/EPA 6010B	
Magnesium	NIOSH 7303/EPA 6010B	
Manganese	NIOSH 7303/EPA 6010B	
Molybdenum	NIOSH 7303/EPA 6010B	
Nickel	NIOSH 7303/EPA 6010B	
Phosphorous	NIOSH 7303/EPA 6010B	
Potassium	NIOSH 7303/EPA 6010B	
Selenium	NIOSH 7303/EPA 6010B	
Silver	NIOSH 7303/EPA 6010B	
Sodium	NIOSH 7303/EPA 6010B	
Strontium	NIOSH 7303/EPA 6010B	
Sulfur	NIOSH 7303/EPA 6010B	
Tin	NIOSH 7303/EPA 6010B	
Titanium	NIOSH 7303/EPA 6010B	
Uranium	NIOSH 7303/EPA 6010B	
Vanadium	NIOSH 7303/EPA 6010B	
Zinc	NIOSH 7303/EPA 6010B	
Radiochemistry		
Barium 133	DOE 4.5.2.3	DOE 4.5.2.3
Cesium 134	DOE 4.5.2.3, EPA 901.1	DOE 4.5.2.3
Cesium 137	DOE 4.5.2.3, EPA 901.1	DOE 4.5.2.3
Cobalt-60	DOE 4.5.2.3, EPA 901.1	DOE 4.5.2.3
Gamma Emitters	DOE 4.5.2.3, EPA 901.1	DOE 4.5.2.3
Gross Alpha	EPA 900.0, 9310	EPA 9310
Gross Beta	EPA 900.0, 9310	EPA 9310
Radioactive Iodine	DOE 4.5.2.3, EPA 901.1, 902.0	DOE 4.5.2.3
Radium-226	EPA 903.1, DOE Ra-04	DOE Ra-04
Radium-228	EPA 904.0, 9320, DOE 4.5.2.3	DOE 4.5.2.3, EPA9320
Total Radium	EPA 9315	EPA 9315

Parameter/Analyte	Nonpotable Water	Solid Hazardous Waste (Liquids and Solids)
Radon	SM7500 Rn-B	----------
Strontium-89	EPA 905.0, DOE Sr-01	DOE Sr-01
Strontium-90	EPA 905.0, DOE Sr-02	DOE Sr-02
Thorium	EMSL-LV	EMSL-LV
Tritium	EPA 906.0	----------
Uranium	ASTM D5174-02/97, DOE U-02, EPA 200.8,EPA 6020/A	DOE U-02, EPA 6020/A
Zinc-65	EPA 901.1/DOE 4.5.2.3	DOE 4.5.2.3
Preparatory and Clean-up Methods		
Toxicity Characteristic Leaching Procedure (Inorganics, Extractable Organics, Volatile Organics)	----------	EPA 1311
Synthetic Precipitation Leaching Procedure	----------	EPA 1312
Waste Extraction Test (W.E.T.)	----------	CCR Chapter 11, Article 5, Appendix II
Anion Preparation	----------	EPA 9056A[3]
Cyanide Distillation	EPA 9010B/C	EPA 9010B/C[3]
Sulfide Distillation	EPA 9030B	EPA 9030B
Metals Digestion	EPA 200.2, 3005A, 3010A	EPA 3050B
Alkaline Digestion for Hexavalent Chromium	----------	EPA 3060A
Bomb Preparation for Solid Waste	----------	EPA 5050
Mercury Preparation	EPA 245.1, 245.2, 7470/A	EPA 7471A/B
Separatory Funnel Liquid-Liquid Extraction	EPA 3510C	----------
Continuous Liquid-Liquid Extraction	EPA 3520C	----------
Solid Phase Extraction	EPA 3535A	----------
Automated Soxhlet Extraction	----------	EPA 3541
Ultrasonic Extraction	----------	EPA 3550C
Waste Dilution	----------	EPA 3580A
Waste Dilution for Volatile Organics	----------	EPA 3585
Purge and Trap for Volatile Organics	EPA 5030A/B/C	EPA 5035/A
Alumina Clean-up	----------	EPA 3610B, 3611B
Florisil Clean-up	----------	EPA 3620B/C
Silica Gel Clean-up	----------	EPA 3630C
Gel Permeation Clean-up	----------	EPA 3640A
Sulfur Clean-up	----------	EPA 3660B
Sulfuric Acid/Permanganate Clean-up	----------	EPA 3665A

1 - Calculated from silica determination

2 – Applicable only to liquid 'Solid Hazardous Waste', where liquids may include aqueous, non-aqueous, and oily wastes. Solids may include soils, sediments, sludges, tissues, filters and any matrix deemed non-liquid.

3 – The referenced method is modified to include a simple prep for non-aqueous and/or solid matrix samples.

Accreditation is also granted to this laboratory to perform the following tests on children's toys:

Chemical	
Lead in Paint by ICP	16 CFR part 1303 (using GL-MA-E-009 and GL-MA-E-013)

Additionally, in recognition of the successful completion of the A2LA evaluation process (including an assessment of the laboratory's compliance with the 2003 NELAC Chapter 5 Requirements), accreditation is granted to this laboratory to perform the following bioassay analyses on bone, tissue, urine, fecal, and nasal swabs.

	Preparation SOP	Analytical SOP
Bioassay Analysis		
Alpha Spectrometry: Alpha: Am-241, Cm-242, Cm-243/244, Cm 245/246, Cf-252, Np-237, Po-208, Po-209, Po-210, Pu-236, Pu-238, Pu-239/240, Pu-242, Pu-244, Th-228, Th-229, Th-230, Th-232, U-232, U-233/234, U-235/236, U-238	GL-RAD-B-001, GL-RAD-B-002, GL-RAD-B-003, GL-RAD-B-010, GL-RAD-B-012, GL-RAD-B-013, GL-RAD-B-017	GL-RAD-B-009
Liquid Scintillation Spectrometry: C-14, Gross Alpha, H-3, Ni-63, Pu-241, Tc-99	GL-RAD-B-001, GL-RAD-B-008, GL-RAD-B-011, GL-RAD-B-012, GL-RAD-B-013, GL-RAD-B-016, GL-RAD-B-020, GL-RAD-B-023	GL-RAD-I-004, GL-RAD-I-014, GL-RAD-I-017
Gas Flow Proportional Counting: Beta: Sr-90	GL-RAD-B-001	GL-RAD-I-006, GL-RAD-I-015, GL-RAD-I-016
Gross Alpha/Gross Beta:	GL-RAD-B-022	GL-RAD-I-006
Kinetic Phosphorescence Analyzer Total Uranium	GL-RAD-B-019	GL-RAD-B-018
Radon Emanation: Ra-226	GL-RAD-B-002	GL-RAD-I-007
Refractometer Specific Gravity	GL-RAD-B-027	GL-RAD-B-027
ICP-MS Uranium Isotopes	GL-RAD-B-035	GL-RAD-B-027
Gamma Spectrometry: Gamma: Ni-59, 46 to 1836 keV	GL-RAD-B-020, GL-RAD-A-013	GL-RAD-I-001

The American Association for Laboratory Accreditation

World Class Accreditation

Accredited DoD ELAP Laboratory

A2LA has accredited

GEL LABORATORIES, LLC

Charleston, SC

for technical competence in the field of

Environmental Testing

In recognition of the successful completion of the A2LA evaluation process that includes an assessment of the laboratory's compliance with ISO/IEC 17025:2005, the 2003 NELAC Chapter 5 Standard, and the requirements of the Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in version 4.1 of the DoD Quality System Manual for Environmental Laboratories (QSM); accreditation is granted to this laboratory to perform recognized EPA methods as defined on the associated A2LA Environmental Scope of Accreditation. This accreditation demonstrates technical competence for this defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009*).

Presented this 22nd day of August 2011.

President & CEO
For the Accreditation Council
Certificate Number 2567.01
Valid to July 31, 2013
Revised June 24, 2013

For the tests or types of tests to which this accreditation applies, please refer to the laboratory's Environmental Scope of Accreditation.

ATTACHMENT 2

PROJECT CONTRACTOR QUALITY CONTROL PLAN

FINAL
CONTRACTOR QUALITY CONTROL PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared Under:
Contract Number N62473-10-D-0808
Contract Task Order Number CTO 0004
Document Control Number: ITSI-0808-0004-0013

Prepared for:

Base Realignment and Closure
Program Management Office, West
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DEPARTMENT OF THE NAVY
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July 2013

ITSI Gilbane Project No. 07204.0004

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ACRONYMS AND ABBREVIATIONS

AHA	accident hazard analysis
BRAC	Base Realignment and Closure
CO	Contracting Officer
COR	Contracting Officer's Representative
CQC	Contractor Quality Control
CQCP	Contractor Quality Control Program
CSO	Caretaker Site Office
CTO	contract task order
DFOW	definable feature of work
DQC	Daily Quality Control
EHS	extremely hazardous substance
EM	Engineer Manual
FFS	Final Status Survey
HPNS	Hunters Point Naval Shipyard
ITSI Gilbane	ITSI Gilbane Company
LLRW	low-level radioactive waste
NRDL	Naval Radiological Defense Laboratory
Navy	U.S. Department of the Navy
PM	Project Manager
QA	quality assurance
QC	quality control
QCM	(Project) Quality Control Manager
ROICC	Resident Officer in Charge of Construction
RPP	Radiation Protection Plan
RSO	Radiological Safety Officer
RSY	radiological screening yard
SAP	Sampling and Analysis Plan
SOW	Statement/Scope of Work
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SS/SD	sanitary sewer and storm drain
TO	task order
USACE	U.S. Army Corps of Engineers

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1.0 INTRODUCTION

This Contractor Quality Control (CQC) Plan was prepared for the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command Southwest by ITSI Gilbane Company (ITSI Gilbane), under contract number N62473-10-D-0808, contract task order (CTO) 0004, and based on the Statement of Work (SOW) submitted by the Navy on April 17, 2012, regarding the Parcel D-1 Phase II Radiological Remediation and Support at Hunters Point Naval Shipyard (HPNS) in San Francisco, California.

This project-specific CQC Plan was developed to ensure that the remediation of sanitary sewer and storm drain (SS/SD) lines, radiologically impacted ship berths, and sites in Parcel D-1 are conducted in a planned and controlled manner; that the product of these activities conforms to contract requirements; and that appropriate documentation exists to support each activity for which ITSI Gilbane is responsible. Figure 1 presents the vicinity map for Parcel D-1 at HPNS. A copy of the approved CQC Plan will be maintained at the site during all field activities and will be available for reference during field work periods.

A Site Superintendent/Field Team Leader and Project Quality Control Manager (QCM) will be present on site during field activities, and will oversee and supervise work performed by ITSI Gilbane personnel and subcontractors on the project. The QCM, who reports directly to the Quality Control Program Manager, will work closely with the Project Manager (PM) and Project Geologist, and with the Navy quality control (QC) representatives, to assure that the work is performed in compliance with the specifications contained in the approved Execution Plan (ITSI, 2013) and this CQC Plan. The QCM has the authority to stop work if contract requirements are not being met. In the event that the QCM is unavailable, an alternate QCM will assume this responsibility. The proposed QC organization for this project is shown on Figure 2, which includes relationships to other elements of ITSI Gilbane, including the reporting structure to a corporate officer. The details of the project QC organization, including qualifications and responsibilities of key QC personnel, are outlined in Section 2.0 and presented in Figure 2.

The QC Program Manager for this Navy contract is responsible for implementing the QC program for the contract, and will work directly with the PM, Site Superintendent/Field Team

Leader, and Project QCM to assure that all work is performed in compliance with the contract. The QC Program Manager will serve as an alternate contact for the Project QCM if questions arise regarding acceptability of materials or performance during the project.

In addition to reporting to the Base Realignment and Closure (BRAC) Navy Remedial Project Manager (RPM) as shown in Figure 2, the PM reports to the ITSI Gilbane Program Manager for the contract, who has the responsibility and authority to ensure that the work is performed according to the approved specifications and to the Navy's satisfaction. The QC Program Manager is also the Corporate Quality Assurance (QA)/QC Director and reports to ITSI Gilbane's Executive Vice President. The QC Program Manager is responsible for reviewing project performance, authorizing project execution modifications, updating the CQC Plan as needed, and for verifying compliance with contract documents and the applicable QA/QC requirements.

2.0 QUALITY CONTROL ORGANIZATION AND APPOINTMENTS

ITSI Gilbane has structured its corporate QC organization to fully support the Program and Project Managers who have ultimate responsibility for the quality of services that ITSI Gilbane provides. The Program and Project Managers are responsible for ensuring that personnel in their organizations understand the corporate and contract-specific QC programs and that their organizations' functions are set up and maintained effectively.

Quality issues are resolved at the lowest possible organizational level at each project site to assure contract compliance and client satisfaction. Issues that cannot be resolved satisfactorily at the project level are resolved at the corporate level.

Key staff positions in the ITSI Gilbane QC organization for this project include:

- Corporate Executive Vice President
- Corporate QA/QC Director
- Quality Control Program Manager
- Program Manager
- Project Quality Control Manager
- Alternate Quality Control Manager
- Project Manager
- Site Superintendent
- Site Safety and Health Officer
- Project Chemist/Laboratory Coordinator
- Data Manager
- Certified Health Physicist.

Figure 2 illustrates the reporting and communication relationships between QC personnel, the ITSI Gilbane field team, subcontractors, and Navy representatives. This structure provides the organizational freedom for personnel to identify and evaluate quality problems and discrepancies, provide recommended solutions, and ensure that appropriate corrective actions are taken.

The specific responsibilities and qualifications associated with each QC-related position are outlined in Table 2. The qualifications, experience, and primary functions of the proposed key appointees for this project are summarized in the following subsections. All QC organization personnel are subject to acceptance by the Contracting Officer (CO) or Contracting Officer's Representative (COR). The CO may require the removal of any individual for noncompliance with quality requirements specified in the contract.

2.1 QC PERSONNEL, QUALIFICATIONS, AND RESPONSIBILITIES

Key QC personnel for ITSI Gilbane projects are assigned on the basis of appropriate experience and the determination that these individuals meet all contract and TO-specific requirements. The Project QC Manager and Alternate QC Manager are appointed by the Quality Control Program Manager. The Site Superintendent/Project Geologist is designated by the PM, and if QC Specialists are required, they will be appointed by the QCM in the field. The following paragraphs identify the QC team for this TO and highlight their qualifications and responsibilities.

Corporate QA/QC Director

The ITSI Gilbane QA/QC director, Ms. Cheryl Prince, has 25 years of experience in QA/QC. She has developed and managed QA/QC programs at project, program, and corporate divisional levels, and has oversight responsibility for multiple large Department of Defense contracts.

Ms. Prince is responsible for audits and general oversight of project QC compliance, for providing guidance and support to project QC personnel, and for assisting with resolution of QC issues that cannot be resolved at the project or program level. Ms. Prince reports directly to the Executive Vice President of ITSI Gilbane Company. Her responsibilities are outlined in Table 1.

Quality Control Program Manager

The QC Program Manager for the contract, Ms. Cheryl Prince, has more than 25 years of experience in the environmental industry, with an emphasis on QA/QC program implementation. Ms. Prince has completed the USACE/Navy *Construction Quality Management for Contractors* training course and is familiar with the requirements of *Safety and Health Requirements Manual*, Engineer Manual (EM) 385-1-1 (USACE, 2008). Her responsibilities in this position are listed in Table 1.

Program Manager

The Program Manager, Mr. Arvind Acharya, has 25 years of experience managing environmental remediation projects. He has performed more than 45 Navy TOs involving remedial and removal actions, expedited response, radiological free release surveys, and operations and maintenance. He has served as technical manager for five Navy programs that involved multiple TOs at multiple sites that were implemented concurrently. His remediation experience covers a wide range of contaminants, including solvents, radiological constituents, petroleum, oils, and lubricants; metals; acids; bases; reactives; polychlorinated biphenyls and pesticides; ordnance waste; and unexploded ordnance. His responsibilities are listed in Table 1.

In his capacity as Program Manager, Mr. Acharya ensures effective execution of projects and compliance with the contract and with the Comprehensive Environmental Response, Compensation, and Liability Act; Resource Conservation and Recovery Act; Toxic Substances Control Act; Safe Drinking Water Act; Superfund Amendments and Reauthorization Act; Clean Air Act; and Clean Water Act regulations, and their state and local counterparts.

Project Quality Control Manager

The QC Program Manager has appointed Tony Olmstead to serve as Project QCM for this project/TO. Mr. Olmstead has more than 15 years of experience in the environmental, construction, and land-development industries. Mr. Olmstead has completed the USACE/Navy *Construction Quality Management for Contractors* training course and is familiar with the requirements of EM 385-1-1.

The Project QC Manager works closely with the PM on quality-related issues, but reports independently to and has an open line of communication with the QC Program Manager. The responsibilities of the Project QC Manager, including implementing the Three Phases of Control (see Section 9.0), reviewing and approving submittals, and other responsibilities are described in Table 1. The QCM has the authority to stop work if contract requirements are not being met. In the event the QCM is unavailable, the designated Alternate QCM will assume these responsibilities. Resumes and appointment letters for both the QCM and alternate QCM are included in Attachment 1.

Alternate Quality Control Manager

The QC Program Manager has appointed Mr. Henry Ng to serve as Alternate Project QCM for this project. Mr. Ng has completed the USACE/Navy *Construction Quality Management for Contractors* training course and is familiar with the requirements of EM 385-1-1.

In the event the QCM is absent from the site or is unavailable, the Alternate QCM will assume the QC responsibilities outlined in Table 1 and described in this CQC Plan.

Site Superintendent/Field Team Leader

The Site Superintendent/Field Team Leader, Mr. Charles Cronister, will be present on site during field activities, and will supervise and oversee the quality of work performed by ITSI Gilbane personnel and subcontractors on the project. He will work closely with the PM and Project QC Manager, and will routinely communicate and coordinate directly with the Resident Officer In Charge of Construction (ROICC), as well as the Caretaker Site Office (CSO), to assure that work is performed in conformance with applicable requirements and to the satisfaction of the Navy. His responsibilities are listed in Table 1.

Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) for the project is Tony Poon (see Figure 2), whose responsibilities and authority are described in the *Site Safety and Health Plan* (SSHP) (ITSI Gilbane, 2012). The SSHO will work closely with the Site Superintendent/ Field Team Leader, QCM and other QC staff to assure that all site activities are conducted safely, in accordance with the contract and the SSHP. The QCM is not responsible for health and safety and is not the designated SSHO.

Project Manager

The ITSI PM for this CTO, Mr. Ed Palser, has more than 24 years of experience overseeing and performing radiological remediation projects including implementation of large-scale removal actions, free release surveys, sampling programs, and drilling projects. The PM's responsibilities include developing task requirements with technical representatives, implementing project plans within schedule and budget, recommending and justifying change orders, tracking resources, monitoring and controlling costs, and ensuring compliance with safety and regulatory requirements.

Project Chemist/Laboratory Coordinator

Kristen Carlyon will serve as the Project Chemist/ Laboratory Coordinator and will be the point of contact for on-site and off-site laboratory matters. The Project Chemist/ Laboratory Coordinator will:

- Coordinate the submittal of samples to both the on-site and off-site laboratories.
- Ensure that the Final Status Survey (FSS) gamma spectroscopy and QA samples are transferred to the on-site laboratory.
- Ensure that the alpha spectroscopy and QA samples are transferred to the off-site laboratory.
- Ensure that soil samples are collected for chemical analysis from radiological screening yard (RSY) stockpiles identified as being derived from installation restoration site areas, and that these samples are submitted to the off-site laboratory for the appropriate chemical analyses.
- Coordinate with the nonradiological waste disposal contractor by providing the chemical analytical results from reuse sampling and analysis so the contractor can determine any additional analyses required for waste characterization purposes, which would be performed for the nonradiological waste disposal contractor.
- Coordinate with the low-level radioactive waste (LLRW) waste disposal contractor by providing the radiological results from the RSY and trench sampling and analysis so the contractor can determine any additional analyses required for waste characterization purposes, which would be performed for the LLRW waste disposal contractor.
- Ensure the proper archiving and storage of the soil and sediment samples.

Data Manager

The Envirachem representative, Chris Bryson will serve as the Data Manager who will be responsible for managing the "cradle-to-grave" data management system to ensure that it seamlessly integrates all phases of the SS/SD radiological and construction work process from the initial survey, excavation, and remediation activities through backfilling of survey units and site restoration, as well as ship berth FSS activities to support free release. The Data Manager will:

- Ensure tracking of each truckload and stockpile of excavated storm drain and sanitary sewer soil to facilitate backfilling within the same general area from which the soil was excavated.
- Ensure tracking of excavated soil from the time it enters the RSYs with a truck ticket through radiological survey and, if necessary, remediation and disposal activities until final disposition and transfer to the appropriate LLRW or non-LLRW waste contractors.
- Ensure chain-of-custody tracking for samples from generation through delivery to both the on-site or off-site laboratories.
- Ensure tracking the radiological survey swipe and sediment samples so that ITSI Gilbane can identify when additional investigative samples are required from those trenches with elevated activity.

Certified Health Physicist

The ITSI Gilbane Certified Health Physicist, Jerry Cooper, is responsible for the following:

- Review and make recommended revisions to:
  - The Radiation Protection Plan (RPP), radiation protection guidelines, and supporting documents.
  - Project plans involving the use or handling of radioactive materials, or access to areas of radiological concern to ensure compliance with RPP requirements and supporting guidelines.
  - Evaluate and interpret radiological data as well as conduct dose modeling.
- Provide day-to-day guidance on radiological protection issues.
  - Identify and train authorized users.
  - Assign project RSO.
  - Coordinate investigations involving radiological occurrences to include review and approval of a resulting Corrective Action Plan.

- Maintain radiological exposure records.
- Provide guidance on radiological-protection issues.
- Assist with the development of site extremely hazardous substance (EHS) plans and obtain approval of EHS plans for projects that involve the use or handling of radioactive materials or access to areas of radiological concern.
- Provide resource specialist review involving exposure to radiation or radioactive materials.

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3.0 OUTSIDE ORGANIZATIONS

To manage subcontractors and vendors effectively, ITSI Gilbane carefully selects and prequalifies each firm. ITSI Gilbane continuously and aggressively manages subcontractor costs, schedule, safety, and quality performance. The pre-qualification process ensures that subcontractors bring the same focus on quality, cost control, schedule discipline, and commitment to customer satisfaction as ITSI Gilbane. Once an award is made to a subcontractor, ITSI Gilbane manages the quality of the subcontractor's performance through the three-phase inspection process outlined in Section 9.0.

Testing laboratories must be accredited, and will provide a copy of their certification and scope of accreditation upon request. The scope of accreditation for the laboratory performing the actual testing must include the appropriate U.S. Environmental Protection Agency or ASTM standards as listed in the technical sections of the Execution Plan (ITSI, 2013) and/or appendices. Laboratories providing environmental analyses must be accredited by a program identified in Unified Facilities Guide Specifications 01 45 02, Section 1.13.2 Laboratory Accreditation Authorities, as appropriate.

The subcontractors/laboratories and the products and/or services they are expected to provide to ITSI Gilbane during the performance of this TO include:

- Test America – testing laboratory
- Timmy's Team – provide radiological control technicians and supervisor
- Envirachem – On-site laboratory (smear samples)

Names and qualifications of all subcontractors proposed for this project and not identified above will be submitted to the Navy for review and approval, prior to the start of field activities. All subcontractors will be subject to ITSI Gilbane's QC procedures and will be provided with copies of the approved CQC Plan. Testing and inspection procedures will be monitored by ITSI Gilbane as described in Section 5.0.

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4.0 SUBMITTAL PROCEDURES

During the implementation of this TO, subcontractors and vendors will be required to submit drawings, product and equipment specifications, and/or catalog data to ITSI Gilbane for approval. All submittals will be reviewed and certified by the Project QCM or Alternate QCM before they are forwarded to the Navy to indicate that the submittals are in compliance with contract requirements. QC procedures for analytical data are described in the *Sampling and Analysis Plan* (SAP) [Execution Plan, ITSI, 2013, Attachment 1].

An initial Submittal Register has been prepared and is included as Attachment 2 of this CQC Plan. The Submittal Register will be maintained for the duration of the TO.

The procedure for internal ITSI Gilbane approval of these submittals is as follows.

- As applicable, the subcontractor or vendor will forward relevant drawings, equipment specifications, and/or catalog data to the QCM or designee, for review. The QCM will verify that the information is complete as required by the applicable section of the procurement specifications.

- The CQC Manager will verify that the test methods and results are consistent with the requirements of the applicable testing method. Results of any on-site testing will be provided to the QCM for review. As necessary, the QCM will get technical input from qualified personnel relative to test methods and results. Upon request, the QCM will provide the results to the Navy ROICC.

- Variations in materials or methods from specifications will be directed to the Project Manager for review and approval of the QCM's recommendation prior to acceptance and/or use of the materials or alternative methods. If the materials or methods are unacceptable, the materials and/or methods will be rejected by the QCM. If the alternative materials/methods are acceptable to the QCM and Project Manager, the Project Manager will notify the Navy ROICC of the recommended acceptability of the alternative materials/methods, and request Navy approval prior to the use and/or acceptance of the materials/methods.

- Copies of the test results will be provided to the project team for validation as applicable. The QCM also will verify that each item supplied conforms to the specifications.

- Results of any on-site testing will be provided to the QCM for review. Upon request, the QCM will forward this information to the Navy ROICC for information only.

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5.0 SPECIAL INSPECTIONS AND TESTING

In addition to implementing the three phases of control system to ensure the overall quality of each definable feature of work (DFOW), ITSI Gilbane will make use of formal testing and inspection procedures where applicable—including tests performed by subcontractors and/or off-site laboratories—to ensure conformance to applicable specifications and verify that control measures are adequate to provide a finished product that conforms to contract requirements.

5.1 SPECIAL INSPECTIONS AND TESTING PLAN AND LOG

Inspections and tests, as necessary, will be performed during field work as part of the overall QC activities and as required by the applicable technical specifications. All inspections and tests will be noted on the Daily Activity Report and Daily QC Report (Attachment 3).

NOTE: Sampling and analyses associated with the site characterization are described in the SAP (Attachment 1 to the Execution Plan, ITSI, 2013). The Special Inspection and Testing Plan and Log (Attachment 3) will be updated as necessary.

ITSI Gilbane will provide the Navy with 24-hour notification prior to the on-site testing. The ITSI Gilbane QCM will be on site during testing activities and will document tests and areas of testing. The QCM will also verify that the third-party testing agency provides adequate and certified equipment to be used during any testing activity. Testing includes operation and/or acceptance tests when specified. ITSI Gilbane will perform the following activities and record and provide the following data:

- Verify that testing procedures comply with contract requirements;
- Verify that facilities and testing equipment are available and comply with testing standards; and
- Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

Results of all on-site tests taken, both passing and failing tests, will be recorded on the Daily QC Report for the date taken, as well as the Testing Plan and Log. Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. If approved by the CO, actual test reports may be submitted later with a reference

to the test number and date taken. An information copy of tests performed by an off-site or commercial test facility will be provided directly to the Navy.

The types of testing and methods of testing/inspection expected to be implemented for this project are described in the SAP which is Attachment 1 of the Execution Plan (ITSI, 2013), and herein.

5.2 EQUIPMENT INSPECTIONS

Inspection requirements are outlined in the SSHP. The SSHO, QCM, or designee will verify that equipment vendors and subcontractors provide safety equipment checklists with each piece of equipment used on the site. Operators using the equipment will also maintain daily inspection records of each piece of power equipment and machinery used on site. Equipment inspection forms are provided in the SSHP.

6.0 TRACKING DEFICIENCIES

The QCM will review any instances where materials, components, assemblies, or equipment or activities fail to meet the specified requirements, and will take appropriate action to prevent future occurrences. All ITSI Gilbane and subcontractor personnel will be responsible for bringing [potential non-conformances to the attention of the Site Superintnendent or QCM. Client complaints and requests for corrective action also will be documented and routed to the PM or QCM, as appropriate.

6.1 DEFICIENCIES

A "deficiency" is defined as any item, part, product or activity with one or more characteristics that depart from the relevant specification, drawing, or other approved method of description, thus making the material, workmanship, or equipment potentially unfit for use.

The QCM will review these occurrences and will take appropriate action to remediate these occurrences and prevent future reoccurence.

Most deficiencies can be corrected during the process of the work through the PQCM's direct interaction with workers and prior to acceptance of the feature of work encompassing the deficiency. Those deficiencies will be tracked through the use of a Rework Item List. Items recorded on the Rework Items List will be assigned a sequential number. The notation in the list will include the location and a concise description of the deficiency, and will indicate the PQCM's verification of the corrective action. (A copy of this form is included in Attachment 3).

6.2 NONCONFORMANCES

A deficiency will be categorized as a "nonconformance" when it adversely affects any of the following:

- Health and safety
- Performance, durability, and longevity
- Reliability or maintainability
- Appearance (when a factor)

A Nonconformance will be addressed in the following manner:

- The portion of work that is affected by the nonconformance will be stopped.

- The entity responsible for the work or item will be officially notified in writing of the nonconformance (see Nonconformance/Corrective Action Request form in Attachment 3).

- The responsible entity will determine causes and develop Corrective and Preventive Actions.

- The PQCM and PM will review and, when acceptable, approve the proposed actions.

- The corrective actions will be implemented by the resposnible entity and verified by the QCM before the impacted work, other than corrective measures, resumes..

Poor performance by workers, subcontractors, or suppliers will be documented and reported, and may result in termination of an individual's or company's services.

6.3 CORRECTIVE AND PREVENTIVE ACTION

The extent of corrective or preventive action taken will be commensurate with the magnitude of the condition and the associated risk factor(s). Corrective and preventive actions will be based on thorough examination of root causes.

After identification and correction of each deficiency, verification inspections will be performed as appropriate to verify the effectiveness of the corrective/preventive measures implemented.

6.4 PROCEDURES FOR TRACKING LABORATORY DEFICIENCIES

Laboratory testing requirements for chemical analyses, and procedures for identifying and managing any deficiencies, are addressed under the SAP (Attachment 1 of the Execution Plan) for this project.

7.0 DOCUMENTATION

A variety of documents and certifications will be developed at specified points or intervals during the course of the project to support the QC process. These items will be submitted to the Navy or maintained by ITSI Gilbane and available for review, as required. QC-related project documentation may include:

- Testing Plan and Log (see Section 5)
- Daily Quality Control Reports (see Attachment 3)
- Three Phase Control Checklists (Preparatory, Initial, and Follow-up; see Section 9 and Attachment 3)
- QC meeting minutes
- Rework Items List (see Section 6.0)
- Nonconformance/Corrective Action Reports (see Section 6.0 and Attachment 3)
- Material Receipt Inspection Checklists
- As-built drawings.

The following subsections briefly describe the elements of QC documentation that are not discussed in separate sections of this CQC Plan. Copies of the referenced QC forms are included in Attachment 3.

7.1 DAILY REPORTS

A Daily Production Report and Daily Quality Control (DQC) Report will be prepared for each day that work is performed at the site, and will account for each calendar day throughout the life of the contract.

The DQC Reports will be completed and signed by the QCM or his designee and will be submitted to the Navy ROICC by 10:00 a.m. the following work day. Copies of the DQC Reports and Daily Production Reports will be forwarded to the PM at the end of each work week.

Typically, the DQC Report will include the following information:

- Preparatory or Initial Phase meetings and inspections with completed checklists provided as attachments

- Follow-up inspections performed on ongoing DFOW;
- Any tests, inspections, or other QC activities performed, with results and references to specifications/drawings or other requirements with test and inspoection results as attachments.
- Deficiencies identified or corrected that day.

Each QC Specialist will prepare a report for each day that work is performed in his or her area of responsibility. These reports will include the same documentation requirements as the DQC Report for the applicable area of responsibility. QC Specialist reports will be signed and dated by the QC Specialists and attached to the DQC Report prepared for the same day.

The Daily Production Report will be completed and signed by the Site Superintendent, and attached to the DQC Report. The Daily Production Report will include the following information:

- Weather conditions
- ITSI Gilbane and subcontractor personnel on site
- Health and safety information
- List of materials received
- List of equipment on site
- Description of field activities performed
- Summary of data collected
- List of work planned for the following day
- Brief summary of issues discussed or concerns
- List of visitors
- Changes from plans and specifications.

7.2 QC MEETINGS AND MEETING MINUTES

Prior to the start of field activities associated with this project, ITSI Gilbane will schedule a pre-construction meeting with the Navy to review the QC requirements for this TO, and establish a mutual understanding of the QC details for the TO. These QC details will include documentation and observation of on-site work (e.g., field activities at HPNS) and off-site work. In addition, this meeting will address interactions between ITSI Gilbane and the Navy with regard to managing the project and completing services consistent with this CQC Plan.

After the start of field activities for the radiological data gap survey, the Project QC Manager will conduct weekly QC meetings at the work site with the Site Superintendent/Project Geologist, QC Specialists, and the subcontractor foremen who are performing the work on the current DFOWs. The CO or COR also may attend these meetings.

As a minimum, the following will be accomplished at each QC meeting:

- Review the minutes of the previous meeting
- Review the schedule and the status of work and rework
- Review the status of submittals
- Review the work to be accomplished in the next 2 weeks and documentation required
- Resolve QC and production problems (pending requests for information, etc.)
- Address items that may require revising or providing an addendum to the CQC Plan
- Review the Accident Prevention Plan and/or Activity Hazard Analysis (AHA) and RPP
- Review environmental requirements and procedures
- Review the following, as applicable: Execution Plan (ITSI, 2013), Waste Management Plan, Radiological Material Management Plan, Dust Control Plan, Stormwater Pollution Prevention Plan, status of HPNS Radiation Awareness training and completion; CQC Plan and progress

The QC Manager will prepare the minutes of the meetings and provide a copy to the CO within 2 working days after the meeting. Copies of the minutes for all meetings will be maintained at the site for reference.

7.3 QUALITY CONTROL VALIDATION

The QC Manager will establish and maintain a series of three-ring binders or folders, divided and tabbed, containing the information listed below. These binders will be readily available to the client during all business hours, and will include the following at a minimum.

- All completed Preparatory and Initial Phase Checklists, arranged by specification section.
- An up-to-date copy of the Special Inspection and Testing Plan and Log with supporting field test reports, arranged by specification section or DFOW.
- Copies of all contract modifications, arranged in numerical order, along with documentation that modified work was accomplished.
- An up-to-date copy of the Rework Items List.

- Copies of QC meeting minutes, arranged by date.
- Up-to-date copies of all punch lists issued by the QC staff to the contractor and subcontractors and all "punch lists" issued by the Navy.
- (As appropriate) Other QC-related correspondence, test reports and notes, arranged by date.

7.4 AS-BUILTS

The ITSI Gilbane Site Superintendent/Field Team Leader or QCM will mark up the site characterization drawing or field activities specifications when deviations from these documents occur. These mark-ups will be used in preparing "as-built drawings" associated with the completed site characterization field activities for submission at the end of the project. Upon completion of work, the QC Manager will furnish a certificate attesting to the accuracy of the as-built drawings prior to submission to the CO. Survey data may also be used to verify locations.

7.5 PHOTOGRAPHIC RECORD

Photographic documentation of project activities will be maintained for the duration of the project, using a digital camera in JPEG (or equivalent) format. Photographic images will be archived, and selected representative electronic copies will be provided to the Navy following completion of the project.

7.6 TECHNICAL COMPLETION REPORT

Following completion of field activities and site restoration, the contractor will prepare internal draft, draft, and final versions of a Technical Completion Report. The report will summarize the work performed, present the analytical results for soil and material sampling, along with radiologic survey results and provide a photographic record of the project.

8.0 DEFINABLE FEATURES OF WORK

A DFOW is a representative portion of work that is separate and distinct from any other stage of work. Five definable features of work have been identified for this project, as outlined in the following subsections. The project schedule is included in the Execution Plan (ITSI, 2013). Identified below is the specification section(s) from the SOW for this TO associated with each DFOW (Attachment 4 presents the SOW for this TO). All activities associated with the Parcel D-1 Phase II Radiological Remediation and Support will be conducted in accordance with the Execution Plan, SAP, and associated documents that were prepared specifically for this project. These plans provide specific methods and requirements for implementation of the DFOWs.

8.1 DFOW 1: UTILITY SURVEY AND FINAL WALK THROUGHS

Preparation for site work will include utility surveys including final walk throughs and punch lists. HPNS facility staff, along with the Navy CSO, Navy ROICC, and BRAC Project Manager (BRAC PM), will be notified of intended the dates for fieldwork at least 48 hours prior to the start of field activities. This DFOW is part of Sections 2.3.4 and 2.5.1.1 in accordance with the SOW for this TO.

8.2 DFOW 2: EXCAVATING SOIL, REMOVING PIPING SYSTEMS, AND TRANSPORT AND DISPOSAL

Excavation of soil (above and below the sewer pipes) and overexcavation along with the removal of pipes are included in this DFOW. Other activities include tracking of excavated soil transported to an RSY, associated dewatering and dust control, and soil management until its released from the RSY and operation of the temporary soil storage transfer area. Transport of soil from the RSY pads and the temporary soil storage transfer areas to the trenches or into bins or stockpiles is included in this DFOW. This DFOW is part of Sections 2.5.1.2 of the specified SOW for this TO. Transport and disposal of railroad ties in accordance with Section 2.5.3 of the SOW are included in this DFOW.

8.3 DFOW 3: CIVIL SURVEYS, IDENTIFICATION, AND TRACKING

Land civil surveys, identification, and tracking removed sewer trenches and intact pieces of trench pipe using consistent methodologies as used by the current basewide radiological contractor, and tracking each load of excavated soil from the trenches and the railroad ties are

included in this DFOW. This DFOW is part of Sections 2.5.1, 2.5.2, and 2.5.3 of the specified SOW for this TO.

8.4 DFOW 4: BACKFILL AND SITE RESTORATION

Soil that meets the criteria specified in the SAP and reused as backfill material within trenches or procured from an off-site source, reuse of recycled asphalt and roadbase, bridging material at the groundwater table, and site restoration activities within Parcel D-1are included in this DFOW. This DFOW is part of Section 2.5.1.4 of the specified SOW for this TO.

8.5 DFOW 5: RADIOLOGICAL SURVEYS AND SAMPLING

Radiological surveys of accessible areas using scintillation detectors, associated data logging, gamma scan surveys, gamma spectroscopy, and laboratory sampling and analysis are included in this DFOW. Surveying at the sewer and storm drain removal areas, Naval Radiological Defense Laboratory (NRDL) Site Area, Ship Berths and rail tie area stockpiles as described in Section 2.5.1.3, 2.5.2, and 2.5.3 of the specified SOW for this TO.

9.0 THREE PHASES OF CONTROL/DOCUMENTATION

The QC Manager will use the three-phase method of control during implementation of this project to ensure the quality of workmanship and results. Three phases of QC will be applied to each DFOW outlined in Section 8. Each of the three phases of control as described in this section, and other QC-related activities, will be documented on the appropriate forms, and noted on the DQC Report.

9.1 PHASE 1: PREPARATORY PHASE

A preparatory phase meeting will be held and an inspection performed before work begins on each DFOW, after all required plans, documents, and materials are approved or accepted, and after copies of the plans and documents are at the work site. The QCM will notify the Navy at least 48 hours in advance of the preparatory phase meeting. At this meeting, the ITSI Gilbane QCM, Site Superintendent/ Field Team Leader, and any QC Specialists involved with the DFOW will meet with the Navy's representative(s) and foremen or management representative for each subcontractor involved in the feature of work.

The preparatory phase meeting will include, but is not be limited to, the following activities.

- Review each applicable paragraph of the specifications applicable to the DFOW (reference to SOW).
- Review applicable sections of the Execution Plan (ITSI, 2013) and contract drawings.
- Review established provisions for required control inspections and testing.
- Review testing procedures to be implemented during the DFOW.
- Examine the work area to assure that all required preliminary work has been completed and is in compliance with the contract.
- Examine required materials and equipment to assure that these items are on hand, conform to approved drawings or submitted data, and are properly stored.
- Review the appropriate AHA to assure safety requirements are met.
- Discuss procedures for controlling the quality of the work, including repetitive deficiencies.
- Verify that the portion of the plan for the work to be performed has been accepted by the CO/COR.

Each preparatory phase meeting will be recorded on the Preparatory Inspection Checklist form, and noted on the DQC report form.

9.2 PHASE 2: INITIAL PHASE

An initial phase inspection/meeting will be completed as work begins on each DFOW. The QCM will notify the Navy a minimum of 24 hours prior to the beginning of the initial phase meeting. Initial Phase activities will include the following, as required.

- Review minutes of the preparatory meeting.
- Establish the level of workmanship required for the DFOW and verifying that it meets minimum acceptable workmanship standards.
- Check work performed to ensure that it is in full compliance with contract requirements.
- Review the minutes of the preparatory phase meeting.
- Verify the adequacy of QC procedures to ensure full contract compliance.
- Verify that required control inspections and testing procedures are in place.
- Compare work with required sample panels (as applicable).
- Resolve all differences between specifications and performance.
- Check work safety procedures and review the SSHP and appropriate AHA to ensure that applicable safety requirements are met; upgrade the AHA if required.
- Review the project schedule with each worker involved in the DFOW.

Each initial phase inspection will be recorded on an Initial Phase Inspection Checklist form, and these documents will be submitted with the DQC Report.

9.3 PHASE 3: FOLLOW-UP PHASE

The follow-up phase applies to DFOWs and consists of continuing checks to ensure that all requirements of the contract that are applicable to the DFOW are being met. After the initial phase meeting has been conducted and work has started on the DFOW, the QC Manager will document in the DQC Report all control activities that are implemented to provide compliance with contract requirements applicable to that particular feature of work, including each follow-up inspection.

Any deficiencies in quality, workmanship, material, equipment, or supplies, and any unauthorized deviations from engineering requirements or specifications, will be recorded on the

DQC Reports. Each deficiency will then be tracked until corrected, as described in Section 6.0. The QC Manager has the full authority to act directly with both ITSI Gilbane and subcontractor personnel to correct minor deficiencies.

Follow-up phase activities include, but are not limited to, confirming that:

- Workmanship continues to meet specifications and requirements;
- Deficiencies have been corrected prior to the initiation of additional features of work that may be affected by the deficient work; and
- All deficiencies have been corrected before a pre-final or final inspection has been requested.

Additional preparatory and initial phases will be conducted for a deficiency if the quality of ongoing work remains or becomes unacceptable.

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10.0 PROCEDURES FOR FINAL INSPECTIONS

10.1 PUNCH LIST INSPECTION

Near the completion of all work on the project, or any increment established by a completion time in the TO, the QCM will prepare a "punch list" of items that do not conform to the approved specifications or drawings. Items included on the Rework Items List that have not been completed will be included on the punch list. The punch list will include the estimated date by which the deficiencies will be corrected. A copy of the punch list will be provided to the CO/COR. The QCM will make follow-on inspections to ascertain that all deficiencies have been corrected.

10.2 PRE-FINAL INSPECTION

Following correction of the deficiencies identified on the punch list, the Navy will be notified that the specified work is ready for a pre-final inspection. The QCM and the ROICC or designee will conduct the pre-final inspection. Following this inspection, the Navy may prepare an action items list of items that must be corrected prior to the final inspection by the Navy. Any items noted during the pre-final inspection will be corrected in a timely manner, and will be accomplished within the time slated for completion of all work, or any increment thereof if the project is divided into increments with separate completion dates.

10.3 FINAL INSPECTION

The QCM will notify the ROICC at least 5 days prior to the desired final inspection date that all specific items previously identified to ITSI Gilbane as unacceptable, along with any remaining work to be performed under the contract, will be complete and acceptable by the date proposed for the final inspection.

The final inspection will be formally scheduled by the ROICC based upon the results of the pre-final inspection. The QCM and the ROICC will be present during the final inspection. Additional Navy personnel may also attend. If the final inspection is satisfactory, the Navy ROICC and RPM will issue a formal acceptance of the work.

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11.0 REFERENCES

ITSI Gilbane Company (ITSI Gilbane), 2013. *Execution Plan, Phase II Radiological Remediation and Support, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, CA.* January

ITSI Gilbane Company (ITSI Gilbane), 2013. *Site-Specific Health and Safety Plan, Phase II Radiological Remediation and Support, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, CA.* January

U.S. Army Corps of Engineers, 2008. *Safety and Health Requirements Manual*, EM 385-1-1. November.

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TABLES

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Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
Corporate QA/QC Director	• Reports directly to the Executive Vice President with direct communication with ITSI Gilbane's President for resolving QA/QC issues. • Responsible for audits and general oversight of companywide QA/QC program. • Provides guidance and support to QC Program Managers and Project QC personnel, and assists with resolution of QC issues that cannot be resolved at the project or program level. • Approves project QC Manager designees in the absence of the QC Program Manager. • Has full authority to require corrective actions and stop work on any portion of a task if it does not conform to the standards or specifications established for the program and/or project.
Quality Control Program Manager	• Reports directly with the ITSI Gilbane Corporate QA/QC Director. • Works closely with the Program Manager to assure compliance with the contractwide QC program, and has direct access to ITSI Gilbane Executive Vice President if needed to resolve issues that require escalation. • Develops, implements, manages, and enforces the Ccontractwide QA/QC Program. • Implements and documents program-level quality control activities. • Conducts QC audits, internal QC system audits, and system checks to ensure that QC controls and documentation are in place; identifies nonconformances and recommends corrective actions. • Directs and approves any changes to the program data management and/or quality management plans. • Reviews project QC plans for adherence to the program quality management plan and project-specific requirements prior to submission.

Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
	• For each TO, appoints a Project QC Manager whose qualifications meet the requirements specified in the contract, the TO, and/or ITSI Gilbane guidelines. • Oversees implementation of program- and TO-specific QC requirements by the designated project-level field QC representatives. • Readily available for consultation with the client and project QC personnel during the TO activities. • Has full authority to stop work on any portion of a task if it does not conform to the standards or specifications established for the program or TO. • Has completed the *Construction Quality Management for Contractors* course, and will maintain this certification while serving as QC Program Manager.
Program Manager	• Serves as the primary point of contact for the client regarding contract management. • Supports the Project Manager in identifying and assigning required resources. • Assists with resolution of any project-related issues when needed. • Works closely with the QC Program Manager and Project Managers to assure compliance with the contractwide QC Program.
Project Quality Control Manager	• Appointed by the QC Program Manager. • Reports directly to the QC Program Manager in implementing, managing, and enforcing the approved CQC Plan, and will not be subordinate to the Project Manager, Site Superintendent/Project Geologist. • May prepare and will review the project CQC Plan. • Maintains a copy of the approved CQC Plan on the project site and will be available to project and client personnel during all work hours. Issues copies of the approved CQC Plan to project QC staff. • Has primary responsibility for project-level quality control, including enforcing and managing all QC field operations,

Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
	protocols, and documentation; responsible for implementation of the three phases of contol system; reviews and approves submittals; oversees QC field personnel; ensures that testing is performed and documented as specified by QC Specialists, laboratory personnel, and any other inspection and testing personnel; and provides QC certifications and documentation as required in the contract and TO. • Works closely with the QC Program Manager to conduct QC audits; ensure that QC controls and documentation are in place; and identify any nonconformances, and recommend/oversee necessary corrective actions. • Works closely with the Site Superintendent/Project Geologist and Project Manager to assure the quality of work on the project. • Attends or conducts the CQC Plan meeting, the coordination and mutual understanding meeting, and any partnering meetings; and conducts the project QC meetings. • Completes and/or approves DQC reports, weekly QC meeting minutes, project submittals, Rework Items List, and as-built records, as required. • Has full authority to stop work on any portion of the task that does not conform to the standards or specifications established for the TO. • Responsible for managing and coordinating all QC documentation submitted by the project QC Specialists, testing laboratory personnel, and any other inspection and testing personnel. • Must have a minimum of 5 years of combined experience as a Superintendent, Project Manager, and/or QC Manager on projects similar in type and scope to the designated TO, with at least 2 years' experience as a QC Manager. • Must be familiar with the requirements of EM 385-1-1, and have experience in the areas of hazard identification, safety compliance, and sustainability. • Will have completed the *Construction Quality*

Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
	Management for Contractors course, and will maintain this certification while serving as QC Manager.
Alternate Project Quality Control Manager	• Appointed by the QC Program Manager to serve in the designated QC Manager's absence. • The responsibilities of, and qualification requirements for, the Alternate QC Manager are the same as for the Project QC Manager, as outlined above.
Project Manager	• Develops task requirements with technical representatives; implements project-specific plans within the project schedule; and maintains and manages the budget. • Responsible for providing a quality product and meeting all contract requirements and oversees compliance with normal safety procedures and regulatory requirements. • Submits a copy of the general description of the work with the names and qualifications of the QC personnel proposed for the project to the QC Program Manager. • Reviews draft QC Plans for adherence to the program quality management plan and project-specific requirements prior to submission. • Works closely with the Site Superintendent/Project Geologist, and Project QC Manager on QC-related matters
Quality Control Specialists	• May be designated by the Project QC Manager for areas of work that are of sufficient complexity or size to justify specific technical expertise.. • Assist and report to the Project QC Manager; ensures that QC requirements are maintained. • Provide appropriate documentation, testing, and verifications, including three phases of control, for each DFOW in their area(s) of responsibility, as assigned. • Attend the coordination and mutual understanding meeting and applicable QC meetings. • Meet qualifications specified in the Contract, the TO, and/or the project CQC Plan, based on the tasks and responsibilities assigned. May perform other tasks, as assigned.

Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
Site Superintendent/ Field Team Leader	• Designated by and reports to the Project Manager. • Works closely with the Project QC Manager, Project Manager, and client representatives to assure that the work is performed in compliance with the CQC Plan, Execution Plan, and drawings and and specifications, as applicable. • Has the authority to stop work if contract or TO requirements are not being met. • Must meet all training and experience requirements specified in the contract and TO.
Project Chemist/ Laboratory Coordinator	• Designated by and reports to the Project Manager. • Works closely with the Project QC Manager, Project Manager, and client representatives to assure that the work complies with the SAP. • Coordinates flow of all sample results from the on-site and off-site laboratory. • Coordinates transfer of analytical to the LLRW waste disposal contractor
Data Manager	• Designated by and reports to the Project Manager. • Works closely with the Project QC Manager, Project Manager, and client representatives to assure that the data is tracked for the initial survey, SS/SD construction process and the RSY pads. • Coordinates activities pertaining to survey of rail ties and data from the ship berth and NRDL areas
Certified Health Physicist	• Designated by and reports to the Project Manager. • Works closely with the Project QC Manager, Project Manager, and client representatives to assure that the work is performed in compliance with the RPP, and supporting guidelines. • Coordinates investigations for each phase of work and guidance on radiological protection issues. • Must meet all training and experience requirements

Table 1

ITSI Gilbane Quality Control Team Responsibilities

ITSI Functional Title	Responsibilities and Relationships
	specified in the contract and TO.

FIGURES

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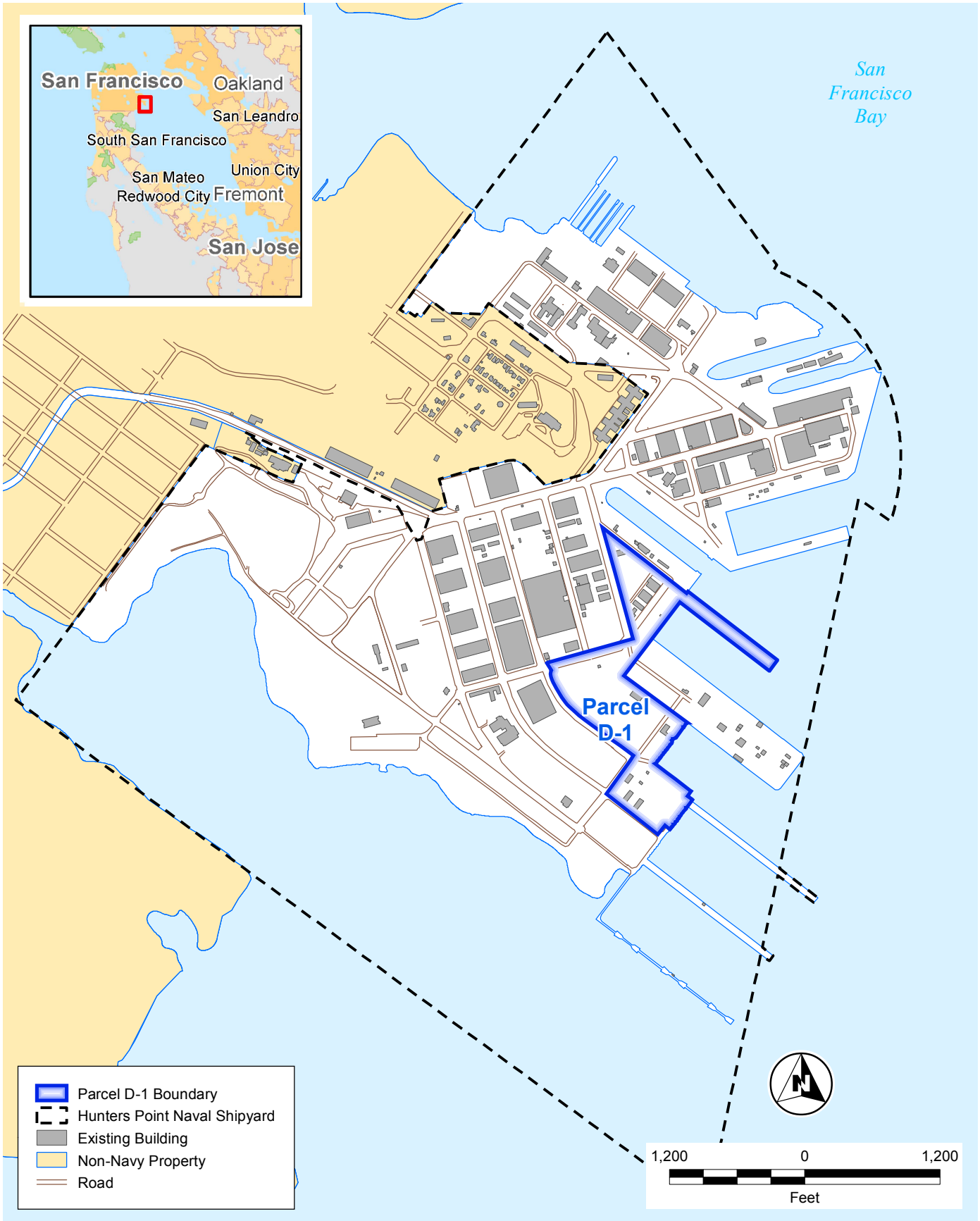

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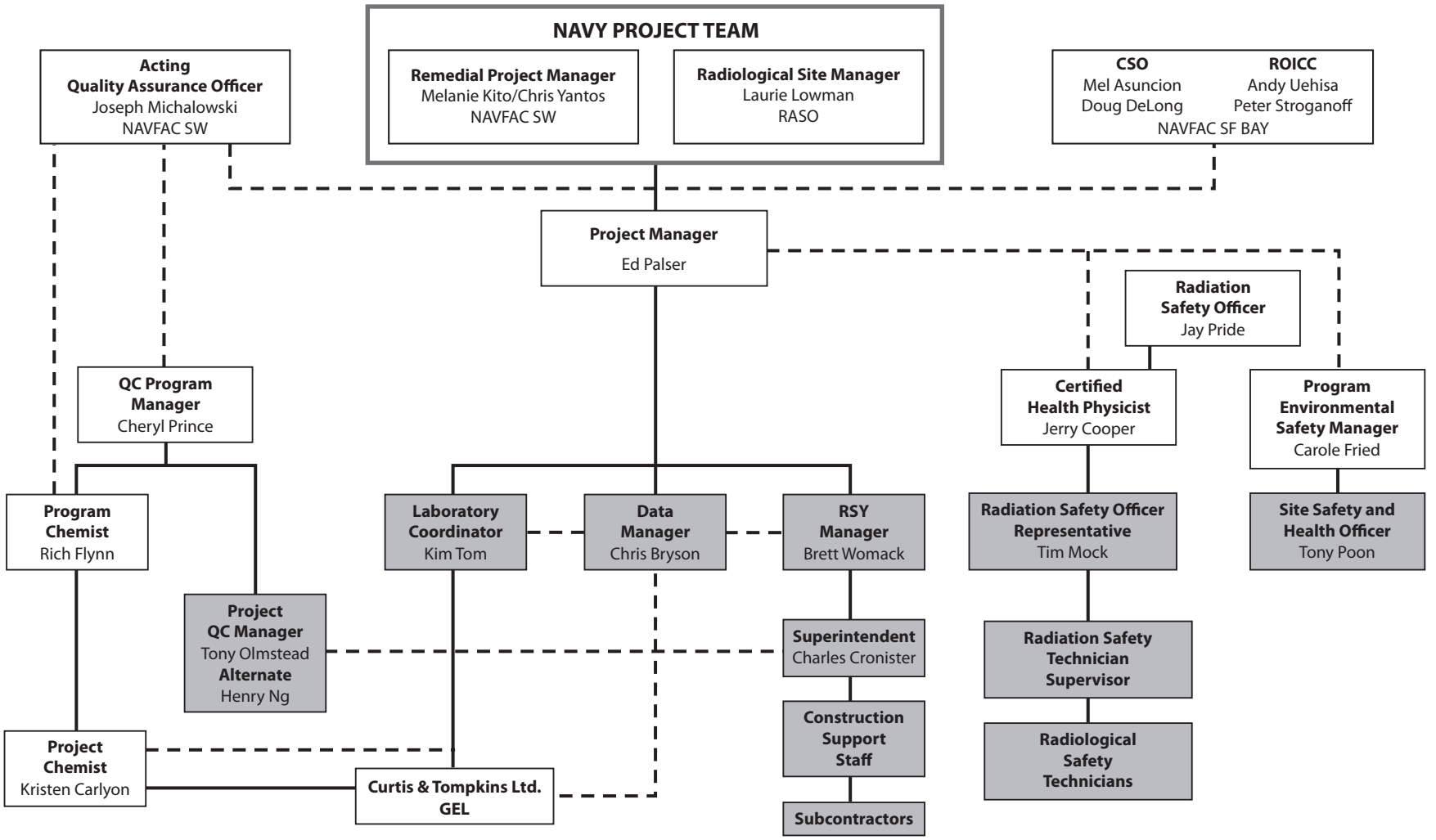
ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Parcel D-1 Vicinity Map



Abbreviations and Acronyms:

CSO - Contractor Site Officer
NAVFAC SW - Naval Facilities Engineering Command Southwest
RASO - Radiological Affairs Support Office
ROICC - Resident Officer in Charge of Consturction
RSO - Radiation Safety Officer
RSY - Radiological Screening Yard
QC - Quality Control
SF - San Francisco

Formal reporting relationship
Supporting relationship

Staff in shaded boxes are on-site and responsible for field implementation of activities under the Execution Plan.

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2
Project Organization Chart

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ATTACHMENT 1

QC APPOINTMENT LETTERS, RESUMES, AND CERTIFICATIONS

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ITSI Gilbane

January 4, 2013

Mr. Tony Olmstead
ITSI Gilbane Company
2730 Shadelands Drive
Walnut Creek, CA 94598

via email: Tolmstead@itsi.com

Subject: Appointment of Project Quality Control Manager
NAVFAC SW RAD EMAC Contract N62473-10-D-0808 TO 0004
Parcel D-1 Phase II Radiological Remediation and Support
Hunters Point Shipyard, San Francisco, CA
ITSI Gilbane Project 07204.0004

Dear Mr. Olmstead:

You are appointed Quality Control Manager (QCM) for the above-referenced project. Your responsibilities and duties are described in the Contractor Quality Control (CQC) Plan approved by ITSI Gilbane for this project.

You are responsible for implementing the CQC Plan and for providing quality inspections to ensure work is performed in accordance with the plan and with Contract specifications. You are authorized to certify and/or approve submittals in accordance with the plans and specifications in this Contract. You have the responsibility and full authority to stop work on any portion of work that does not conform to the project contract documents.

You are to report directly to me on quality matters. If you require any other information, please do not hesitate to call me. You can reach me at 925-946-3334 (office), 925-457-7808 (cell), or by e-mail at cprince@itsi.com.

Sincerely,

Cheryl D. Prince
ITSI Corporate QA/QC Director

CDP/cmn

Mr. Ed Palser, ITSI Gilbane Project Manager
Mr. Arvind Acharya, ITSI Gilbane Program Manager

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Tony Olmstead–Site Superintendent/QC Manager

Highlights:
▪ Licensed General Contractor with 22 years of experience in the construction industry with airfield expertise. ▪ Provides Quality Control management through responsibilities as Site Safety Officer (SSO) and leadership as Site Superintendent for airfield and environmental projects for various Government agencies. ▪ Leverages expert knowledge of Quality Management practices required for airfield construction, environmental remediation. ▪ Facilitates daily Quality and Safety meetings, leads work crews with emphasis of achieving zero lost work time through implementation of Plan-of-the-Day quality requirements and safety protocols. ▪ Responsible for contractual compliance for safety and quality reporting for federal, state, and local agencies for all airfield design, documentation, and reporting. ▪ Certified USACE Construction Quality Management (CQM) (2005/2010) for Contractors, implementing proven three-phase approach for all projects.

Licenses/:	Years of Experience:
Licensed General Contractor, CA #833959	22 years With ITSI – 12
Active Registrations/Certifications:	**Affiliations:**
USACE Construction Quality Management (CQM) for Contractors, 2005, 2010 Qualified Stormwater Practitioner (QSP), August 2011	N/A
Training:	**Employment History:**
ACI Concrete Field Testing Technician – Grade I 40-hour HAZWOPER, 2007 16-hour HAZWOPER Site Supervisor Training HAZWOPER 40-Hour Initial Training and 8-Hour Annual Refreshers HAZWOPER 16-Hour Site Supervisor Training CPR/First Aid Training OSHA 30-Hour Training Lead Technical Training, CA Rad Awareness Training Asbestos Awareness training	2000 – Present: ITSI 1995 – 2000: Foreman, Remodeling Industry 1990 – 1995: Head Maintenance Engineer, Pacific Gateway Properties

Project Experience:

Mr. Olmstead is a Quality Control (QC) Manager with 22 years of management and supervision experience in the construction industry. He has served as General Contractor, Site Superintendent, Site Safety Officer (SSO), and Quality Control Manager on projects valued at more than $150 million, with project emphasis on various military installations and Navy/Air Force Base locations. He manages subcontractors and craft trades ensuring quality work is safely accomplished. He leads Plan-of-the-Day and safety tailgate meetings to review quality requirements and safety protocols for daily work scheduled. He directs work crews and monitors construction compliance with the contract, collaborates with client to ensure the Project Safety Plan and all safety procedures are followed. He conducts safety audits, and implements, monitors, and documents implementation of corrective measures.

As a registered Qualified Stormwater Practitioner (QSP) in California, Mr. Olmstead oversees Best Management Practices (BMP) for stormwater control and provides daily reports. Measurable rain events are documented as he oversees the effectiveness of BMP to complete sampling and analysis. He provides required reports, documenting compliance with stormwater control procedures. Mr. Olmstead is proficient with all instrumentation needed to collect, monitor, and interpret air quality and ancillary inspections. He facilitates meetings with the client and all stakeholders to coordinate community relations activities, providing reports, progress information, and logistics plans for project sites that impact nearby communities. Relevant experience is described below.

Site Superintendent/QCM, Basewide Radiological Support, Former Concord Naval Weapons Station; 2012. Mr. Olmstead provided QC management, site supervision and safety operations for radiological surveys based on previously conducted Historical Radiological Assessment (HRA) at CNWS. He performed QC oversight for characterization, Final Status Survey (FSS) at six depleted uranium (DU) munitions magazines, 35 special weapons

storage areas, and eight buildings on the premises. He also led the biological decontamination, asbestos removal, and MARSSIM surveys using portable scanning technology systems for both horizontal and vertical surveys. Daily QC reports and graphical packages were developed for each survey unit/room for RASO review which included ESRI ArcMap packages. He interfaced with the ROICC and led weekly QC meetings to provide the Navy with maps illustrating exact location of radiological contaminants. He led QC processes, inspection, and monitored progress activities in support of the basewide radiological surveys at CNWS.

Site Superintendent/QCM/SSO, Environmental Restoration Program, Performance-Based Restoration Program, Travis Air Force Base, CA. 2009, 2011-2012. Mr. Olmstead provided QC management, site supervision and safety operations for environmental program on Travis AFB. He led QC processes, inspection, monitored maintenance activities in support of CERCLA documents following removal and disposal of contaminated sediment and grubbing piles. He directed and managed 22 people from four separate business craft/trade subcontractors, including trucking and material supply. Mr. Olmstead managed ITSI Gilbane craft and labor force executing excavation, maintenance of stockpile, erosion control, and restoration work. He also provided abatement plans and facilitated program to remove contaminants including PCBs, dioxins, and arsenic. He facilitated the daily Plan-of-the-Day and safety tailgate meetings provided specific training and awareness of the daily project procedures to adhere to compliance policies. He provided asbestos awareness training for tasks that involved demolition of transit pipelines, with specific requirements to inspect and monitor for possible asbestos material. He managed, established and maintained project decontamination/reduction zones and waste storage areas, demolition and stockpiling of concrete and asphalt for reuse. Mr. Olmstead managed site restoration, including backfilling excavations with clean fill, including the regrading, and hydroseeding process. The project was completed on schedule and within budget and with no safety incidents. He was instrumental in achieving Land Use Controls (LUC) of unrestricted areas, above the industrial levels targeted by the Owner.

Site Superintendent/QCM.SSHO, Underground Pipeline Removal, [Former] Redding Army Airfield, Redding, California, CA. 2008. Mr. Olmstead provided QC management, led site operations and safety and health processes while directing for the pipeline removal project on the former Redding Army Airfield. He managed the removal and disposal of aviation fueling points and associated pipelines, fuel pit boxes, concrete vaults, and underground fuel pipelines at various airfield locations. The excavations process was phased to provide quick turnaround, maximizing schedule efficiency. The project required confirmation sampling, prompt backfilling and restoration to avoid erosion or ponding, mitigating any impact to the airfield flight line. QC management was critical to assure scheduled activities were coordinated and all events were in compliance with the contract. Mr. Olmstead identified and established the decontamination and waste storage area, utilizing his QC and SSO expertise. He managed and monitored the process required to separate hazardous materials and construction debris. He facilitated and monitored the transportation and disposal methods to assure compliance with contract and environmental regulations. Mr. Olmstead implemented the innovative process to assist soil compaction through placing a geomat onto the project site. Rock and dry fill covered the geomat prior to paving. Mr. Olmstead managed this process providing innovative project enhancements to maximize efficiency and project results. He facilitated and led the Plan-of-the-Day and safety tailgate meetings, providing a proactive approach to assure quality and safety plans. While the airfield needed to maintain schedule and be fully operational, detailed schedules were utilized for specific work projects and not interfere with airfield flightline. This required additional coordination with staff and operations, facilitating meetings to ensure work progress was continuously available. Special attention was given to provide adequate notification and lead efforts to ensure safe procedures and protocols for work near an operating flightline. Mr. Olmstead managed the site safety and project quality, schedule, budget and coordination of all work, including craft and local subcontractors. The project met schedule and budget and had zero safety incidents.

Site Superintendent/QC Manager, Point Molate Naval Fuel Depot, Richmond, California Closed UST and Fuel Pipelines, CA. 2007. Mr. Olmstead provided QC management and managed specialty subcontractor and crew performing Underground Storage Tank (UST) demolition and closure under confined space entry protocol on City of Richmond property. The property was contiguous to the Chevron Richmond Refinery at Point Molate. He coordinated with the Safety Officer to direct and manage the safety of crews entering and surveying each UST. He managed the project requirement efforts including measuring the depth of standing water, and collecting water samples for waste characterization analysis. Additional project requirements consisted of collecting core and coating samples to test for asbestos and lead. Mr. Olmstead facilitated the daily Plan-of-the-Day meetings, proactively supporting the implementation of daily safety meetings, safety inspections, safety audits, and ensured compliance

for required safety protocols for confined space. The site was close to residential walking trails, requiring stringent safety procedures to be integrated including equipment use, vehicle traffic safety and pedestrian safety. He was instrumental in coordinating with the Navy's Community Involvement Plan, providing key staff with daily information. The site was extremely successful by achieving structural closure ahead of schedule, within budget and with zero safety incidents.

Site Superintendent/QC/SSO, AMCO Chemical Superfund Site, Alameda, CA. 2009 – 2012. Mr. Olmstead provided QC management, led the stringent Site Safety programs, and the managed the air monitoring requirements for the AMCO contract. He provided support of the feasibility study and subsequent pilot plant tests. The project required innovative remedies to eliminate, reduce, and controls risks to human health and to the environment. The remedies needed to be in compliance with the Record of Decision (ROD). The site was hazardous and required remedial action. The corroded storage tanks were leaking chemical spillage, including vinyl chloride, into the soil. This was extremely hazardous with the close proximity of public housing that bordered two sides of the property and a public road bordering the third. He facilitated the required actions to gather and analyze air sampling while continually monitoring the site, the wells, and areas inside individual homes. With the reports collected, additional information was prepared and the documented results were integrated in data logs to provide comprehensive assessments of the site and surrounding areas. QC management was critical to assure remediation actions were in compliance with the contract.

Site Superintendent/QCM. Construction of Global Hawk Launch and Recovery Element Differential Global Positioning System and Access Road, Beale AFB, CA. 2006, 2008. Mr. Olmstead managed the site and provided QC management to assure the quality construction of a 30 by 50-foot section of flexible pavement, 250 feet long. The site was designated to support the Global Hawk Launch Recovery Element while in compliance with the contract. The construction included sub-base preparation and installation of two-inch thick asphaltic paving. A 32-foot wide paved access road was included in the construction. The flight line fire station led to the new Launch Recovery Element location for stored equipment. Mr. Olmstead managed the quality and safety performance of major subcontractors, craft and labor personnel, which consisted of more than 50 technical and professional staff. He facilitated Plan-of-the-Day meetings to identify and discuss safety protocols and quality expectations for the day's task. He managed the restoration process of the wetland/waterway area. The restoration process needed to meet schedule before the commencement of wet season to avoid impacting natural habitat of the wetland areas. Schedule was met; project was within budget and contractual requirements fulfilled.

Site Superintendent/SSO/QC Manager, Rapid Runway Repair, Travis AFB, CA. 2008-2009. Mr. Olmstead provided QC management, lead the critical SSO process for the analysis project requirements to determine waste characterization. He provided site management and coordination of the collection process. He provided the QC management and SSO roles needed to be in place while the required samples were collected from various soils and concrete waste piles. The samples were analyzed to ensure the waste could be properly segregated by type. Assessment of the samples determined the methodology utilized for recycle process or disposal in an appropriate landfill. QC management was critical to assure methodology was in compliance with the contract. The site was hazardous and a required a mitigation process, which was identified and implemented. The area was surrounded by general public housing, which required an extensive air-monitoring program put into place. Mr. Olmstead coordinated with key staff at the Base Community Relations Program to provide reports and communication of assessments to keep public informed. He was able to provide the information needed by the Base Community Relations Program, maintaining an intelligent, well informed populous. Mr. Olmstead was instrumental to the Base Relations capability to build trust within the community and thereby assisting the overall mission of the Base Relations Program.

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NAVAL FACILITIES ENGINEERING COMMAND
SOUTHWEST
U.S. ARMY Corps of Engineers

US Army Corps of Engineers®

San Diego Chapter, Inc.
"Building Your Quality of Life"

NAVFAC

PRESENTS THIS CERTIFICATE TO

Tony Olmstead

AGC San Diego Chapter

WHO HAS SUCCESSFULLY COMPLETED

August 31 – September 1, 2010

U.S.A.C.E. Construction Quality Management for Contractors

Kugan Panchadsaram PE, PMP
CQM Facilitator
Kugan & Associates Inc.

Dennis Chung
US Army Corps of Engineers
San Francisco District

Glen Schaffer
AGC-San Diego Director of Marketing & Education
CQM Training Coordinator

This Certificate is valid for 5 years from the date above

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ITSI Gilbane

January 4, 2013

Mr. Henry Ng
ITSI Gilbane Company
2730 Shadelands Drive
Walnut Creek, CA 94598

via email: Hng@itsi.com

Subject: Appointment of Project Alternate Quality Control Manager
NAVFAC SW RAD EMAC Contract N62473-10-D-0808 TO 0004
Parcel D-1 Phase II Radiological Remediation and Support
Hunters Point Shipyard, San Francisco, CA
ITSI Gilbane Project 07204.0004

Dear Mr. Ng:

You are appointed Alternate Construction Quality Control Manager (CQCM) for the above-referenced project. Your responsibilities and duties are described in the Construction Quality Plan (CQP) approved by ITSI Gilbane Company for this project. If you are called upon to serve in this capacity, you will have all of the same responsibilities for implementing the CQP and for providing quality inspections to ensure work is performed in accordance with the plan and Contract specifications.

In the CQCM role, you are authorized to certify and/or approve submittals in accordance with the plans and specifications in this Contract. You have the responsibility and full authority to stop work on any portion of work that does not conform to the standards or specifications established for this project.

You are to report directly to me on quality matters. If you require any other information, or if I can help you in any way, please do not hesitate to call me. You can reach me at 925-946-3334 (office), 925-457-7808 (cell), or by e-mail at cprince@itsi.com.

Sincerely,

Cheryl D. Prince
ITSI Corporate QA/QC Director

CDP/cmn

Mr. El Palser, ITSI Gilbane Project Manager
Mr. Tony Olmstead, ITSI Gilbane QC Manager
Mr. Arvind Acharya, ITSI Gilbane Program Manager

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Henry Ng, EIT – Quality Control/Civil Engineer

Highlights:
▪ Provides civil engineering design and quality control (QC) for airfield projects for various Government agencies. ▪ Leverages expert knowledge of construction management, engineering, and technical skills in the areas of concrete and airfield paving. ▪ Experience providing QC testing on subgrade, aggregate base, and pavements. ▪ Responsible for coordinating with federal, state, and local agencies for all airfield design and documentation. ▪ Certified USACE Construction Quality Management (CQM) for Contractors, 2007. ▪ Provides Quality Control Management utilizing the three-phase approach, facilitating weekly QC meetings.

Education:	Years of Experience:	Foreign Languages:
BS, Civil Engineering, University of California at Davis, [redacted]	With ITSI – 5	Fluent in Cantonese and Mandarin

Active Registrations/Certifications/Clearances:	Affiliations:
Engineer in Training – CA No. 122340, 2005 Qualified Storm Water Pollution Prevention Plan (SWPPP) Practitioner (QSP), July, 2011	N/A

Training:	Employment History:
ACI Concrete Field Testing Technician – Grade I USACE Construction Quality Management (CQM) for Contractors, 2007 40-hour HAZWOPER, 2007 30-hour OSHA construction safety training, 2009 USACE PCC airfield paving, 2-day workshop, 2010 USACE Pavement-Transportation Computer Assisted Structural Engineering (PCASE), 2-day workshop, 2009 and 2011 Computer proficiency in Access, Synchro, Matlab, and AutoCAD	2007 – Present: ITSI 2005 – 2007: City of Oakland, Transportation Engineering & Services Division

Awards/Commendations:
N/A

Project Experience:

Mr. Henry Ng is a Quality Control (QC) Manager with five years of QC management and engineering experience in the construction industry. He provides QC for civil design and construction with specialized experience in all aspects of airfield project requirements, including helipad, concrete and asphalt pavement design. He provides direction and coordination for Design Quality Control (DQC) and is responsible for the civil design quality process. His most recent experiences include the $9 million at Westover Air Reserve Base (ARB), $5 million airfield repair project at Lemoore airfield for the US Navy and $12.1 million for the Forward Operating Base at Kandak Air Force Base in Afghanistan. Prior to this, he spent 2 years as Site QC Manager at NAS Lemoore for multiple activities involving airfield concrete paving repair, rubber removal and joint seals. Mr. Ng utilizes QC plans, procedures, reporting and documentation to deliver projects that are compliant with Navy QC requirements. Mr. Ng employs proven quality systems that covers all aspects of design and construction operations, both on-site and offsite, and is an expert in the sequence of design and construction expected in all Government Quality Control Plans. In addition, he provides quality assurance on a programmatic basis thorough his weekly QC meetings with Project Teams. This proactive approach ensures that all client requirements are integrated into the Quality Control Plan, and are in compliance with UFC, FAA, and AF standards.

Additionally, Mr. Ng provides environmental support on various civil projects. His experience includes landfill advance planning and design projects and on environmental groundwater sampling, and he is proficient in tracking, reporting and documentation required for environmental support. In addition, he provides design estimates and quantity take-off reports and is proficient in numerous technical engineering programs that support various civil projects. He has assisted professional engineers on a variety of civil and environmental projects for the City of Oakland and the University of California.

Civil Engineer/Quality Control –AFCESA SATOC, Repair Taxiways F and R at Westover Air Reserve Base (ARB), MA, June 2011 to present. Provided civil engineering design and design quality reviews for this $5 million design-build repair of Taxiways F and R at Westover ARB. Westover is the nation's largest ARB, and home to the Air Force's largest cargo aircraft, the C-5 Galaxy. He integrated the Design Quality Control three-phrase process and facilitated QC weekly meetings. His responsibilities included specific scheduling efforts to execute quality reviews and construction while the airfield maintained normal operations. Quality requirements to determine the exact grades, elevations, drainage, and alignments of the existing ground and drainage features as major DQC factors were critical to the success of this project. He also provided tracking implementation through daily reports, identification and tracking of deficiencies, documentation of progress of work, and supporting other project QC requirements. His responsibilities also included: design drawings, review of project specifications, geotechnical report and survey data design analysis, design site grading, layout drainage system, airfield markings in accordance with UFC criteria, and design of taxiway pavement section with PCASE program and in accordance with applicable UFC standards.

Civil Engineer/Quality Control – AFCESA SATOC, Repair Pavement for Taxiways and Runway, Westover ARB, MA, Jan 2011 to present. Provided Quality Control management and civil engineering design for this $4.2 million design-build project to repair Taxiway N and G, PCC on Runway 05/23, and Taxiway L and Y base, to meet UFC 3-260-01/02 and UFGS criteria. Mr. Ng was responsible for the extensive QC process for this project, through development of preconstruction submittals in accordance AFCESA QC requirements. He obtained permits for all work required, including submittal review and material verification, and was responsible for maintaining effective correspondence with Project QC meetings and communication with the client. He also provided documentation for the three phases of QC, including the initial, preparatory, and follow-up meetings, as well as daily reporting required by the contract. His responsibilities also included: design drawings, review of project specifications, geotechnical report and survey data design analysis, design site grading, layout drainage system, airfield markings in accordance with UFC criteria, and design taxiway pavement section with PCASE program and in accordance with applicable UFC standards. The scope included repair of existing pavement joints/cracks, repair existing pavement markings and repair of PCC pavement on the touchdown zones to meet current codes and standards.

Civil Engineer/Design Quality – Forward Operating Base, Kandak Air Force Base, Afghanistan, 2011. Mr. Ng provided civil engineering expertise and extensive design quality reviews for this $12.1 million design-build contract. The project requirements included the implementation of QC plan for the major portions of the Airfield, consisting of helipad design, evaluation of geotechnical reports, concrete and asphalt pavement and pavement sections with Pavement-Transportation Computer Assisted Structural Engineering (PCASE) and in accordance with Unified Facilities Criteria (UFC) criteria, joint layout, and pattern. Provided additional DQC processes for all aspects of the K-span construction and all mechanical and fire prevention systems; civil work including sidewalks with extensive quality assurance of all concrete and foundations.

Quality Control/Field Engineer– Lemoore Airfield ID/IQ Contract, Repair Airfield Pavement U.S. Naval Air Station (NAS), Lemoore, CA, Sep 2008 to December 2010. Mr. Ng served as field engineer and provided DQC for this $5 million project to repair runways at NAS Lemoore, CA. The QC process for this project entailed specific project requirements including rubber removal, spall repair and cleaning, concrete pavement repair with 12-inch concrete, resealing joints in rigid airfield pavements, pavement striping and symbol painting, installation of reflective glass beads, removal of loose paint and paint waste disposal. As Quality Control Manager, he provided oversight of daily QC project activities on site, coordinated with subcontractors, inspectors, and clients. He facilitated weekly meetings to provide DQC specifications through extensive tracking and reporting. He provided QC and reviewed reports and submittal documents as well as Requests for Information (RFIs), supported extensive QC on concrete testing, generated concrete design mix, as-built drawings, and managed the surveying support team. He supported the project with procurement of estimated quantities and kept track of daily, weekly, and monthly production rates. Calculated quantities on site, met with client and stakeholders, and resolved quality control/civil engineering issues.

Transportation Engineering Intern – City of Oakland, Transportation Engineering & Services Division, Oakland CA, May 2005 to Jan 2007. Assisted in various civil engineering projects, provided calculation and drafting on wide variety of transportation projects for the Public Works Department. Prepared design elements for engineering plans, profiles, and cross-section details. Compiled a wide variety of engineering data, and applied and interpreted survey notes. Assisted in preparing routine correspondence and reports, and provided engineering review of a Traffic Control Plan.

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U.S. ARMY CORPS OF ENGINEERS

USACE LEARNING CENTER
HUNTSVILLE, ALABAMA

NAVFAC
Naval Facilities Engineering Command

CERTIFICATE
this is to certify that

Henry NG

has completed the Corps of Engineers and Naval Facilities Engineering Command Training Course

Construction Quality Management for Contractors Recertification

Certificate Number: SPK-99-07-00259

Given on *April 27, 2012*

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

Director, USACE Learning Center

CEHR-P Form 586 (REVISED)
1 AUG 98

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ATTACHMENT 2

SUBMITTAL REGISTER

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SUBMITTAL REGISTER *(ER 415 1-10)*	CONTRACT NO.

TITLE AND LOCATION	CONTRACTOR	SPECIFICATION SECTION

					TYPE OF SUBMITTAL										CLASSIFICATION			CONTRACTOR SCHEDULE DATES			CONTRACTOR ACTION			GOVERNMENT ACTION		
ACTIVITY NO	TRANS-MITTAL NO.	ITEM NO	SPECIFICATION PARAGRAPH NUMBER	DESCRIPTION OF ITEM SUBMITTED	DATA	DRAWINGS	INSTRUCTIONS	SCHEDULES	STATEMENTS	REPORTS	CERTIFICATES	SAMPLES	RECORDS	O&M MANUALS	INFORMATION ONLY	GOVERNMENT APPROVED	REVIEWER	SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	CODE	DATE	SUBMIT TO GOVERN-MENT	CODE	DATE	REMARKS
a.	b.	c.	d.	e.	f.	g.	h.	i.	j.	k.	l.	m.	n.	o.	p.	q.	r.	s.	t.	u.	v.	w.	x.	y.	z.	aa.

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ATTACHMENT 3

QC FORMS

Includes:

a. **Daily Production Report**
b. **Daily Quality Control Report**
c. **Definable Features of Work Tracking Logs**
d. **Initial Phase Checklist**
e. **Material Receipt Inspection Checklist**
f. **Nonconformance/Corrective Action Report**
g. **Nonconformance Report/Corrective Action Tracking Log**
h. **Operation and Manitenance Instruction Record**
i. **Preparatory Phase Checklist**
j. **Request for Information**
k. **Rework Items List**
l. **Testing and Special Inspection Plan and Log**

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ITSI Gilbane

DAILY PRODUCTION REPORT

(Attach Continuation Page as Needed)

Project

CONTRACT NO. / TO NO.	PROJECT TITLE / LOCATION	REPORT DATE	REPORT NO.
ITSI Gilbane Project No.			

Weather

Weather Conditions				Temp (F)		Ground Conditions
AM		PM		Low		
				High		

Additional Comments

ITSI Gilbane Personnel On Site

Scheduled Activity No.	ITSI Gilbane Staff Name	Trade/Duty Position	Number	Description of Work Performed	Hrs

Subcontractor Personnel On Site

Scheduled Activity No.	Employer	Trade/Duty/Position	Number	Description of Work Performed	Hrs

Total ITSI Gilbane Work-Hours on Site This Day	**0.00**
Total Subcontractor Work-Hours on Site This Day	**0.00**
Subtotal ITSI Gilbane + Subcontractor Work-Hours on Site This Day	**0.00**
Cumulative Total Work-Hours From Previous Report	
Cumulative Work-Hours from Start of Construction	**0.00**

Safety

Was a job safety meeting held this date? (If "yes," attach copy of meeting minutes.)	No		Yes		

Description of Health & Safety Actions Taken Today / Safety Inspections Conducted

Were there any lost time accidents on this date?	No		Yes		If "YES", a copy of the completed Accident Investigation Report is required. (Ref to APP)

ITSI Gilbane

DAILY PRODUCTION REPORT

(Attach Continuation Page as Needed)

Project

CONTRACT NO. / TO NO.	PROJECT TITLE / LOCATION	REPORT DATE	REPORT NO.
ITSI Gilbane Project No.			

Equipment

Equipment/material received today to be used on job site:

Construction and field equipment on job site today (include field instruments):

Work Performed Today

Description of work performed today:

Work Planned Next Day

Description of work planned for next working day or next working week:

Next Day:

Next Week:

Issues or Concerns

Discussion of issues / concerns encountered on site:

Visitors

Name	Organization	Purpose of Visit

Signed

ITSI Gilbane Superintendent Signature:		Date:
Printed Name and Title:		

NOTE: ATTACH PERTINENT INFORMATION TO THIS REPORT.

ITSI Gilbane

DAILY QUALITY CONTROL REPORT

PHASE	CONTRACT NO / TO NO:	ITSI GILBANE PROJECT NO.:	REPORT NO:
	PROJECT TITLE / LOCATION:		DATE:

PREPARATORY

PREPARATORY PHASE INSPECTIONS PERFORMED TODAY YES ☐ NO ☐

(Attach 2-page Preparatory Phase Checklist for each DFOW.)

Schedule Activity No.	Definable Feature of Work

INITIAL

INITIAL PHASE INSPECTIONS PERFORMED TODAY YES ☐ NO ☐

(Attach Initial Phase Checklist for each DFOW.)

Schedule Activity No.	Definable Feature of Work

FOLLOW-UP

FOLLOW UP INSPECTIONS PERFORMED TODAY

WORK OBSERVED COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE?	YES ☐	NO ☐
WORK OBSERVED COMPLIES WITH SAFETY REQUIREMENTS?	YES ☐	NO ☐

Schedule Activity No.	Definable Feature of Work and Work Description

TESTS PERFORMED TODAY (List: tests performed, methods used, who performed the tests. Note: equipment calibration check, test location, test results.)

REWORK ITEMS IDENTIFIED TODAY	REWORK ITEMS CORRECTED TODAY
DFOW / Description	DFOW / Description

SUBMITTALS REVIEWED TODAY

MATERIAL RECEIPT INSPECTIONS PERFORMED

Supplier	Material Received/Results (Attach completed Material Receipt Inspection Checklist)

INSTRUCTIONS GIVEN TO SUBCONTRACTORS OR RECEIVED FROM CLIENT / DIFFERING SITE CONDITIONS, ERRORS OR DISCREPANCIES NOTED / REMARKS:

On behalf of ITSI Gilbane, I certify that this report is complete and correct, and that the equipment and material used and the work performed during this reporting period are in compliance with the contract plans, drawings, and specifications to the best of my knowledge, except as noted in this report.		
	PROJECT QC MANAGER PRINT AND SIGN	DATE

NOTE: Include as an attachment to the Daily QC Report: The Daily Production Report, Subcontractor daily logs, material receipts and bills of lading, inspection and test results, Nonconformance Reports, Site Safety Sign-in Logs, and other records developed or received on today's report date.

ITSI Gilbane

DEFINABLE FEATURES OF WORK TRACKING LOG

CONTRACT / TO NO.:	PROJECT TITLE / LOCATION:	ITSI GILBANE PROJECT NO.:

ACTIVITY NUMBER	SPECIFICATION SECTION	FEATURE OF WORK	DATE PREPARATORY PHASE COMPLETED	DATE INITIAL PHASE COMPLETED	DATE DFOW COMPLETE

ITSI Gilbane

INITIAL PHASE CHECKLIST

CONTRACT NO. / TO NO.:		ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:		DATE:
DEFINABLE FEATURE OF WORK:	SCHEDULE ACTIVITY NO.:	SPECIFICATION SECTION:

PERSONNEL PRESENT

CLIENT REP NOTIFIED ☐ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	TRADE/DUTY/POSITION	COMPANY/AGENCY

PROCEDURE COMPLIANCE

CONFIRM FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY PHASE. CONFIRM COORDINATION BETWEEN PLANS, SPECIFICATIONS, AND SUBMITTALS.	YES ☐ NO ☐
COMMENTS:	

PRELIMINARY WORK

IS PRELIMINARY WORK COMPLETE AND CORRECT?	YES ☐ NO ☐
IF NOT, WHAT ACTIONS TAKEN?	

WORKMANSHIP

IS REQUIRED LEVEL OF WORKMANSHIP ESTABLISHED?			YES ☐ NO ☐ (IF "NO," EXPLAIN IN "COMMENTS.")
WHERE IS WORK LOCATED?			
IS SAMPLE PANEL REQUIRED?	YES ☐	NO ☐	(IF "YES," MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE. AND DESCRIBE LOCATION OF SAMPLE.)
WILL THE INIITAL WORK BE CONSIDERED AS A SAMPLE?	YES ☐	NO ☐	
COMMENTS:			

RESOLUTION

RESOLVE ANY DIFFERENCES:
COMMENTS:

CHECK SAFETY

WERE JOB CONDITIONS REVIEWED USING EM 385-1-1 AND ACTIVITY HAZARD ANALYSIS?	YES ☐ NO ☐ (IF "NO," EXPLAIN IN "COMMENTS.")
COMMENTS:	

OTHER

OTHER ITEMS OR REMARKS:

_____ ITSI GILBANE QC MANAGER SIGNATURE AND PRINTED NAME	_____ DATE

ITSI Gilbane

MATERIAL RECEIPT INSPECTION CHECKLIST

CONTRACT NO. / TO NO.:	ITSI GILBANE PROJECT NO.:	
PROJECT TITLE / LOCATION:	DEFINABLE FEATURE OF WORK:	DATE:
DESCRIPTION OF MATERIALS INSPECTED:		
SUPPLIER NAME:		
NAME OF SUBCONTRACTOR TAKING DELIVERY:		
PLANNED USE OF MATERIAL:		
DOCUMENTS USED DURING THE INSPECTION:		
SPECIFICATION SECTION:		
ARE ALL MATERIALS IN COMPLIANCE WITH THE PROCUREMENT DOCUMENTS AND APPROVED SUBMITTAL? YES ☐ NO ☐		
IF NOT, EXPLAIN:		
ARE THE MATERIALS IN COMPLIANCE WITH THE BUY AMERICAN ACT? YES ☐ NO ☐		
IF NOT, EXPLAIN AND INDICATE IF WAIVER RECEIVED:		
OTHER COMMENTS? NOTE NCR NUMBER, IF APPLICABLE.		
_____ ITSI GILBANE QC REPRESENTATIVE NAME AND SIGNATURE		_____ DATE

NOTE: ATTACH COPY OF DELIVERY RECEIPTS/PACKING LISTS, TEST RESULTS AND PHOTOGRAPHS.

ITSI Gilbane

NONCONFORMANCE/CORRECTIVE ACTION REPORT

CONTRACT NO. / TO NO.:	ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:	DATE:
	NCR LOG NO.:

PART A: DESCRIPTION OF NONCONFORMANCE/DEFICIENCY (INCLUDE SPECIFIC REQUIREMENT REFERENCES):

IDENTIFIED BY:	DATE:

PART B: ROOT CAUSE:

PART C: CORRECTIVE AND PREVENTIVE ACTIONS

CORRECTIVE ACTIONS TO BE TAKEN (LIST AS CA 1, CA 2, ETC. FOR REFERENCE):

	PROPOSED COMPLETION DATES:

PREVENTIVE ACTIONS TO BE TAKEN (LIST AS PA 1, PA.2, ETC. FOR REFERENCE):

	PROPOSED COMPLETION DATES:
RESPONSIBLE MANAGER PRINTED NAME AND SIGNATURE	DATE

PART D: ACCEPTANCE:

QC MANAGER SIGNATURE AND PRINTED NAME	DATE:
CORRECTIVE ACTION(S) VERIFIED BY (ATTACHED LIST WITH REFERENCE NUMBERS IF NOT VERIFIED AT SAME TIME.)	DATE:

ITSI Gilbane

NONCONFORMANCE REPORT/CORRECTIVE ACTION TRACKING LOG

CONTRACT NO./ TO NO.:	ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:	

NCR #	ISSUE DATE	PROBLEM DESCRIPTION	CORRECTIVE OR PREVENTIVE ACTIONS	COMPLETION DATE	VERIFICATION/ CLOSURE DATE

OPERATION AND MAINTENANCE INSTRUCTION RECORD

CONTRACT NO. / TO NO.:	ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:	
REFERENCE SPECIFICATION (SECTION / PARAGRAPH):	DATE INSTRUCTION PROVIDED:
OPERATION AND MAINTENANCE INSTRUCTIONS WERE CONDUCTED FOR (TYPE OF EQUIPMENT):	
DOCUMENTS / MANUALS PROVIDED / REVIEWED:	

The following personnel were present:

Printed Name	Signature

The personnel identified herein by their signatures certify that they have been instructed in the operation and maintenance of the above-mentioned equipment.

Instructions Were Given By:

Instructor Signature and Printed Name

ITSI Gilbane Representative Signature and Printed Name

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ITSI Gilbane

PREPARATORY PHASE CHECKLIST

CONTRACT NO. / TO NO.:		ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:		DATE:
DEFINABLE FEATURE OF WORK:	SCHEDULE ACTIVITY NO.:	SPECIFICATION SECTION:

PERSONNEL PRESENT

CLIENT REP NOTIFIED ___ HOURS IN ADVANCE? YES ☐ NO ☐

NAME	TRADE/DUTY/POSITION	COMPANY/AGENCY

SUBMITTALS

REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES ☐ NO ☐

IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED?

ARE ALL MATERIALS ON SITE? YES ☐ NO ☐

IF "NO," WHAT ITEMS ARE MISSING?

CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL (THIS SHOULD BE DONE AS MATERIAL ARRIVES).

COMMENTS:

MATERIAL STORAGE

ARE MATERIALS STORED PROPERLY? YES ☐ NO ☐

IF "NO," WHAT ACTIONS TAKEN?

SPECIFICATIONS

REVIEW EACH APPLICABLE SPECIFICATION PARAGRAPH

LIST SPECIFICATIONS COVERED:

DISCUSS PROCEDURES FOR ACCOMPLISHING THE WORK:

CLARIFY ANY DIFFERENCES:

PRELIMINARY WORK & PERMITS

IS PRELIMINARY WORK CORRECT? YES ☐ NO ☐ ARE PERMITS ON FILE? YES ☐ NO ☐

IF "NO," WHAT ACTIONS TAKEN?

ITSI Gilbane

PREPARATORY PHASE CHECKLIST

CONTRACT NO. / TO NO.:		ITSI GILBANE PROJECT NO.:
PROJECT TITLE / LOCATION:		DATE:
DEFINABLE FEATURE OF WORK:	SCHEDULE ACTIVITY NO.:	SPECIFICATION SECTION:

TESTING	IDENTIFY TESTS TO BE PERFORMED, FREQUENCY, AND BY WHOM. (Reference Item of Work as identified on Testing and Inspection Plan and Log)
	WHEN REQUIRED?
	WHERE REQUIRED?
	REVIEW TESTING PLAN.
	ARE TESTING FACILITIES APPROVED? YES ☐ NO ☐
	IF "NO," WHAT ACTIONS TAKEN?
SAFETY	IS ACTIVITY HAZARD ANALYSIS APPROVED? YES ☐ NO ☐
	REVIEW APPLICABLE PORTIONS OF EM 385-1-1.
	COMMENTS:
MEETING COMMENTS	CLIENT AND AGENCY REPRESENTATIVES COMMENTS DURING MEETING:
OTHER ITEMS OR REMARKS	

ITSI GILBANE QC MANAGER:SIGNATURE AND PRINTED NAME	DATE

ITSI Gilbane

REQUEST FOR INFORMATION

CONTRACT NO. / TO NO.:	DATE ISSUED:	RFI NO.:

PROJECT TITLE / LOCATION:	DATE REQUIRED:
ITSI GILBANE PROJECT NO.:	PRIORITY: ☐ Critical ☐ Routine

SUBMITTED TO: Address: Phone:	**SUBMITTED BY:** Address: Phone / E-mail:

SUMMARY DESCRIPTION:

DRAWING REFERENCE:	**SPECIFICATION SECTION:**

INFORMATION REQUIRED:

PROPOSED SOLUTION/SUGGESTED ALTERNATIVES/RECOMMENDED ACTION (IF APPLICABLE):

ATTACHMENTS / NUMBER OF PAGES:

COST IMPACT: ☐ ADDITIONAL COST: ☐ NO CHANGE: ☐ CREDIT: ☐ TBD: [$ ___] ROM

SCHEDULE IMPACT: ☐ YES: ☐ NO: ☐ TBD: [__] ESTIMATED DAYS:

Note: The Government response is not authorization to proceed with work involving a change in contract cost, time, or both. If the response requires such, a formal contractual modification in accordance with the applicable contract documents is required from the client.

ITSI Gilbane

REQUEST FOR INFORMATION

CONTRACT NO. / TO NO.:	DATE ISSUED:	RFI NO.:

RFI Transmittal – ITSI Gilbane Approval

ITSI GILBANE PROJECT MANAGER:	PROJECT QUALITY CONTROL MANAGER:
SIGNATURE / DATE:	SIGNATURE / DATE:

TO BE COMPLETED BY GOVERNMENT

Contracting Officer Response / Disposition / Concurrence

RESPONSE:

RESPONSE FROM:	**DATE ANSWERED:**
	DATE FORWARDED:
ATTACHMENTS FROM RESPONDER:	**COPY TO:**

Government Approval – RFI Response

CONTRACTING OFFICER:	**CONSTRUCTION MANAGER:**
SIGNATURE / DATE:	**SIGNATURE / DATE:**

ITSI Gilbane

REWORK ITEMS LIST

CONTRACT NO. / TO NO.:	PROJECT TITLE / LOCATION:	ITSI GILBANE PROJECT NO.:	
DEFINABLE FEATURE OF WORK, PHASE OF WORK, OR WORK AREA:		BEGIN DATE:	THROUGH DATE:

LOG NO.	DATE IDENTIFIED	DESCRIPTION (Nature of work, location, other items potentially impacted, etc.)	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No., Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION (Indicate NCR No. if applicable)	DATE COMPL.	INITIALS & DATE VERIFIED

ITSI Gilbane

TESTING AND SPECIAL INSPECTION* PLAN AND LOG

CONTRACT NO. / TO NO.:	PROJECT TITLE / LOCATION:	ITSI GILBANE PROJECT NO.:

ITEM OF WORK (From Schedule)	SPECIFICATION SECTION	SPECIFICATION PARAGRAPH	WORK FEATURE	TEST REQUIRED	STANDARD (ACI,ASTM)	FREQUENCY	DATE(S) COMPLETED	REMARKS (NOTE AND ATTACH RESULTS AS RECEIVED)

* Special Inspections include all inspections required by the specifications and references therein but do not include routine QC inspections of work or three-phase inspections.

ATTACHMENT 4

SCOPE OF WORK

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Section C - Descriptions and Specifications

STATEMENT OF WORK

RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACTS (RAD EMAC)

SCOPE OF WORK FOR

CONTRACT N62473-09-D-2614 X003

PARCEL D-1 PHASE II RADIOLOGICAL REMEDIATION AND SUPPORT

HUNTERS POINT SHIPYARD

SAN FRANCISCO, CA

NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST

SAN DIEGO, CALIFORNIA 92132-5190

Date: April 17, 2012

This scope of work (SOW) shall be as outlined below and as described elsewhere in the basic contract. Naval Facilities Engineering Command Southwest (NFECSW) will administer this contract.

1.0 GENERAL

1.1 INTRODUCTION

These actions are to address recommendations contained in the Final Historical Radiological Assessment (HRA), August, 2004 for radiologically impacted sites in Parcel D-1, with primary focus on sanitary sewer and storm drain (SS/SD) lines, radiologically impacted ship berths, and sites in Parcel D-1. The HRA is available as part of the administrative record and is included in the references issued with this SOW.

All work shall be accomplished in accordance with procedures and methodologies described in the *Radiological Management Plan, Hunters Point Shipyard, San Francisco, CA, February 2012*. This Time Critical Removal Action falls under the Base-wide Removal Action Action Memorandum, Hunters Point Shipyard, San Francisco, California, Revision 2006. Additionally, applicable NFECSW environmental work instructions are to be followed. Applicable Base-Wide Work Plans, the Removal Action Memorandum and NFECSW environmental work instructions are listed in the references to this SOW.

Providing a work environment that maintains the health and safety of working personnel at the shipyard is the Navy's number one priority. The Contractor shall maintain a health and safety program that encourages the prevention of all work-related accidents. An appropriate Site Safety and Health Plan (SSHP) shall be developed with appropriate references to work plans, Accident Prevention Plans (APPs), and Activity Hazard Analyses (AHAs).

Services shall be provided in accordance with the current Architectural-Engineering (A-E) Guide for A-E Firms performing services.

The total period of performance for this project shall be 18 months.

All radiological Contractors and Subcontractors shall be identified in the proposal, or be identified to the Navy's Base Realignment and Closure Program Management Office (BRAC) prior to field use. The Prime Contractor shall have a Nuclear Regulatory Commission (NRC) and/or State of California Broad Scope License that allows handling and storage of byproduct, source, and special nuclear material pertinent to the jurisdiction of Parcel D-1 and the area of work conducted at HPS.

1.2 BACKGROUND

After thorough review of the operational history of Hunters Point Shipyard (HPS) and site-specific investigation data, the Navy determined that the storm drain and sanitary sewer systems in Parcel D-1 may contain radioactive material. This determination was documented in the Final Historical Radiological Assessment, Volume II (HRA). The radionuclides of concern for the storm drain and sanitary sewers are cesium-137, radium-226, and strontium-90. The HRA also identified the ship berths along Parcel D-1 as radiologically impacted. The radionuclides of concern associated with the ship berths in Parcel D-1 are considered to be cesium-137, radium-226, plutonium-239, and strontium-90.

This SOW is a continuation of the Parcel D-1 radiological TCRA that began in 2009. As part of that effort, the Navy produced several project planning documents that covered all of Parcel D-1 including the Final Parcel D-1 Design Plan. The Design Plan provides site specific design drawings for all known segments of sanitary sewer and storm drain pipe in the parcel. The Design Plan also provides the general approach and project-specific requirements for sanitary sewer and storm drain removal.

For this task order, the Navy is not funding a separate base-wide contract to provide radiological laboratory services and clearance of overburden soil for backfill. The contractor for this SOW will assume all responsibility for sampling, analysis, and clearance of radiologically impacted soils in trench units and overburden soil units. The radiological screening yard in Parcel D-1 shall be utilized for clearance of overburden material. The contractor will

be responsible for procuring their own laboratory services from a DoD ELAP certified laboratory for alpha, strontium-90 and gamma analysis.

The Navy is directing this removal action under the Department of Defense Installation Restoration Program (IRP) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), along with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The Final Basewide Radiological Removal Action, Action Memorandum – Revision 2006 (Basewide Action Memo) outlines these removal actions.

The Basewide Radiological Management Plan, developed in February 2012, outlines the currently accepted procedures for removing, surveying, and remediating the storm drain and sewer sanitary system. This Plan is a compilation and revision of the former Base-Wide Radiological Work Plan Revision 1, October 2007 and the Final Project Work Plan, Revision 4, Base-wide Storm Drain and Sanitary Sewer Removal, Hunters Point Shipyard, San Francisco, California, June 2008.

1.3 OBJECTIVE

The primary objective of this SOW is to continue and complete the Base-wide Sanitary Sewer and Storm Drain TCRA, perform Final Status Surveys of the sanitary sewer and storm drain system, the NRDL building site, and the Ship Berths adjacent to Parcel D-1. Final Status Survey reports are to contain adequate information and data to achieve unrestricted free release. The figures included in Appendix A of the Parcel D-1 Design Plan for Work Areas 13 and 25 detail the area where sewer and storm drain removal is to occur. The Hunters Point Shipyard Utility Map GIS file provides additional information for the lines in these areas. The Navy is seeking to complete all SS/SD removal in Parcel D-1 with this Phase II SOW. It is estimated that there is at least 5,700 lineal feet of SS/SD lines remaining.

The current agreement between the BRAC Cleanup Team and the Navy is that the Navy will pursue a radiological unrestricted free release of the sewer and storm drains in Parcel D-1. This agreement means that the Contractor is to attain free release by either: (1) surveying, remediating, appropriately disposing of impacted material above the Basewide Action Memo remediation goals, and performing a final status survey, and/or (2) providing ample analysis, survey results, and conceptual site model justification, with corresponding Navy and Regulatory approval, to justify that material left in place and reused as backfill meet applicable release criteria and regulatory requirements for unrestricted free release.

This task order will include the development of appropriate plans to execute radiological work in Parcel D-1. Planning documents include an Execution Plan, Task Specific Plan, and a Design Plan for the sewer and storm drain removal. Planning document requirements are found in Section 2.4 of this SOW.

To address the HRA recommendation for the radiologically impacted ship berths, the Contractor shall write a Task Specific Plan (TSP), perform characterization surveys, perform necessary remediation, remedial action surveys, final status surveys, and write a final status survey report. For the sanitary and storm drain systems the Contractor shall write an execution plan, a design plan, remove the sewer and storm drain lines and associated impacted soil, characterize the trench and overburden materials, manage excavated materials, perform remediation, perform a final status survey, backfill utilizing cleared overburden soil, and write corresponding survey unit project reports.

As the Contractor conducts these radiological remediation activities in Parcel D-1, they are required to maintain appropriate radiological work area controls. These controls shall be detailed in a Radiological Protection Plan. The Contractor shall also coordinate and facilitate other work efforts in their designated work areas with the Navy and other Contractors when access to the radiologically controlled area is required. The contractor shall be responsible for radiological free-release of trench and overburden soils, laboratory analyses, soil stockpiling, requesting low level radiological waste (LLRW) bins, and loading of LLRW as determined by laboratory results above release criteria. The contractor shall provide analytical results detailing the levels of contamination on the chain of custody to the LLRW waste disposal contractor.

As per the BRAC Bylaws and NFECSW contracting objectives, the Contractor shall utilize qualified small business subcontractors within the Hunters Point Hub Zone as defined by the three zip codes 94124, 94134, and 94107 if available. Furthermore, due to the nature of soil and debris transportation, worker health and safety, and community concerns, an active and robust dust suppression and monitoring program will be required of the Contractor while excavating, stockpiling, loading, or transporting soil and debris.

1.4 "PRE-PROPOSAL" CONFERENCE

A pre-proposal meeting and site walk will be held in order to provide any necessary work scope clarifications. This site walk and meeting will be scheduled by the Contract Specialist.

2.0 WORK ELEMENTS

The work elements under this SOW are identified as follows:

- Work Element 1 – Project Management
- Work Element 2 – Project Meetings
- Work Element 3 – Project Infrastructure
- Work Element 4 –Planning Documents
- Work Element 5 – Removal Actions and Radiological Surveys
- Work Element 6 – Completion Reports
- Work Element 7 – Site Support Activities

The following subsections describe the tasks to be completed within these work elements. The Contractor shall provide a cost bid schedule for each work element as outlined in Section 4.0 of this SOW.

2.1 WORK ELEMENT 1 - PROJECT MANAGEMENT/ SUPPORT/ ADMINISTRATION

This element includes personnel and resources for the management and control of project activities, such as scoping, planning, estimating, executing, tracking, controlling, analyzing, coordinating, and closure of this project. This element also includes direct management of the project, as well as the support for administrative functions needed for successful project management.

Project management shall include coordination of all on-going field activities at the site and responding to Navy requests for information as they occur.

Project management shall also include coordination with Navy, Regulatory, and archaeological resource managers for actions under this SOW that fall within an area of archaeological or historical zone on Hunters Point Shipyard. The contractor will provide archaeological monitoring for field activities in archaeological or historical zones. A figure showing areas of concern is included for reference. Archeological monitoring shall be conducted by or under the supervision of personnel who meet the minimum Secretary of the Interior's standards. Archaeological Monitoring progress reports will be included in field daily reports during field activities conducted in archaeological and or historical zones.

Project management shall also include detailed tracking and planning of project schedules in consultation with BRAC.

Invoicing shall conform to the measurement and payment items described later in this SOW. Upon request, the Navy Remedial Project Manager (RPM) or the Resident Officer in Charge of Construction (ROICC) representative shall be provided with documentation that substantiates the basis of payment requests during construction.

Project Management activities are anticipated to also include the following:

- Provide Meeting minutes for kickoff meetings and meetings with Navy members and regulators.
- Provide schedule and monthly progress reports to the Navy RPM and the Naval Radiological Affairs Support Office (RASO)
- Conference calls on a weekly basis to update the Navy RPM and the RASO on the project status, field work, data review, and report progress.
- E-mail daily site reports when field activities are occurring
- Review, approve, and track project costs and prepare financial information
- Develop and maintain project files
- Conduct administrative project close out contractual requirements
- Weekly project QA/QC meetings and meeting notes with ROICC personnel during field operations
- Provide monthly data call information at the request of the Navy
- Maintain, update, and submit as-built drawing bi-weekly showing pipeline removal, survey, and backfill progress.

Deliverable requirements for project management are included in Section 7.0 of this SOW.

2.2 WORK ELEMENT 2 - PROJECT MEETINGS

2.2.1 KICK OFF MEETING

The Contractor shall coordinate and attend a kick-off meeting at Hunters Point Shipyard no later than fourteen (14) days after the Contract is awarded. Attendees of this meeting will include the Contractor Project Manager, Project Radiation Safety Officer, Navy RPM, Resident Officer In Charge Of Construction (ROICC), Caretaker Site Office (CSO) representative, RASO representative, and other project team members as available. A draft project schedule, identification of radiological work areas, project phasing, temporary facilities, building access requests, and proposed traffic routes will be provided by the contractor. The Contractor shall provide meeting minutes to the BRAC Remedial Project Manager and Contract Specialist within fourteen (14) calendar days.

2.2.2 BRAC CLEANUP TEAM (BCT) MEETINGS

Preparation for BCT meetings shall include monthly coordination with the Navy to present project status, field work updates, schedule of work to be completed, and report progress. The contractor will be responsible for preparing a short Power Point presentation for each month to be presented by the RPM at monthly BCT meetings. This task also includes providing technical support to the Navy, in person, at the meetings. The Navy will require technical support at a minimum of 3 Regulatory Meetings. One (1) meeting in San Diego, two (2) meetings in San Francisco or Oakland, during this period of performance.

2.2.3 CONTRACTOR COORDINATION MEETINGS

Project meetings also entail coordination requirements between multiple contractors and the Navy. Meetings with the Base-wide Radiological Contractor, , Caretaker Site Office (CSO), ROICC, BRAC, NFECSW, RASO, Utilities Providers (to include Pacific Gas and Electric, AT&T, San Francisco Public Utilities Commission (SFPUC), etc.) and other Navy project managers shall be accounted for under this task. This also includes a Quality control meeting and a RASO/BRAC weekly teleconference. A minimum of 2 weekly Navy meetings will be required throughout the period of performance.

At the broad scope Hunters Point contractor integration meetings, this Contractor shall provide appropriate figures and present pertinent project information to other contractors working on site. A minimum of three (3) large Hunters Point contractor integration meetings will be required during an 18 month period of performance.

2.3 WORK ELEMENT 3 - PROJECT INFRASTRUCTURE

Initial period of project infrastructure support should be for eighteen months.

2.3.1 PROCUREMENT

This element includes personnel and resources used in the procurement of the project equipment, materials, and laboratory services. Equipment, materials and supplies that are used throughout the fieldwork will be procured and stored on-site at a safe location. Note: Charges for procurement should be included in the cost of the equipment and materials under the various technologies and structure elements.

2.3.2 MOBILIZATION

This element includes the transport of equipment, personnel, and facilities to and from the site as well as construction and deconstruction of temporary facilities and utilities.

Fieldwork shall not commence until the Contracting Officer has issued a Notice to Proceed (NTP) to the Contractor. The Contractor shall obtain all necessary permits and pay applicable permit fees.

The Contractor shall utilize and reference Unified Facilities Guide Specifications (UFGS) 01 50 00, February 2009 for Temporary Construction Facilities guidelines.

The Contractor shall notify the Nuclear Regulatory Commission of the intent to start work at least 14 days prior to mobilization or as required by their NRC license.

2.3.3 SITE CLEANUP AND DEMOBILIZATION

The Contractor will perform cleanup activities during progress of the Work, at the completion of the Work, and in accordance with the Basic Contract. The Contractor will perform periodic cleanup to keep the site and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris.. As a condition precedent to final acceptance of the Work by the Government, the Contractor shall remove all of waste materials, rubbish, and windblown debris. All sidewalks and streets affected by the work shall be swept clean and returned to a condition consistent with that prior to commencement of work.

Upon finishing site cleanup and receiving concurrence form a site inspection by the CSO, ROICC, and document review by RASO and BRAC the Contractor will ensure complete decontamination and screening of all equipment, demobilize equipment, personnel, and facilities equipment from the site in an orderly manner.

2.3.4 LOGISTICAL SUPPORT

Base-wide logistical support should include the costs associated with rental of an appropriate number of field trailers and other costs associated with general Contractor field operations support (e.g. copiers, trailer utilities, work stations, etc.). Initial period of logistical support should be for eighteen months.

The Government will provide a designated laydown area near the work site in a non-radiologically impacted area. The Contractor shall provide and maintain administrative field office facilities within the laydown area at the designated site. Building 381 will be available for use by the contractor. The Contractor shall be responsible for cleanliness and orderliness of the area used and for the security of any material or equipment stored in this area Although federal police patrol the base, the contractor is responsible for the security of heavy equipment, instruments, vehicles, trailers, field facilities, and any other materials left on the project site.

The Contractor shall obtain the necessary permits for connections to necessary services provided by utility companies serving the project area.

2.4 WORK ELEMENT 4 - PLANNING DOCUMENTS

The Contractor shall develop appropriate planning documents outlining their approach for completing this SOW. For SS/SD removal activities, the Navy seeks to maintain the same approach previously used at Hunters Point Naval Shipyard and as described in the current Base-wide Radiological Management Plan. However, the contractor for this SOW will be solely responsible for all radiological laboratory services required to achieve free-release of the soil. Additionally, the contractor will be required to excavate, transport, screen, sample, and remediate, the overburden trench soils to be used as backfill. The Contractor shall perform radiological characterization, remediation, and removal as has been developed by the reference documents in Section 5. Changes, additions, and deviations from previously approved base-wide radiological work plans, Task Specific Plans, and abstracts may be recommended by the Contractor. Any changes that are recommended shall be subject to review and approval by the Navy and the regulators prior to implementation.

For all planning documents the Contractor shall provide the Navy with a MS Word version of the document in track changes mode for all working files during the editorial phases between Internal Draft, Draft, and Final. The Contractor shall prepare official Response to Comments to Navy and BCT members who submit formal comments for the Draft version. The Navy will require 21 calendar days to review and comment on the internal draft version. Document distribution requirements are listed in Section 7.0 of this SOW.

2.4.1 EXECUTION PLAN

An Execution Plan is similar to a Work Plan. The Navy has previously submitted an Execution Plan for Parcel D-1 prior to the first phase of work in Parcel D-1. This plan has been provided as a model. It should be noted that this plan is outdated and a revision to this plan will be necessary for this scope of work. The Contractor shall develop an execution plan that provides detail as to how they will perform this SOW. The Execution Plan shall also have key contractor specific plans that will be developed by the Contractor. At a minimum the Execution Plan shall have a Site Description and Background, Regulatory Framework, Sewer and Storm Drain System Description, Field Work Implementation, and Reporting requirements.

Additional key elements and appendices of the Execution Plan shall include but are not limited to:

2.4.1.1 BASE-WIDE RADIOLOGICAL MANAGEMENT PLAN IMPLEMENTATION

The Contractor will outline how they will utilize, reference, and divert from the existing Base-wide Radiological Management Plan in order to execute the SOW. The Contractor may reference and draw from the existing Base-wide Radiological Management Plan to execute their field work, or the Contractor may propose and execute new methods and procedures based on Navy and BCT concurrence. The Contractor shall provide ample information for how they will implement their efforts for these tasks and meet the requirements of BRAC and RASO.

2.4.1.2 SAMPLING AND ANALYSIS PLAN

The Contractor is required to prepare a Sampling and Analysis Plan (SAP) in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (QAPP) before conducting field sampling. The SAP shall be written in accordance with applicable regulatory guidance documents and NFECSW Environmental Work Instructions. The

SAP shall be reviewed and approved by the RASO and subsequently the NFECSW Quality Assurance Officer (QAO) prior to regulatory review and field implementation.

For this SOW, the Contractor shall prepare a SAP that includes the use of a DoD ELAP certified laboratory for gamma, alpha, and strontium-90 analysis of debris, soil and sediment. A DoD ELAP certified laboratory shall be used for characterization, post-remediation, and final status survey samples. The final status survey samples are considered to be definitive data for work described in this SOW.

2.4.1.3 RADIOLOGICAL PROTECTION PLAN

As part of the Execution Plan, the Contractor shall prepare a Radiological Protection Plan (RPP) that outlines the day-to-day management of radiological impacted sites, remediation, surveys, health and safety concerns, training requirements, standard operating procedures, materials handling requirements, and project site controls. At a minimum the RPP shall summarize radiological controls and practices specific to:

- Project work objectives
- Contractor policies and standard operating procedures
- Scope of work requirements
- Quality control and quality assurance
- Radiation protection personnel requirements
- Task specific hazard analysis/controls for potential radiological events at the site
- Contamination control
- Instrumentation and equipment
- Work control procedures, work permits, credentialing, and licensing
- Procurement, receipt, inventory, shipping, transportation of radioactive materials, and control of radioactive waste
- Record keeping
- Planned special exposures
- Personal protective equipment
- Decontamination procedures
- Radionuclide analysis,
- Radiological work process
- Memorandum of Understanding (MOU) between the contractor and the Navy shall be agreed upon to ensure proper radiological materials handling responsibilities. The contractor will also be required to enter an MOU that includes all other Navy contractors who have invoked their NRC license at HPNS. The contractor shall generate and/or review, edit, and sign the two HPNS MOUs at least 30 days prior to mobilization to the site.

The Contractor shall be in compliance with the requirements of the NFECSW Environmental Work Instructions, as applicable. The RPP shall be amended as appropriate and must be reviewed and accepted by the Navy RPM, RASO, NAVFAC Command Safety Officer, and Navy and Marine Public Health Center (NMPHC) Safety Officer, as appropriate.

2.4.1.4 QUALITY CONTROL/ QUALITY ASSURANCE PLAN

The Contractor shall prepare a Quality Control and Quality Assurance Plan as per UFGS 01 45 02, February 2009. At a minimum the Plan shall include:

- A description of the quality control organization, including a chart showing lines of authority;
- The name, qualifications, duties, authorities, and responsibilities of each person assigned a QC function;
- A schedule for managing submittals, testing, inspections, and any other QA function (including those of Contractors, Subcontractors, fabricators, suppliers, purchasing agents, etc.) that involves assuring quality workmanship, verifying compliance with the plans and specifications, or any other QC objectives. Inspections shall also verify compliance with all environmental requirements and include, but not be limited to, air quality and emissions monitoring records and waste disposal records, etc;
- Reporting procedures and reporting format for QA/QC activities including such items as daily summary reports, schedule of data submissions, inspection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation;
- A list of definable features of the work to be performed consistent with the tasks outlined in this SOW. A definable feature of work is a task that is separate and distinct from other tasks and has separate control requirements. The minimum definable features of work for this task are listed in the Design Plan.
- Provide QC plan to the ROICC 30 days prior to site mobilization. Reports and Contractor Production reports shall be in CD format and be issued according to the deliverables listed in Section 7, item number 3.

2.4.1.5 ACCIDENT PREVENTION PLAN AND SITE SAFETY AND HEALTH PLAN

The Contractor shall complete the Accident Prevention Plan (APP), and a Site Safety and Health Plan (SSHP). The APP and SSHP shall be submitted in the formats as required by the US Army Corps of Engineers' latest version of EM 385-1-1 manual. There are overlapping elements when preparing both APP and SSHP as provided in the Army's manual. The SSHP elements that overlap with the APP elements need not be duplicated provided each safety and health issue receives adequate attention and is documented in the APP/SSHP. The title of the plan shall be APP/SSHP and shall include all elements and sub-elements, including the AHA (Activity Hazard Analysis), as stated in the manual. In addition, the Contractor shall comply with the requirements of the UFGS (Unified Facilities Guide Specifications) 01 35 26 (February 2009).

The APP/SSHP will provide a safe and healthful environment for all personnel involved as well as personnel working near the sites. Certify to the NAVFAC Southwest RPM that the Final APP/SSHP have been reviewed with each contractor and subcontractor employee prior to mobilization and start of fieldwork activities.

An *Internal Draft Final* and *Final* APP/SSHP will be submitted according to the schedule, and will be printed under a separate cover from the Execution Plan. The APP/SSHP shall be immediately accessible to all workers at the site at all times during the project, and copies shall be mounted on, located adjacent to the Contractor's Safety and Health Bulletin on site or available in every vehicle utilized for work under this Task Order.

The Contractor shall conduct an annual review of the APP and SSHP; the AHAs shall be "living" documents in that changes in the field will be documented and added to the AHAs as field change notices. The APP/SSHP shall be amended as appropriate and must be reviewed and accepted by the Navy RPM, RASO, NAVFAC Command Safety Officer, and Navy and Marine Public Health Center (NMPHC) Safety Officer, as appropriate.

2.4.1.6 ENVIRONMENTAL PROTECTION PLAN

The Environmental Protection Plan includes two main parts, the Storm Water Pollution Prevention Plan (SWPPP) and the Dust Mitigation Plan. These plans will meet the substantive requirements of the appropriate storm water and dust mitigation applicable, relevant, and or appropriate regulations (ARARs). All applicable NFECSW Environmental Work Instructions shall be followed.

2.4.1.6.1 STORM WATER POLLUTION PREVENTION PLAN

A Storm Water Pollution Prevention Plan (SWPPP) shall be developed. At a minimum the SWPPP shallcover the site description, Best Management Practices (BMPs) to be implemented for construction activities, BMPs to be implemented for erosion and sediment control, waste management and disposal spill responses, post-construction controls, site inspection and monitoring programs, responsible personnel, training requirements, and certifications and compliance requirements. The SWPPP shall meet the requirements of the State of California general permit for storm water discharges from construction sites. Submit the SWPPP, along with any required Notice of Intents, a minimum of 14 calendar days prior to the start of construction. A copy of the approved SWPPP shall be kept at the construction on-site office..

2.4.1.6.2 DUST CONTROL PLAN

The contractor shall produce a plan to mitigate dust in all areas of the base where work included in this SOW may occur. The immediate work areas as well as any other haul roads or roads travelled by privately operated vehicles shall be included in the plan. A Basewide Dust Control Plan, Revision 1, has been developed for time critical removal actions including sewer and storm drain excavations. This plan may be incorporated by reference or revised if determined to be necessary. At a minimum the DCP shall outline how the contractor will follow and integrate the current Basewide Dust Control Plan, or how the contractor will develop and utilize similar dust control measures for grading and soil/sediment material movement under this SOW. The DCP will address the substantive requirements of air quality ARARs for construction and environmental remediation operations at Hunters Point Shipyard. The primary focus of the DCP will be

on dust mitigation requirements, along with dust control practices and integrating air monitoring requirements with other contractors operating at Hunters Point Shipyard. Section 5.0 of the Basewide Dust Control Plan, Revision 1, contains methods and frequency of air quality monitoring and sampling. Air monitoring shall include total suspended particulates, manganese, lead, PM10, asbestos, and radiolnuclides of concern. Personnel monitoring shall also be included. Air monitoring will occur for each workday of field work during the period of performance. The contractor will be responsible for continuous dust mitigation, weekly street sweeping, and daily track-out control in radiological controlled areas.

2.4.2 DESIGN PLAN FOR PARCEL D-1

This SOW is a continuation of the Parcel D-1 radiological TCRA that began in 2009. As part of that effort, the Navy produced the Final Parcel D-1 Design Plan. This Design Plan provides site specific design drawings for all known segments of sanitary sewer and storm drain pipe in the parcel. The Design Plan also provides the general approach and project-specific requirements for sanitary sewer and storm drain removal. It should be noted that this plan is currently outdated. The contractor shall revise the plan for Navy and regulatory approval as necessary to reflect changes in the basewide radiological work plans and also the use of an independent laboratory and self performed operation of the RSY.

2.4.3 TASK SPECIFIC PLANS (TSP) FOR PARCEL D-1

A TSP provides the site specific information and details for the final status survey of an impacted site, designed to achieve free-release. At a minimum the TSP shall include Site Description and Summary, Survey Description, Release Criteria, Survey Unit layout and sample location, Data Quality Objectives, and reference area information. For this SOW, two new TSPs will be required as detailed below in sections 2.4.3.1 and 2.4.3.2.

The TSP is an internal Navy document and requires both an draft and final distribution as per the document distribution matrix in Section 7 of this SOW. The draft document will be reviewed for approval by BRAC and RASO before issuing the final TSP. Distribution of draft TSPs may be electronic.

The Contractor shall follow methods and procedures as outlined in the Base-wide Radiological Management Plan. TSPs should be adequate in scope to conduct a Final Status Survey and any remediation necessary to achieve free release. The Contractor shall use available site figures, and HRA references to optimize investigations, remediation, and surveys.

2.4.3.1 NRDL SITE AREA

The Contractor shall prepare a TSP to perform the radiological investigations, any remediation necessary to achieve free release,and Final Status Survey of the NRDL Site area.

2.4.3.2 PARCEL D-1 SHIP BERTHS

The Contractor shall prepare a TSP to perform the radiological investigation, any remediation necessary to achieve free release, and final status surveys of the ship berths adjacent to Parcel D-1. The survey area is defined as the portion of land that extends inland fifty feet from the water's edge at Berths 21, 22, and 29. Berths 21, 22, and 29 make up the entire perimeter of the Phase II area of focus. Although the ship berths are listed in the HRA as part of Parcel F, the portion of land that is to be included in this survey is considered Parcel D-1.

2.5 WORK ELEMENT 5 - REMOVAL ACTIONS AND RADIOLOGICAL SURVEYS

The Contractor will conduct field operations as outlined below. During the conduct of field operations, the Contractor shall actively implement their radiological controls plan maintaining a secure radiological control area. The Contractor shall also implement their environmental protection plan to ensure that appropriate SWPPP, dust control, and air monitoring measures are undertaken as outlined in the Execution Plan and Design Plan.

2.5.1 SEWER AND STORM DRAIN REMOVAL

The Contractor shall provide personnel, equipment, supplies, and services to remove, sample, survey, remediate, backfill, and restore a minimum of 5,700 lineal feet of sewer and storm drain line as shown in the referenced figure. The general depth of excavation for these lines is between 3-16 feet below ground surface. The contractor shall refer to design drawings to determine the maximum depth. It should be noted that the lines draining into berths 21 and 22 have already been previously removed by another contractor or do not exist due to aging infrastructure and erosion events.

These estimates account for the total lineal feet of sewer and storm drain remaining in Parcel D-1. These estimates do not necessarily depict the total lineal feet of trenching required for removal of the lines. The contractor shall review the design drawings to identify lines that may be co-located in a common trench, thereby reducing the amount of trenching required. If during the course of excavation, the contractor encounters previously unidentified SS/SD lines, the total linear feet shall be considered part of the contracted amount of 5,700 linear feet. Conversely, if lines shown in the design plan are not found, the contractor will only be compensated for the actual linear feet of lines removed.

This contract task order will be referred to as Parcel D-1 Phase II of the sewer and storm drain removal action activities. See the included figure for an overview of the lines remaining in Parcel D-1. The Design Plan contains the most detailed information regarding the location and length of pipe in each work area.

2.5.1.1 PREPARE THE WORK AREA

The Contractor shall coordinate access points and traffic patterns with the Navy RPM, CSO, ROICC, RASO other pertinent base Contractors, the San Francisco Police Department, and the City of San Francisco. The Contractor shall establish a controlled radiological work area around Work Areas in Parcel D-1. Coordination for termination

of water supply, electric lines, gas lines, phone lines, and sewer line impacts shall be coordinated withthe caretaker's site office (CSO).

Underground utility clearance shall be completed prior to initiating intrusive activities. The Contractor shall review utility maps, mark the proposed limits of intrusive activity, use geophysical methods as necessary, and notify Underground Service Alert.

The Contractor is required to remove portions of the asphalt and road base material in preparation for sewer and storm drain excavations. The contractor shall stockpile these materials for reuse during site restoration following removal and remediation actions. Asphalt shall be reused during backfill activities by grinding and placing within the top six inches of trench backfill.

Removal and staging of any existing debris, refuse materials, or soil stockpiles will be the responsibility of the contractor. The Navy will designate an area within Parcel D-1 to stockpile such materials.

The Contractor is responsible for the removal of the RSY pads in the RSY-2 area prior to removal of SS/SD lines, and survey of the NRDL building, which are located beneath. Removal is only required for those pads that obstruct other work. The RSY pads are considered impacted due to their former use in previous sewer removal activities. The contractor shall survey and remove the pads in a manner the preserves the construction materials for later use. Materials shall be segregated, stockpiled, and maintained in a Navy approved location within Parcel D-1 or Parcel E. A work instruction that details the procedure to be used is provided as reference.

2.5.1.2 EXCAVATE AND REMOVE THE SEWER AND STORM DRAIN SYSTEM

The Contractor shall remove the asphalt or concrete surface covering, excavate sewer and storm drains, and overburden soil as outlined by the Design Plan and as entailed in their Execution Plan.

The Contractor under this SOW is responsible for material handling and management of excavated overburden soils, and sewer and storm drain piping within the radiologically controlled area (RCA) to be established within Parcel D-1.

2.5.1.3 SAMPLE, SURVEY, REMEDIATE

The Contractor shall sample and survey the excavated trench, sewer pipe, storm drain pipe, manholes, sediment, and overburden material. Trench Survey Units shall be laid out and sampled by the Contractor. Survey Units are not to exceed 1,000m^2. The Contractor shall utilize a sampling and survey plan that is based on appropriate MARSSIM guidance for attaining free release and site closeout. Where procedures in the Execution Plan differ from

MARSSIM guidance, the Execution Plan shall be followed. Changes to this general approach may be recommended in the Execution Plan by the Contractor and will require Navy approval before implementation.

The Contractor is responsible for radiological field surveys, screening, and sampling performed in their controlled radiological work area established in the Parcel D-1 Work Areas. All sampling, surveys, and screening conducted by the Contractor shall be recorded and documented appropriately. Any soil sample requiring laboratory analysis including characterization, post remediation, and final status survey samples shall be analyzed at a DoD ELAP certified laboratory as per the SAP. The contractor shall be responsible for collecting, delivering, and analyzing all samples required to execute this scope of work.

Excavated soil requiring screening in the Radiological Screening Yard (RSY) shall be performed within RSY-2. The contractor will be provided exclusive access to all 29 RSY pads. The contractor will be responsible for all radiological controls, posting, maintenance, dust mitigation, air monitoring, and any other license requirement necessary for complete operation of the screening yard. The contractor shall deliver, manage, scan, sample, and radiologically clear the material in the RSY. The contractor shall track excavated materials from each trench unit and backfill the material at the site of origin. Once the material has been delivered to the RSY, the contractor shall spread the material on a screening pad to screen and sample, and clear accordingly. A single RSY pad (overburden unit) is approximately 1,000 square meters in size. Large debris (over 6 inches in diameter) such as concrete and segments of pipe shall not be delivered to the RSY, but rather processed within the designated work area. The contractor shall only place material in a LLRW bin based on a corresponding laboratory result, or with the direction of the Navy. Multiple rounds of remediation may be required to clear an RSY overburden unit. Excavated soil derived from IR Program sites in Parcel D-1 may be generated during excavation activities. Chemical sampling of the excavated IR program site soils to determine suitability for use as backfill material is required. IR soils shall be analyzed for the associated chemicals of concern. IR sites and the associated CoCs can be found in the Parcel D-1 Record of Decision. Material not suitable for backfill, defined as being above the project action limits, shall be released of radiological control, consolidated, moved off-site, and managed until the basewide transportation and disposal contractor mobilizes to remove the material. Navy BRAC and RASO approval of RSY pad data is required prior to consolidating any overburden unit. The contractor shall assume this review period to take 1 week from date of transmittal of data.

Following completion of excavation activities, a Final Status Surveys (FSS) of the trench survey units will be performed. The results from the FSS will be reviewed by BRAC and RASO to verify that scan surveys and sampling is complete. The Navy will determine whether backfill of the trench survey unit may occur. Should the remediation goals not be met, the Contractor will perform remediation and additional excavation until remediation goals have been met and appropriate risk levels have been reached. The contractor will be responsible for multiple rounds of remediation until all post-remediation samples and FSS samples are verified to be below the project action limits.

2.5.1.4 BACKFILL AND RESTORE SITE CONDITIONS

Upon receiving authorization from BRAC and RASO to backfill a trench, the Contractor will backfill and compact the trench in preparation for restoration of the site. Material that has been screened and cleared out of the RSY shall be used as backfill. Material that was excavated and processed through RSY shall be tracked and returned to the approximate trench location it was initially excavated from. Should not enough backfill material be available from screened and cleared excavated material, additional material will be available from the on-site approved backfill stockpile. The contractor can assume no cost for backfill material above the water table. The Contractor may opt to utilize backfill material from an outside source with appropriate chemical and radiological screening prior to use. The Contractor will also be responsible for providing material to bridge the groundwater table. In these portions of Parcel D-1, the groundwater table is generally 6 to 10 ft bgs.

The Contractor will maximize the use of road base material and asphalt previously removed during the excavation of storm and sewer drains in Parcel D-1 to refurbish and restore surface conditions to a level consistent with pre excavation and surrounding unexcavated conditions. The top six inches of each trench shall be backfilled with this or similar material to create a non-dust generating surface. Soil shall not be used as a final surface on drivable surfaces. Recycled asphalt shall not be used as backfill material below 1 foot bgs.

Trench compaction will be achieved through a reasonable effort, equivalent to three passes or more by an excavator mounted sheep's-foot roller at optimum moisture content per one foot lift. No compaction tests will be required in this area.

2.5.2 PARCEL D-1 AREA INVESTIGATIONS, REMEDIATION, AND FINAL STATUS SURVEYS

The Contractor shall follow methods and procedures for building and area surveys and remediation as outlined in the Basewide Radiological Management Plan, their Execution Plan and Task Specific Plans produced in accordance with Section 2.4 of this SOW.

2.5.2.1 NRDL SITE AREA

The Contractor shall conduct surveys as specified in a Navy approved NRDL Site TSP (developed under section 2.4 of this SOW) to support the MARSSIM Class I final status survey FSS goal. Survey work may require asphalt and piping removal, radiological screening yard pad removal, as appropriate to support clean closure. Contaminated areas shall be remediated and re-surveyed to support clean closure. The MARSSIM Class 1 survey will include Class 2 survey units as appropriate.

2.5.2.2 SHIP BERTHS

The Contractor shall conduct surveys as specified in a Navy approved Parcel D-1 Ship Berths TSP to support the FSS goal and free-release of the site. Survey work may require asphalt removal to support clean closure.

Contaminated areas shall be remediated and re-surveyed to support clean closure. The HRA lists the ship berths as historical location of OPERATION CROSSROAD ship decontamination and material testing. A ship berth is defined as the area extending 50 feet inland from the water's edge. All concrete structures, utility pads, vaults, piping, or other infrastructure that exists within the ship berth area shall be accounted for in the survey. As such, any items that require removal, including asphalt, shall be tracked and staged in separate areas based on the survey unit of origin. The material shall be considered impacted until the final determination of the specific survey unit has been established. The contractor shall assume a Class I survey will be required in this area, unless proper justification and rationale is accepted by the Navy prior to survey implementation.

2.5.3 PARCEL D-1 RAIL TIE SURVEY AND DISPOSAL

Several large stockpiles of creosote rail ties exist in Parcel D-1. The locations of these stockpiles are in the southern portion of Parcel D-1 near Berths 22 and 29, and at the head of Gun Mole Pier adjacent to Berth 14. All ties are considered radiologically impacted. The contractor shall develop a method to radiologically survey and release the rail ties from radiological controls. The proposed method shall be developed in a radiological work instruction and submitted to the Navy for review and approval. The contractor shall conduct the radiological survey in a manner that minimizes the generation of LLRW. Rail ties that exhibit contamination levels above the action limit designated in the work instruction shall be uniquely tracked, stockpiled separately, and controlled in a radiological controlled area. At the completion of survey activities, the Navy will review the field data and determine the number of radiological LLRW bins required for disposal. Following review of data, the contractor will be responsible forloading the bins. LLRW disposal costs will not be included in this SOW. All rail ties that are considered non-LLRW shall removed from the site. Transport and disposal shall be the responsibility of the contractor. Coordination with the CSO for T&D activities is be required. Material leaving HPNS shall exit the base through a portal monitor. The contractor shall provide and staff the portal monitor appropriately. All rail ties must be disposed of at waste disposal facility. Recycling and re-use of the material is not permited. Following the removal of all materials, the immediate area of tie stockpiles will be surveyed to verify and document there is no residual radioactivity remaining in the area.

2.6 WORK ELEMENT 6 - COMPLETION REPORTS

For all completion reports the Contractor shall provide the Navy with a MS Word version of the document in track changes mode for all working files during the editorial phases between Internal Draft, Draft, and Final. Completion reports require high quality representation of field conditions and survey results, to include accurate post remediation and or demolition as-built figures. All supporting working files, (i.e. Site Photos, CADD, GIS, VSP, Excel, etc.) will be provided in their native formats at the end of the contract. The Contractor shall prepare official Response to Comments to Navy and BCT members who submit formal comments for the Draft version. Document distribution requirements are listed in Section 7.0 and 8.0 of this SOW.

2.6.1 SURVEY UNIT PROJECT REPORTS

The Contractor shall compose a Survey Unit Project Report (SUPR) for each sewer Survey Unit (SU) developed during the execution of this SOW. SUPRs will be bundled into groups of roughly 5 Survey Units to form packages.

The SUPR is based off of the *Survey Unit Project Report Abstract for the Sanitary Sewer and Storm Drain Removal Conducted After January 1, 2011, Hunters Point Naval Shipyard, San Francisco, California, July 2011*. A survey unit shall not exceed 1000 square meters. The Contractor shall prepare the SUPRs as Internal Draft, Draft, and Final.

2.6.2 FINAL STATUS SURVEY REPORTS

The Contractor shall prepare and finalize Final Status Survey Reports to complete clean closure and free release requirements for the ship berths and the NRDL building site.

2.6.3 REMOVAL ACTION COMPLETION REPORTS

Following completion of the SUPRs and Final Status Survey Reports, along with respective concurrence from the Navy and BCT, the Contractor shall summarize the findings of the SUPRs and Final Status Survey Reports into a Removal Action Completion Report (RACR). The RACR shall clearly state the conceptual site model for Parcel D-1, the nature and extent of radiological contamination encountered, provide a summary of residual risks following removal, remediation, and final status surveys, provide a robust ALARA (As Low As Reasonably Achievable) analysis, and provide sound justification for clean closure and free release. At a minimum, the RACR shall include an executive summary, introduction, summary of all building and area survey results, summary of all storm drain and sanitary sewer survey unit results, conclusions and recommendations.

2.7 WORK ELEMENT 7 – SITE SUPPORT ACTIVITIES

The Contractor shall provide site support activities for an initial period of eighteen months.

2.7.1 WASTE MATERIAL MANAGEMENT

2.7.1.1 RADIOLOGICAL/MIXED WASTE

Radiological and mixed wastes from sewer and storm drain removal activities and other area surveys are to be transferred to the on-site LLRW Contractor for storage and disposal. Bins required for bulk storage of radiological/mixed wastes will be provided under separate contract but coordination activities are required. Assume disposal sampling for waste characterization will be performed by the US Army Joint Munitions Command (USAJMC) contractor. Coordination efforts with the RASO, Navy RPM, and the radiological waste contractor is required. The Contractor shall coordinate and ensure appropriate radiological waste handling procedures are

conducted within their controlled radiological work area. The Contractor shall prepare a waste information sheet for each waste source detailing the existing analytical information available or expected to be generated for each waste storage unit (drum, bin, etc.) as well as information on the wastes (source area, filed instrument readings, on-site laboratory results, etc.). Low Level Radiological Waste determination shall be supported by laboratory analytical results and not solely using field screening instruments, unless accepted by the Navy and authority provided in writing. Currently procurement of the containers, manifesting, transportation and disposal is all arranged by the USAJMC radiological waste broker. The radiological waste is to be stored under a broad scope license authority, or under an appropriate Memorandum of Authorization (MOA) with another contractor on base until transported by the USAJMC's designated radiological waste transportation and disposal contractor.

2.7.1.2 NON-RADIOLOGICAL WASTES

Waste management, characterization sampling, stockpiling, and storage are covered under this contract. The Base-wide Radiological Management Plan, Attachment 1, document the difference between IRP and non IRP site soil and waste material handling processes. These guidelines remain in effect. Final off-site transportation and disposal of soil and debris wastes will be managed under a separate base-wide chemical waste transportation and disposal contract. These efforts will be associated with non-radioactive waste generated from the building and area surveys and remediation, and the sewer and storm drain removals under this SOW. All construction debris and chemical waste material is to be stockpiled or packaged in appropriate containers and staged in approved areas. Coordination efforts between the base-wide transportation and disposal Contractor, the CSO and the ROICC will be required.

3.0 SPECIAL CONSIDERATIONS

3.1 "Section 2912 of the FY 1994 Defense Authorization Act (Pub. L. 103-160) establishes the following preference for business located in the vicinity of base closure and alignment work:

(a) Preference required – In entering into contracts with private entities as part of the base closure or realignment of a military installation under a base closure law, the Secretary of Defense shall give preference, to the greatest extent practicable, to qualified businesses located in the vicinity of the installation and to small business concerns and small disadvantaged business concerns. Contracts for which this preference shall be given shall include contracts to carry out activities for the environmental restoration and mitigation at military installations to be closed or realigned."

DFARS Subpart 226.71 and 226.72 implement the requirements of Section 2912 of the FY 1994 Defense Authorization Act.

"Section 817 of the 1994 Defense Authorization Act) Pub L. 103-337) authorizes the Secretary of Defense to give preference to entities that plan to hire local residents when entering into contracts for services to be performed at a military installation that is affected be closure or management under a base closure law."

DFARS Subpart 226.7104 implements the requirements of Section 817 of the FY 1995 Defense Authorization Act) Pub. L. 103-337). DFARS 226.7104 states:

"When planning for contracts for services related to base closure activities at a military installation affected by a closure or realignment under a base closure law, contracting officers shall consider, including, as a factor in source selection, the extent to which offerors specifically identify and commit, in their proposals, to a plan to hire residents in the vicinity of the limitary installation that is being closed or realigned."

The Government hereby makes it a condition of this award that the prime Contractor shall abide by the federal laws mentioned herein. The prime Contractor shall provide an explanation of all efforts and results to award subcontracts and hire personnel within the vicinity of Hunters Point Naval Shipyard, San Francisco, California. Vicinity, as defined in this award, refers to the following three postal zip codes: 94124, 94134, and 94107.

3.2 All requirements of the basic contract, in addition to those specifically mentioned in this scope of work, remain in full effect and performance.

3.3 Minutes of regulatory agency, Navy and/or Activity meetings shall be submitted to the RPM, CS and activity Point-of Contact (POC) within ten (10) calendar days after each meeting.

3.4 Public Affairs – The Contractor shall not disclose any data resulting from action in this contract to the news media or public. The Contractors shall refer all press or public contacts to the Activity POC and shall notify the RPM of their actions. The Contractor may not distribute reports or data to any other source, unless specifically authorized by the Public Affairs Officer in accordance with NAVFAC Instruction.

3.5 Any oral directions, instructions, explanations, commitments and/or acceptances given by any government employee to the Contractor or his personnel shall not be construed by the Contractor as a scope change to this proposal scope of work. Only the Contracting Officer has the authority to issue any change in SOW to the Contractor, and scope changes shall be issued in writing.

3.6 The Contractor shall provide copies of all correspondence to the RPM and Contract Specialist.

3.7 The Contractor shall make every effort to prevent the spread of contamination or release of contaminants to the environment in accordance with federal, state, and local laws, regulations and instructions.

3.8 Forward all deliverables to the NFECSW RPM. A copy of the deliverables transmittal letter shall also be forwarded to the Contract Specialist.

3.9 The Contractor's cost proposal format shall be in accordance with the cost estimate format provided in Section 4 – Government Furnished Data, enclosure (1).

4.0 PERFORMANCE MEASUREMENT AND PAYMENT

This section references a negotiated schedule of values for the purpose of making fair progress payments. In their proposal the Contractor shall at a minimum provide pricing and level of effort assumptions (i.e. labor hours and equipment rates) to support the following items under each task of Work Elements 1 through 7 – Removal Action:

- Work Element 1 – Project Management
- Work Element 2 – Project Meetings
- Work Element 3 – Project Infrastructure
- Work Element 4 –Planning Documents
    - Execution Plan
    - Design Plan for Parcel D-1
    - Task Specific Plans for Parcel D-1
- Work Element 5 – Removal Actions and Radiological Surveys
    - Sewer and Storm Drain Removal
    - Parcel D-1 Area Investigation, Remediation, and Final Status Survey
- Work Element 6 – Completion Reports
    - Survey Unit Project Reports
    - Final Status Survey Reports
    - Removal Action Completion Report
- Work Element 7 – Site Support Activities

The Contractor shall include in their bid proposal a rollup summary of costs as per the following bid schedule. Additional cost estimate information regarding assumptions, estimates, subcontractor costs, other direct consumable costs, and applicable fees are to be included in the Contractor's detailed cost proposal.

Bid Schedule

Main Contract	Major Task Element	Unit (i.e. ls, $/CY, $/lf, etc)	Total Cost ($)
Work Element 1	2.1 Project Management Tasks	ls	
Work Element 2	2.2.1 Kick Off Meeting	ls	
	2.2.2 BCT Meetings	ls	
	2.2.3 Contractor Coordination Meetings	ls	
Work Element 3	2.3.2 Mobilization	ls	
	2.3.3 Site Cleanup and Demobilization	ls	
	2.3.4 Logistical Support	ls	
Work Element 4 Planning Documents	2.4.1 Execution Plan	ls	
	2.4.2 Design Plan for Parcel D-1	ls	
	2.4.3 Task Specific Plans for Parcel D-1	ls	
Work Element 5 Removal Actions and Radiological Surveys	2.5.1.1 Prepare the Work Area	ls	
	2.5.1.2 Excavate and Remove the SS/SD System	ls	
	2.5.1.3 Sample, Survey, Remediate	ls	
	2.5.1.4 Backfill and Restore Site Conditions	ls	

	2.5.2 Area Investigation, Remediation, and Final Status Survey		
	2.5.2.1 NRDL Site Area	ls	
	2.5.2.2 Ship Berths	ls	
	2.5.3 Parcel D-1 Rail Tie Survey and Disposal		
Work Element 6 Completion Reports	2.6.1 Survey Unit Package Reports	ls	
	2.6.2 Final Status Survey Reports	ls	
	2.6.3 Removal Action Completion Report	ls	
Work Element 7	2.7.1 Waste Material Management	$/mth	
		Total Main Contract	

The Navy reserves the right to exercise remedies for any and all performance that does not meet performance standards in accordance with pertinent clauses in the contract and to assess the quality of any and all performance using the Contractor Performance Assessment Reporting System (CCASS) or other appropriate performance rating and recording system.

The Navy will implement the following incentives to motivate the contractor to provide superior service and implement remedies when necessary:

- CCASS – The Navy will evaluate contractor performance using the CCASS database.
- Payment - Payments will be made to the contractor upon 1) verification that the corresponding performance standards and Acceptable Quality Levels have been satisfactorily achieved, and 2) submission of a properly prepared invoice.

5.0 REFERENCE MATERIALS

5.1 GOVERNMENT FURNISHED MATERIALS:

5.1.1 Hunters Point Historical Radiological Assessment, Vol 2, August, 2004
5.1.2 Basewide Radiological Removal Action Memorandum, Hunters Point Shipyard, San Francisco, California, Revision 2006
5.1.3 Base-Wide Radiological Management Plan, January 2012
5.1.4 Survey Unit Project Report Abstract for the Sanitary Sewer and Storm Drain Lines Removed After January 2011, Hunters Point Shipyard, San Francisco, California, July 2011.
5.1.5 Record of Decision for Parcel D-1 and UC-1, Hunters Point Shipyard, San Francisco, California, July 2009.
5.1.6 Final Design Plan for the Parcel D-1 Sanitary Sewer and Storm Drain Removal
5.1.7 Hunters Point Shipyard Soil Reuse and Backfill Requirements
5.1.8 Hunters Point Shipyard Utility Map GIS file
5.1.9 Hunters Point Shipyard Dust Control Plan, Rev. 1, November 2010

5.2 REFERENCE MATERIALS NOT FURNISHED ON CD WITH THIS RFP:

5.2.1 Enclosure(s): Cost Estimate Format (includes work elements without labor hours)
5.2.2 SOUTHWESTNAVFACENGCOMINST 5100.1.a of February 1995
5.2.3 29 CFR 1910.120 (Hazardous Waste Operations and Emergency Response)
5.2.4 Latest Version of EM 385-1-1 US Army Corps of Engineers Safety and Health Requirements
5.2.5 Manual Navy/Marine Corps Installation Restoration Program Manual
5.2.6 Local Activity safety plans and standard operating procedure
5.2.7 Unified Facilities Guide Specifications should be the latest version at the award of contract.
5.2.8 NAVFAC Environmental Work Instructions 1 through 8

6.0 CONTRACT ADMINISTRATION DATA

6.1 POINTS OF CONTACT

Remedial Project Manager (RPM):

Name: Melanie Kito, P.E. (BPMOW.MK)

BRAC PMO West

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San Diego, CA 92108

Phone: (619)532-0787

Fax: (619)532-0995

Contract Specialist (CS):

Name: Cynthia Mafara (RRA0B.CK)

BRAC PMO West

1455 Frazee Road, Suite 900

San Diego, CA 92108

Phone: (619)532-0978

Fax: (619)532-0995

Activity Point of Contact (POCs):

Name: Mike Mentink, BRAC Field Team Leader Caretaker Site Office (TI)

Phone: (415)743-4729

Fax: (415)743-4700

Name: Mel Asuncion, BRAC Field Team Caretaker Site office (TI)

Phone: (415)743-4721

Fax: (415)743-4700

Resident-Officer-In Charge-Of-Construction (ROICC): (as applicable)

Name: Shirley Ng

Andrew Uehisa

Address: ROICC San Francisco Bay Area

NAVFAC SW

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Alameda, CA 94501-7545

Phone: (510)749-5939 (Shirley Ng)

(510)749-5875 (Andrew Uehisa)

Radiological Affairs Support Office

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Quality Assurance Officer (QAO):

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Naval Facilities Engineering Command Southwest

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Phone: (619) 532-2540, 522-2540 {DSN}

(619) 532-1195 {Fax}

7.0 DELIVERABLES SCHEDULE MATRIX

Item Number	Deliverable	SOW Reference Paragraph(s)	RPM (# of hard copies/ electronic copies)	RASO (# of hard copies/ electronic copies))	ROICC /CSO (# of hard copies/ e-copies)	Regulatory Agency(ies) (# of hard copies/ disks)	Due Date
1	Monthly Progress Reports and Schedule Updates	Section 2.1	0/1	0/1	0/1	0/0	Concurrent with monthly invoice issuance
2	Conference Call Agenda and previous call minutes	Section 2.1	0/1	0/1	0/1	0/0	1 working day prior to weekly call
3	Daily Field Reports	Section 2.1	0/1	0/1	0/1	0/0	2 working days following field activities
4	Kick Off Meeting Minutes	Section 2.2	0/1	0/1	0/1	0/0	10 days after meeting
5	Community Meeting Support Presentations/ Notes (Task 2.2.2)	Section 2.2	0/1	0/1	0/0	0/0	1 week prior to regulator/community meeting
	Execution Plan (Internal Draft)	Section 2.4.1	1/1	1/2	2/2	0/0	60 days after kick off meeting
	Execution Plan (Draft)	Section 2.4.1	1/1	1/2	1/2	5/25	45 days after receipt of Navy comments
	Execution Plan (Final)	Section 2.4.1	1/1	1/2	2/2	5/25	45 days after receipt of Regulator comments

Item Number	Deliverable	SOW Reference Paragraph(s)	RPM (# of hard copies/ electronic copies)	RASO (# of hard copies/ electronic copies))	ROICC /CSO (# of hard copies/ e-copies)	Regulatory Agency(ies) (# of hard copies/ disks)	Due Date
6	Design Plan (Internal Draft)	Section 2.4.2	1/1	1/2	2/2	0/0	90 days after kick off meeting
7	Design Plan (Draft)	Section 2.4.2	1/1	1/2	1/2	5/25	45 days after receipt of Navy comments
8	Design Plan (Final)	Section 2.4.2	1/1	1/2	2/2	5/25	45 days after receipt of Regulator comments
9	Task Specific Plans (Draft)	Section 2.4 (Task 2.4.3)	1/1	1/1	1/1	0/0	90 days after kick off meeting
10	Task Specific Plans (Final)	Section 2.4 (Task 2.4.3)	1/1	1/1	1/1	0/0	30 days after receipt of Navy comments
11	Survey Unit Project Reports and Final Status Survey Reports (Internal Drafts)	Section 2.6.1 and 2.6.2	1/1	1/1	0/1	0/0	30 days after RASO approval of FSS data
12	Survey Unit Project Reports and Final Status Survey Reports (Draft)	Section 2.6.1 and 2.6.2	1/1	1/1	0/1	10/25	45 days after receipt of Navy Comments

Item Number	Deliverable	SOW Reference Paragraph(s)	RPM (# of hard copies/ electronic copies)	RASO (# of hard copies/ electronic copies))	ROICC /CSO (# of hard copies/ e-copies)	Regulatory Agency(ies) (# of hard copies/ disks)	Due Date
13	Survey Unit Project Reports and Final Status Survey Reports (Final)	Section 2.6.1 and 2.6.2	1/1	1/1	1/1	20/35	45 days after receipt of BCT comments
14	RACR (Internal Draft)	Section 2.6.3	1/1	1/1	0/1	0/0	45 days after completion of Survey Unit Reports, (Task 2.6.1)
15	RACR (Draft)	Section 2.6.3	1/3	1/1	0/1	10/25	45 days after issuing Internal Draft
16	RACR (Final)	Section 2.6.3	2/2	1/1	1/1	25/35	45 days after receipt of BCT comments

8.0 PERFORMANCE MEASUREMENT AND PAYMENT SUMMARY

Within the table the tasks have been rolled up under each Work Element so as to avoid repetition of the text. Performance measurement and payment will however be made at the task level. The Contractor's proposal and invoice shall therefore be broken out by task.

Work Element / Task	Performance Standard	Acceptable Quality Level	Assessment Method	Performance Payment and Incentive
Section 2.1 (Task 1- Project Management)	Accurate and timely cost and schedule management. Accurate and timely meeting support.	100% Navy acceptance	Navy performance evaluations	Payable monthly as lump sum divided by period of performance
Section 2.2 (Task 2- Project Meetings)	Attendees are prompt and appropriately prepared to meetings and presentations.	100% Navy acceptance	Navy receipt of Contractor-prepared minutes within 10 days of meeting and BCT presentation materials.	Payable based on number of meetings supported • Task 2.2.1 Kick-off Meeting • Task 2.2.2 BCT Meetings • Task 2.2.3 Contractor Coordination Meetings
Section 2.3 (Task 3- Project Infrastructure)	Completion of procurement activities, mobilization efforts, utilities coordination. Maintain a clean and secure work site. Mobilize and demobilize personnel with minimal impacts on other base contractors.	100% Navy acceptance	Navy ROICC, CSO and RPM approval	Lump sum payable pro-rated based on percentage completed. • Task 2.3.1 Procurement • Task 2.3.2 Mobilization • Task 2.3.3 Site clean-up & De-mobilization • Task 2.3.4 Logistical Support
Section 2.4 (Task 4- Planning Documents)	Navy acceptance of deliverables (no resubmittal required due to inadequate content or poor quality). The execution plan, to include SSHP, and all sections and appendices shall include sufficient	100% Navy acceptance	Navy acceptance by Remedial Project Manager (RPM); acceptance by RASO, ROICC, CSO, and NMCPHC. Concurrence by	Lump sum payable as a percentage of completion through submission of deliverables to Navy. Payment will be individually based given independently for the completion of the following deliverables:

Work Element / Task	Performance Standard	Acceptable Quality Level	Assessment Method	Performance Payment and Incentive
	information to implement the mobilization of equipment and personnel, excavate and remove the sewer and storm drain pipes, site preparation, perform the appropriate sampling and surveying, clear the appropriate material and trenches, record and maintain appropriate data in support of site close out, backfill trenches, and demobilize when complete. The planning documents must be clearly written, and have minimal transcription, typographical, and grammatical errors. The SSHP, AHAs, and APPs must be accepted by BRAC, NFECSW, NMCPHC, and comply with all applicable codes, standards, and regulations (including the NCP).		BCT and other applicable State Regulators will also weigh in.	1. Task 2.4.1 Execution Plan, 2. Task 2.4.2 Design Plan 3. Task 2.4.3 Task Specific Plans The following milestone limits in the payment schedule are: 30% of the proposed task cost at distribution of internal draft, 30% of task cost upon acceptance and distribution of draft document by KO or RPM, RASO, ROICC, CSO, and NMCPHC, and 40% of task cost upon acceptance and distribution of final document by KO, RPM, and FFA signatories as applicable.
Section 2.5.1 (Task 5-Removal and Survey Actions)	Completion of site preparation, materials and equipment surveys, excavation, sewer and storm drain removal, and remediation with no health and safety incidents. Survey and sample data collection should occur in a timely manner with no or very minimal schedule delays. Sample and survey results collected shall be accurately documented and meet SAP requirements for QA/QC procedures. Data	100% Navy acceptance	Navy acceptance by Contracting Officer (KO) or Remedial Project Manager (RPM); acceptance by RASO, ROICC, CSO, and NMCPHC. Concurrence by BCT.	Lump sum payable pro-rated as a percentage of task completion based on percentage of lineal feet of line removed, surveyed, and backfilled. The following milestone limits in the payment schedule are: 50% of the proposed task cost at the completion of the sewer and sanitary system removal, 30% of task cost upon completion of site removal action and meeting clean up goals and or risk mitigation acceptance by RPM and RASO; and 20% of

Work Element / Task	Performance Standard	Acceptable Quality Level	Assessment Method	Performance Payment and Incentive
	shall be uploaded to NEDD-NIRIS as appropriate. Concurrence on meeting removal action completion criteria from BRAC, NFECSW and RASO. Complete backfill and site restoration requirements shall be met. All efforts to minimize waste additional expenses should be met. No significant violations of the environmental management plan, i.e. SWPPP or air monitoring violations causing work stoppage.			task cost upon completion of backfill and site restoration acceptance by KO or RPM, RASO, ROICC, CSO. • Task 2.5.1.1 Prepare the work area • Task 2.5.1.2 Excavate and remove drain lines • Task 2.5.1.3 Sample, survey, and remediate • Task 2.5.1.4 Backfill and restore site conditions
Section 2.5.2 (Task 5- Ship Berths and NRDL Site Area)	Completion of site preparation, materials and equipment surveys, area surveys, and remediation with no health and safety incidents. Survey and sample data collection should occur in a timely manner with no or very minimal schedule delays. Sample and survey results collected shall be accurately documented and meet SAP requirements for QA/QC procedures. Data shall be uploaded to NEDD-NIRIS as appropriate. Concurrence on meeting removal action completion criteria from BRAC, NFECSW and RASO. Complete backfill and site restoration requirements shall be met. No significant violations of the environmental management	100% Navy acceptance	Navy acceptance by Contracting Officer (KO) or Remedial Project Manager (RPM); acceptance by RASO, ROICC, CSO, and NMCPHC. Concurrence by BCT will also weigh in.	Lump sum payable pro-rated as a percentage of task completion. The following milestone limits in the payment schedule are: 25% of the proposed cost at the completion of M&E surveys and building/site preparation, 40% of the proposed task cost at the completion of the site surveys and remediation, 25% at the completion of site remediation actions, final status survey and meeting clean up goals and or risk mitigation acceptance by RPM and RASO; and 10% of task cost upon completion of site restoration and acceptance by KO or RPM, RASO, ROICC, CSO. • Task 2.5.2.1 NRDL Site Area

Work Element / Task	Performance Standard	Acceptable Quality Level	Assessment Method	Performance Payment and Incentive
	plan, i.e. SWPPP or air monitoring violations causing work stoppage.			• Task 2.5.2.2 Ship Berths
Section 2.5.3 (Task 5-Parcel D-1 Rail Tie Survey and Disposal)	Completion of radiological free-release survey of rail ties. Following data review, LLRW materials shall be segregated and staged seperately. Survey and sample results shall be accurately documented and data presented on a weekly basis to the Navy for review. Following review of data, non-LLRW materials shall be properly profiled and shipped off-site to an appropriate landfill. LLRW waste material shall be loaded into a LLRW bin for disposal by the USAJMC contractor.	100% Navy acceptance	Navy acceptance by Remedial Project Manager (RPM); data acceptance by RASO. Waste disposal profile and manifests accepted by the CSO.	Lump sum payable at task completion. The following milestone limits in the payment schedule are: 25% of the proposed cost at the completion of radiological surveys, 70% of the proposed cost at completion of waste disposal activities. 10% of the proposed cost at the completion of a site survey to document there is no residual radioactivity at the stockpile sites.
Section 2.6. (Task 6 – SUPRs, FSS Reports, and RACR)	Navy acceptance of deliverables (no resubmittal required due to inadequate content or poor quality). The SUPR Package reports and RACR should clearly outline the site characteristics, survey and data collection methods, removal action results, and provide ample justifications for no further action and site close out in Parcel E Work Areas. The SUPRs and RACR must be clearly written, and have minimal transcription, typographical, and grammatical errors.	100% Navy acceptance,	Navy acceptance by Contracting Officer (KO) or Remedial Project Manager (RPM); acceptance by RASO, ROICC, CSO, and NMCPHC. Concurrence by BCT will also weigh	Lump sum payable as a percentage of completion through submission of the following deliverables: 2.6.1 SUPRs 2.6.2 FSS Reports 2.6.3 RACR The following milestone limits apply to the payment schedule: 40% of the proposed task cost at distribution of internal draft, 30% of task cost upon acceptance and distribution of draft document by KO or RPM and RASO, and 30% of task cost upon acceptance and distribution of final document

Work Element / Task	Performance Standard	Acceptable Quality Level	Assessment Method	Performance Payment and Incentive
				by KO, RPM, and FFA signatories.
Section 2.7 (Task 7 -Site Support Activities)	Efficient processing of radiological and chemical waste material through screening yard and waste manifesting process. Accurate and timely delivery to transportation and disposal contractor. Environmental considerations during storage and stockpiling, in particular dust mitigation and SWPPP measures must be adequately maintained at all times.	100% Navy acceptance	Navy acceptance by Contracting Officer (KO) or Remedial Project Manager (RPM) and RASO; acceptance by ROICC and CSO. Spot visits by Navy, review of field logs and manifest sheets.	Lump sum payable as a percentage of completed amount of task. • Task 2.7.1.1 Radiological/ Mixed Waste • Task 2.7.1.2 Non-radiological Waste

AMENDMENTS

Solicitation: N62473-09-D-2614, PTO X003

Title: Parcel D-1 Phase II Radiological Remediation and Support, Hunters Point Shipyard (HPS), San Francisco, CA

CS/Phone: Cynthia Mafara, 619-532-0978

PL/Phone: Melanie Kito, 619-532-0995

The Request for Proposal due date is **revised** from **May 30, 2012** to **June 4, 2012** at 2:00 p.m., Pacific Standard Time.

The purpose of the Amendment is to respond to Request for Information (RFI's) :

1. The CD with the reference documents provided by the Navy was not received until May 8th. Will the Navy consider extending the due date for the proposal by at least one week due to the delay in providing reference data?
   Navy Response: The due date remains unchanged for this solicitation.
2. Will the Navy consider increasing the page limitation for the Volume 1 of the proposal to 20 pages?
   Navy Response: The page limitation remains unchanged at 15 pages.
3. Is the contractor required to submit a schedule proposed for the work as part of the Technical Volume? Is the schedule included in the page limitation for Volume 1?
   Navy Response: Yes, a schedule shall be included and does count as part of the 15 pages.
4. Are 11 x 17 size sheets counted as a single page within the page limitation for Volume 1?
   Navy Response: The pages shall be 8.5 x 11 only.
5. RFP Factor 3 – Performance Confidence Assessment: Will a contractor with no performance confidence assessments under the Radiological EMAC and contractors with a Substantial Confidence assessment both be given an Acceptable Rating by the Evaluation Board, or will the contractor with the Substantial Confidence Assessment be rated higher than the contractor with no performance assessment?
   Navy Response: Offerors lacking past performance information on other task orders under this Multiple Award Contract will not be evaluated favorably or unfavorably in past performance and will receive a rating on Unknown Confidence.

6. The Bid Schedule provided includes a lump sum to perform work elements under WE 5. However, Section 2.5.1 of the SOW states: "If during the course of excavation, the contractor encounters previously unidentified SS/SD lines, the total linear feet shall be considered part of the contracted amount of 5,700 linear feet. Conversely, if the lines shown in the design plan are not found, the contractor will only be compensation for the specific linear feet of lines removed."
   a. This wording implies that the contractor will be compensated for this work element on a unit rate basis. Can the Navy clarify if their intent is to compensate the contractor on a lump sum or a unit rate basis?
      Navy Response: See below (b).
   b. If the intent is to compensate the contractor on a unit rate basis, will the unit rate provided be used in the event the contractor encounters SS/SD quantities greater than the contracted amount of 5,700 linear feet?
      Navy Response: **The intent of the referenced statement is to state that the exact number of linear feet that exists in the field is unknown due to previous removal actions, inaccurate as-built drawings, and the designation of Parcel boundaries. Therefore, the contractor is to bid the estimated amount of 5,700 linear feet as a lump sum. Per Section 8.0 of the SOW, the lump sum amount that is included in the contractors proposal will be paid as a pro-rated amount based on what is actually removed. The pro-rated amount will be determined by taking the lump sum and dividing by 5,700. The contractor will be paid based on the exact number of feet removed to date. The contractor will not be expected to remove more than 5,700 linear feet under this task order without compensation. As such, a contract modification would be issued in the event there are more than 5,700 linear feet remaining in Parcel D-1 and a per linear foot price, assumed to be the pro-rated cost from the task order, would be used to cost the work.**

7. Is the contractor required to install any surface stormwater swale system following removal of the storm drain lines in WA13 and WA25? If so, can the Navy provide a copy of the plan/details used to construct the existing swale system used to drain the site?
   Navy Response: No surface stormwater swales will be required for this task order.
8. What condition should the contractor expect to receive RSY-2 when it is turned over by the current contractor? Can we expect that it will be in ready to operate condition or should the contractor expect that it will require repairs prior to use?
   Navy Response: The Navy intends to hand over the RSY free of the need for major repairs and in a ready to use condition.
9. Section 2.5.1.1 of the SOW indicates: "The contractor is responsible for removal of the RSY pads in the RSY-2 area prior to removal of the SS/SD lines, and survey of the NRDL building site which is located beneath. Removal is only required for those pads that obstruct other work…" Is the Contractor required to restore the RSY pads removed following the completion of the SS/SD removal and NRDL survey? If so, can the Navy provide the drawings and specifications used to construct the RSY pads?
   Navy Response: The contractor is not required to restore the RSY pads following survey activities.
10. Can the Navy provide a drawing showing the layout of RSY-2 similar to the drawing file "HPS RSY-4 Rev 03-31-11" that was provided with the recent RFP for PTO X001 HPS Parcel C, Phase II Radiological Remediation and Removal?
    Navy Response: The requested figure is provided as part of this amendment.
11. The SOW Section 2.5.1.1 fifth paragraph states: "The Contractor is responsible for the removal of the RSY pads in the RSY-2 area prior to removal of SS/SD lines, and survey of the NRDL building, which are located beneath. Removal is only required for those pads that obstruct other work. The RSY pads are considered impacted due to their former use in previous sewer removal activities. The contractor shall survey and remove the pads in a manner the preserves the construction materials for later use. Materials shall be segregated, stockpiled, and maintained in a Navy approved location within Parcel D-1 or Parcel E. **A work instruction that details the procedure to be used is provided as reference**." Can the Navy provide the referenced procedure?
    Navy Response: The referenced work instruction was provided on the reference CD provided previously.
12. There is an existing hydrant and water stand adjacent to RSY-4. Is this available to supply water to the contractor under this PTO? Is there any cost for the water?
    Navy Response: Yes, the water stand adjacent to RSY-4 is available for use. Additionally, there is a water source in RSY-2.
13. The SOW Section 2.5.1 first paragraph states: "It should be noted that the lines draining into the berths 21 and 22 have already been previously removed by another contractor or do not exist due to aging infrastructure and erosion events." The Final Design Plan for the Parcel D-1 Sanitary Sewer and Storm Drain Removal (Shaw, 2010) includes a drawing Fig.2 *Sanitary Sewer and Storm Drain Lines in Parcel D-1* that shows two lines draining into Berth 21 and two lines draining into Berth 22. Please confirm that these 4 lines have been removed and do not exist. If partially removed, please identify the portion remaining. If the pipe lines have been removed, were the linear feet associated with those pipes deleted from the estimate in Section 1.3 of the SOW?
    Navy Response: The contractor shall propose a cost for the removal of 5,700 linear feet of pipe. The 4 lines draining into berth 21 and 22 are removed and not part of this SOW.
14. The SOW Section 2.5.1.3, third paragraph states "Chemical sampling of the excavated IR program site soils to determine suitability for use as backfill material is required. IR soils shall be analyzed for the associated chemicals of concern. IR sites and the associated CoCs can be found in the Parcel D-1 Record of Decision." Figure 4 *IR Sites* of the ROD for Parcel D-1 and UC-1 shows several small IR sites associated with Parcel D-1 Work Areas 13 and 25. However, Figure 3 *Parcel D-1 IR Sites and Work Areas* of the Final Design Plan for Parcel D-1 indicates there are no IR sites associated with Work Areas 13 and 25.Please clarify whether any IR sites are within the Work Area 13 and 25 boundaries.

Navy Response: As stated, the IR sites and the associated CoCs can be found in the Parcel D-1 Record of Decision. The D-1 Design Plan does not accurately reflect the status of work areas 13 and 25 because they were not in scope.

15. The SOW Section 2.5.1.3 Sample, Survey, Remediate - What is the average number of biased and systematic samples required to radiologically clear an RSY pad?
Navy Response: 10 biased samples and 20 systematic samples is the average number required to clear an RSY pad.
16. The SOW Section 2.5.1.3 Sample, Survey, Remediate - What is the average number of remediation events required to radiologically clear an RSY pad?
Navy Response: The average number of remediation events is 1.5.
17. The SOW Section 2.5.1.3 Sample, Survey, Remediate - What is the average number of biased and systematic samples required to pass a trench unit?
Navy Response: 10 biased samples and 21 systematic samples is the average number required to clear a trench unit.
18. The SOW Section 2.5.1.3 Sample, Survey, Remediate - What is the average number of remediation events required to radiologically clear a trench unit?
Navy Response: The average number of remediation events is 4 to clear a trench unit.
19. Para 3.8.3 of the Final Design Plan for the Parcel D-1 Sanitary Sewer and Storm Drain Removal states "Shaw will identify and track sewer trenches and intact pieces of trench pipe using the same identification system used by the current Basewide radiological contractor that is currently removing HPS sewer for radiological remediation within other parcels of HPS. This identification nomenclature is presented in the legend of the Parcel D-1 utility maps (Appendix A)." The piping inside of Work Areas 13 and 25 are not identified using the identification nomenclature system. Therefore, the individual pipe numbers, lengths and depth at manholes is not provided. Is it acceptable for the contractor to develop a nomenclature or does the Navy have a preferred system?
Navy Response: The contractor can develop their own nomenclature.
20. The SOW Section 1.3 first paragraph estimates at least 5,700 lineal feet of Sanitary Sewer and Storm Drain lines remaining. Para. 3.8.1 of the Final Design Plan estimates 6,650 linear feet (3655 for Work Area 13 and 2995 for Work Area 25). Paragraph 3.8.1 of the final Design Plan estimates 15,440 cubic yards to be excavated from the two Work Areas. Because pipe lengths vary and pipe depths are not provided, and because the number of Survey Units to be established and the number of soil samples are dependent on pipe lengths and depths, can the Navy provide the basis for the estimates in the Final Design Plan so that all contractors have the same starting information for bids?
Navy Response: The information provided in the Section 2.5.1 of the SOW and in the reference materials is all the information known to the Navy regarding Work Areas 13 and 25.
21. The SOW Section 2.5.3 requires the contractor to radiologically survey and release the railroad ties from radiological controls. "All ties that are not LLRW shall be removed from the site. Transport and disposal are the responsibility of the contractor." Since transportation and disposal costs will be directly proportional to the number of ties, will the Navy consider providing a number of ties for the contractor to base its lump sum for this element of work as indicated on the Bid Schedule? Or will the Navy consider making payment based on unit rate?
Navy Response: The number of ties is unknown to the Navy. The contractor shall bid a lump sum.
22. Is a separate report needed for the survey and disposition of the railroad ties? Is there a need to collect samples under the railroad tie piles for chemical and/or radiological analysis or is the requirement just performing a radiological survey?
Navy Response: A separate report is not required for the survey and disposition of the railroad ties. The contractor shall retain any and all documentation of survey results in the form of field logs and/or laboratory reports. A section in the RACR shall detail the procedures and findings of the surveys and final disposition.
23. Section 2.5.3, paragraph 1 states that "Rail ties that exhibit contamination levels above the action limit…shall be uniquely tracked, stockpiled separately, and controlled in a radiologically controlled area."

Please confirm that ties that meet release criteria are not required to be uniquely tracked and separately stockpiled, but may be disposed at the contractor's convenience in accordance with other stipulations listed in the RFP?

Navy Response: The Navy will review survey data and release the ties from radiological control. Following review, the ties may be disposed of at the contractor's convenience.

24. The quantity of railroad ties is significant and the contractor is responsible for removal and disposal of those that are not LLRW, whereas the contractor will have no cost associated with transportation and disposal of those that qualify as LLRW. There seems to be no prior survey data of the ties and no precedent for these surveys, which leaves a wide range of potential cost for this disposal of non-LLRW. Can the Navy provide guidance to help standardize the conditions that bidders will address in this section of the cost proposal?

    Navy Response: The ties were recently removed from contaminated survey units on the Gun Mole Pier and the South Pier. The levels of Radium and Cesium in soil in all instances were below 2.0 pCi/g and 1.3 pCi/g, respectively. The Navy does not expect to find more than 5% of the railroad ties to exceed the release criteria.

25. Section 2.4.3.2 of the Scope of Work requires the Contractor to perform a FSS of Berths 21, 22 and 29 from the water's edge inland 50-ft. The berths have deteriorated significantly and in some areas, all that remains of the edge of the berth are pilings and other structures surrounded by water. Is it the Navy's intent for the Contractor to survey the berths from the original edge of the berth, including the isolated structures in the water, or to survey from the continuous edge of the water to a point 50-ft inland?

    Navy Response: The contractor shall survey from the mean low low water line to a point 50 feet inland from the edge of the original berth.

26. Portions of the seawall along Berths 21 and 22 have significant degradation in some areas. In the berth areas where water cannot be removed by natural processes (tidal flow) or pumping is use of scanning underwater acceptable or is the contractor expected to install coffer dams or sheet piles to aid in water removal prior to surveying these areas?

    Navy Response: The contractor is not expected to dewater in any manner. Only the exposed portions of the ship berths during a low tide event shall be surveyed. Any portion of ship berths that extends to an elevation lower than the mean low low water line is considered to be Parcel F.

27. Two key documents referenced in the Final Design Plan for Parcel D-1 were not included in the reference documents provided by the Navy. Please provide: (1) Parcel D-1, Sewer Removal Work Plan (Shaw, 2010), and (2) Parcel D-1, Radiological Work Plan (Shaw, 2010)

    Navy Response: Provided as requested.

28. During the site visit, we saw large stockpiles of crushed stone and/or other material along the western portion of WA 25. Will this material be removed by others prior to the start of field work under this CTO? If the gravel will not be removed can portions of the stockpile be moved to facilitate work in this area?

    Navy Response: All gravel and stone stockpiles unrelated to this scope of work will be removed from WA 25 prior to mobilization to the field.

29. During the site visit, we saw a large stockpile of rail and other metallic debris located adjacent to the stockpile of RR ties located in WA 25. Please confirm that survey and/or disposal of this metallic material is outside the scope of this CTO. Can the Contractor expect that this material will be removed by others prior to the start of this CTO?

    Navy Response: The metallic material is outside the scope of work for this CTO. This material will be removed from prior to mobilization to the field.

30. Does the prohibition on 6" diameter or greater materials in the radiological Laydown areas apply to the railroad ties?

    Navy Response: No. The 6" diameter restriction is only applicable to the FSS of the soil on the RSY soil screening pads. Any material may be transported to the yard at the contractor's discretion.

31. Can the Navy describe the desired procedures for recycling the RSY pads?

    Navy Response: A work instruction was previously provided.

32. Will Building 381 be available for contractor use during field work on this CTO? Is 110 V power available at this building?
Navy Response: Yes. Building 381 will be available for use. Power will be required to be pulled from a nearby transformer in the central area of the Gun Mole Pier.

33. Per FAR 16.202 a firm fixed price contract places maximum risk on the contractor, however, the risks must reasonably define functional or detailed specifications with some certainty in order to determine a fair and reasonable price. Factor 4 states that price will be evaluated on the basis of whether or not it is fair and reasonable. Paragraph 2.45.1 in the SOW states that …"the contractor will remove, sample, survey, remediate, backfill and restore a minimum of 5,700 lineal feet of sewer and storm drain lines at a general depth of excavation of these lines between 3-16 feet. If the contractor encounters previously unidentified SS/SD lines, the total linear feet shall be considered part of the contracted amount of 5,700 linear feet". Conversely, if lines shown in the design plan are not found, the contractor will only be compensated for the actual linear feet of lines removed". This goes against the basic tenant of a fixed price competitive contract. Competitive pricing for selection purposes is based 5,700 linear feet. Why would it not be a scope change if the linear feet actually removed is greater or the contactor compensated if it is less than 5,700 linear feet on a fixed price competitive RFP?
Navy Response: The intent of the referenced statement is to state that the exact number of linear feet that exists in the field is unknown due to previous removal actions, inaccurate as-built drawings, and the designation of Parcel boundaries. Therefore, the contractor is to bid the estimated amount of 5,700 linear feet as a lump sum. Per Section 8.0 of the SOW, the lump sum amount that is included in the contractors proposal will be paid as a pro-rated amount based on what is actually removed. The pro-rated amount will be determined by taking the lump sum and dividing by 5,700. The contractor will be paid based on the exact number of feet removed to date. The contractor will not be expected to remove more than 5,700 linear feet under this task order without compensation. As such, a contract modification would be issued in the event there are more than 5,700 linear feet remaining in Parcel D-1 and a per linear foot price, assumed to be the pro-rated cost from the task order, would be used to cost the work.

34. Paragraph 2.4.3 requires Task Specific Plans for Parcel D-1, NRDL Site Area and Ship Berths and does not limit the number of remediations necessary to achieve free release and the extent of excavations and samples could vary greatly and impact price significantly. Please define a reasonable number of rounds of remediations per failed excavation/trench required for pricing and source selection purposes.
Navy Response: The contractor shall assume 3 rounds of remediation and subsequent systematic sampling will be required.

35. Will it be acceptable to follow MARSSIM guidelines and collect systematic samples once and upon a need for remediation, just address the remediated area and then add that final sampling effort to the original set of samples, or is the contractor required to collect a full new set of systematic samples for the unit?
Navy Response: The contractor shall collect a full new set of systematic samples as per the previously executed procedure that has been agreed upon by the State of California and the USEPA.

36. Will LLRW roll-off bins be available to meet proposal schedule and will there be a limited number available to dispose of LLRW?
Navy Response: The contractor shall assume that LLRW bins will be available when requested. The contractor shall assume that a minimum of 20 bins will be available and/or in the possession of the contractor at any time.

37. Will the ROICC also approve work plans before work begins? In the past, the ROICC has required an addition of an Excavation Plan to the original task specific plans.
Navy Response: The ROICC will review and comment on project work plans during the allowable Navy internal draft review period. Approval will come from the Navy BRAC office. Per the original SOW for this task order, the contractor shall meet the requirements of the EM-385. The Excavation Plan is a requirement in Appendix A of the EM-385 and is therefore not called out as a project work plan in the SOW that will require regulatory review.

38. The SOW does not define the ultimate disposition of the RSY-2. At the conclusion of field work, is the contractor responsible for demobilization and disposal of RSY-2 construction material and final free-release of the RSY area? If not, what is the contractor's responsibility?
Navy Response: The contractor's responsibility is to remove only the RSY pads that are necessary to conduct the radiological surveys and SS/SD removals in the area. The pads shall be deconstructed per the work instruction provided in the reference CD. The material shall be stockpiled and managed within Parcel D-1 until demobilization. During demobilization, the contractor shall conduct a radiological scan of the RSY-2 area to identify any residual contamination that is consistent with criteria established in the work instruction. Deconstruction of the remaining pads is not required as part of this SOW.

39. Regarding the font requirement for Volume I: Technical Submittal, does the 12 point Times New Roman requirement also pertain to Exhibits within the Volume?
Navy Response: No.

40. Can the Navy provide a drawing showing the layout of RSY-2 with an overlay of the location of the SS/SD piping to be removed in WA 13 to facilitate the contractor's determination of the proposed approach for removing soil in the RSY?
Navy Response: The requested figure is provided.

41. **Section 2.3.2 – Mobilization**: This section states that this element includes the transport of equipment to and from the site.
    - Will the Contractor be required to perform incoming and outgoing surveys of equipment being brought onto the site or will this continue to be performed by the Basewide Radiological Support Contractor?

    Navy Response: The contractor for this CTO will be responsible for incoming and outgoing surveys.

42. **Section 2.3.4 Logistical Support:** Building 381 will be available for use by the contractor.
    a. Will this building already have power provided or will the contractor need to supply or re-establish power?
    Navy Response: The contractor will need to supply and re-establish power.

    b. The Design Plan shows Building 381 and the Northern portion of Berth 21 to be within Shaw's Work Area 28. Will Shaw be moving their RCA boundary to the Southern edge of the Gun Mole Pier to allow the contractor access to the work area?
    Navy Response: Yes

43. **Section 2.4 – Work Element 4 – Planning Documents**: This section states that the Navy will require 21 calendar days to review and comment on the internal draft versions.
    - What is the estimated duration that will be required by the regulatory agencies to review the draft version?

    Navy Response: 30 calendar days.

- In Section 2.5.3 Parcel D-1 Rail Tie Survey and Disposal it states that the contractor is responsible for the transport and disposal of the non-LLRW rail ties. Will the contractor be required to generate a Waste Management Plan for the rail tie disposal, or is there an existing Basewide Waste Management Plan the Navy can provide?
  Navy Response: No. The contractor will not be required to generate a Waste Management Plan.

44. **Section 2.4.1.6.1 – Storm Water Pollution Prevention Plan**: This section states that the SWPPP shall meet the requirements of the State of California general permit for storm water discharges from construction sites.
    - Does the Navy want the SWPPP to meet the requirements specified in Water Quality Order 2009-0009-DWQ as amended by 2010-0013-DWQ on November 16, 2010, including the requirement to have a State of California Water Board Certified Qualified SWPPP Developer (QSD) and a Qualified SWPPP Practitioner (QSP)?
      Navy Response: Yes.

45. **Evaluation Factor 3 – Performance Confidence Assessment**: This section states that explanations shall not exceed two double-sided (or four single-sided pages) in total. Is this assessment part of the maximum fifteen page limit for Volume 1?
    Navy Response: No.

46. **Section 2.5.1 Sewer and Storm Drain Removal:**
    a. Can the Navy provide a figure identifying the trench survey units that are adjacent to or within Work Areas 13 and 25?
    Navy Response: The requested figure has been provided.

    b. For those adjacent trench survey units, can the Navy provide the corresponding SUPRs, or at a minimum the SU figures and analytical results so that the bidders can identify potentially contaminated lines? The information will be used to insure proper controls and worker safety concerns are addressed properly budgeted.
    Navy Response: The SUPRs for the adjacent trench survey units are not available at this time. The Navy is in the process of issuing these reports to the regulators. Following award of this contract task order, the contractor will be provided this information.

    c. The RFP noted that lines draining berths 21 and 22 have been previously removed; will these SUPRs be incorporated into the D-1 Phase-2 RACR?
    Navy Response: No. The D-1 Phase II RACR will incorporate only the work performed under this task order.

47. **Section 2.5.1.1 – Prepare the Work Area**:
    - Are there any monitoring wells or other key features in Parcel D-1 that have to be abandoned and/or protected?
      Navy Response: The contractor shall make effort to protect any existing wells during excavation, stockpile, and transportation activities. If in the event a well must be destroyed, the Navy shall be notified. No cost shall be included in this scope of work for abandonment or replacement of wells.

    - Are the bidders responsible for abandoning and/or replacing damaged wells? If yes, are there Monitoring Well construction details available?
      Navy Response: No. Abandoning or replacing wells is not included in this scope of work.

    - During the site walk it was obvious that several contractors are currently using a combination of permanent fencing and/or temporary fence panels to establish work area boundaries and RCAs in Parcel D-1 and immediately adjacent in Parcel E. Does the Navy have a figure identifying what

fencing will remain and what the contractors need to supply? For example, will the contractor be required to provide temporary fence panels around RSY 2?
Navy Response: The Navy does not currently have a figure identifying the temporary fencing versus permanent fencing. The contractor shall assume new fencing will need to be installed around RSY-2.

- Are there any access or transportation issues for the Federal Police, CSO, other activities on the base, other contractors, etc. that need to be addressed?
Navy Response: The scope of work addresses the coordination and access requirements.

48. **Section 2.5.1.3 – Sample, Survey, Remediate**: Material not suitable for backfill, defined as being above the project action limits, shall be released of radiological control, consolidated, moved off-site, and managed until the basewide transportation and disposal contractor mobilizes to remove the material.
    - Where is the stockpile location for the soil that is not suitable for backfill?
Navy Response: The area known as Metal Debris Reef in the southern corner of Parcel E will be used as the stockpile area for material that is not suitable for backfill.

    - How long should the contractor allow for managing these stockpiles?
Navy Response: Stockpiles that are deemed unsuitable for backfill will be removed by the basewide T&D contractor within 60 days.

    - Does the Navy anticipate any non-radiological contractors to be working in Parcel D-1 during the execution of this project? If yes; what areas are affected?
Navy Response: Yes, the Navy Basewide groundwater contractor will require periodic access to monitor wells in the D-1 parcel. This activity occurs on a quarterly basis. Any area with a monitoring well will be affected.

    - Does the contractor have to provide radiological support for these non-radiological contractors during their work and what is the estimated duration?
Navy Response: Yes, radiological support will be required. The contactor shall assume two days per quarter will require support.

49. **Section 2.5.1.3 – Sample, Survey, Remediate**: Regarding the pads and trenches:
    - What is the average number of biased and systematic samples required to radiologically clear an RSY pad?
Navy Response: 10 biased samples and 20 systematic samples is the average number required to clear an RSY pad.
    - What is the average number of remediation events required to radiologically clear an RSY pad?
Navy Response: The average number of remediation events is 1.5.
    - What is the average number of biased and systematic samples required to pass a trench unit?
Navy Response: 10 biased samples and 21 systematic samples is the average number required to clear a trench unit.
    - What is the average number of remediation events required to radiologically clear a trench unit?
Navy Response: The average number of remediation events is 4 to clear a trench unit.
50. **Section 2.5.1.4 – Backfill and Restore Site Conditions**:
    - Are there any requirements to provide drainage in the areas affected by storm drain removal actions?
Navy Response: No

51. **Section 2.5.2.2 Ship Berths**: Regarding radiological surveys of soil associated with the Parcel D-1 ship berths;

- For soil sample collection for Class 1 surveys associated with the ship berths in Parcel D-1, will a 10% sample collection rate for Pu-239 (as is typically the case for Sr-90) be acceptable except in the cases where elevated concentrations of Cs-137 are identified?
  Navy Response: Yes.

- For radiological surveys of concrete and asphalt surfaces of Parcel D-1 ship berths, will gamma scan surveys (including FIDLER surveys) be required, or are 100% alpha and beta scan surveys using Ludlum 43-37 series and 43-68 gas flow proportional counters acceptable?
  Navy Response: A FIDLER survey will not be required.

- Will GPS maps be required for scan surveys?
  Navy Response: Yes.

- The berths are identified as an area 50-ft inland of the water's edge. The edge of the berths is constructed of badly deteriorated corrugated metal and severely undermined asphalt. What are the expectations for conducting site restoration?
  Navy Response: The contractor shall survey from the mean low low water line to a point 50 feet inland from the edge of the original berth.

52. **Section 2.5.3 Parcel D-1 Rail Tie Survey and Disposal**
    a. Can the Navy provide a survey unit figure for the Gun Mole and South Pier and a summary of the corresponding SU soil analytical data? To simplify this data request, the analytical data could be limited to those samples that exceed the release criteria, or simply the highest detected analytical result identified per survey unit. Identifying the radionuclides and the levels of contamination is essential to selecting the scanning instrumentation and for developing a methodology that minimizes the generation of LLRW.
       Navy Response: The FSS reports are not finalized at this time and the requested data is not available.

    b. Will Shaw still have radiological control over the area where the rail ties are located in WA 24 adjacent to Berth 14 or will this area be turned over to the contractor who is awarded this contract?
       Navy Response: This area will be turned over to the contractor who is awarded this contract.

    c. Has the Navy established a timeframe for when the stockpiled asphalt currently in Work Area 25 will be moved?
       Navy Response: The stockpiled asphalt will be removed prior to the contractor mobilizing under this SOW.

    d. Does the Navy have operational requirements or procedures for running a Portal monitor?
       Navy Response: Yes. The requested procedure is included as reference.

53. **Section 2.6.3 Removal Action Completion Reports**: This section states that following the completion of the SUPRs and Final Status Survey reports, along with respective concurrence from the Navy and BCT, the Contractor shall summarize the findings of these documents into a RACR.
    a. Since RACRs typically include the radiological work performed for entire parcels, will the Navy require incorporation of the Parcel D-1 Phase I SUPRs and Final Status Survey reports prepared by Shaw into the Parcel D-1 RACR or will the Navy keep Phase I and Phase II as separate Parcel D-1 RACR documents?
       Navy Response: The Navy will keep Phase I and Phase II separate.

b. If one RACR is to be prepared for all of Parcel D-1 (Phase I and Phase II), should these costs be included in the response to the RFP or should the costs be limited to preparation of only the Phase II SOW RACR?
Navy Response: Not applicable.

c. If Phase I and Phase II are to be combined into a single RACR for Parcel D-1, will the Navy make the raw data as well as all reports prepared for Phase I available in a useable format (Word/Excel/Access) for preparation of the Parcel D-1 RACR?
Navy Response: Not applicable.

54. **Section 2.7.1.2 Non-Radiological Wastes**: Waste characterization sampling is included, but disposal will be performed by the basewide chemical T&D contractor. Can the Navy provide the minimum sampling requirements and frequency that the T&D contractor will require since different landfills require different analysis?
Navy Response: The contractor shall refer to and be responsible for standard sampling requirements for waste profiling and disposal originating from IR sites with the CoC's cited in the ROD.

55. **Bid Schedule (Page 20 of 27):**
a. Work Element 5, Parcel D-1 Rail Tie Survey and Disposal - What are the units for the Parcel D-1 Rail Tie Survey and Disposal?
Navy Response: Lump Sum

b. Work Element 7, Waste Material Management – The total cost is grayed out. Are these costs supposed to be included in the total cost? If yes, how many months should the contractors assume waste must be managed?
Navy Response: Yes. 12 months

56. Reference is made to (b) Basis of Evaluation under Factor 3. The second paragraph states that offerors lacking past performance on task orders under the MAC will receive a rating of Unknown Confidence. However, the preceding paragraph states that the Government reserves the right to obtain information associated with past performance from any and all sources outside the Government. If the Government chooses to obtain information from any and all sources outside the Government, does this not conflict with giving offerors that have not performed on task orders under the MAC a rating of Unknown Confidence? Please explain if there is no conflict in the Government's view.
Navy Response: Yes, this is a conflict, so the second sentence in b. is to be deleted through the end of the paragraph.

57. Reference is made to Section 3.1. Please confirm that the extent to which an offeror identifies and commits in their proposal to a plan to hire residents in the vicinity of the installation at which work is to be performed is not a source selection factor in this solicitation.
Navy Response: Correct, this is not a source selection criteria, but is subject to audit at anytime.

58. Please confirm that the California Executive Order D-62-02 that bans the disposal of decommissioning waste from a radiologically impacted facility/site to a state of California Class III Landfill applies to the non-LLRW wooded ties at HPNS.
Navy Response: Wooded ties that are scanned and proven to be non-LLRW can be disposed of as non-LLRW as long as they meet all of the landfill requirements.

59. Section 2.2.2 states that a minimum of 3 Regulatory meetings. For pricing purposes, please define the number of meetings the contractor should include in this proposal?
Navy Response: 3 meetings in person. However, the contractor will be responsible for supplying the appropriate updated information for the monthly basewide radiological presentations.

60. Berth 29 is to be radiologically cleared in accordance with the Scope of Work. Berth 29 extends into Parcel E. Does the Berth 29 clearance requirement under this Scope of Work end at the Parcel D-1 boundary? If not, how far does it extend into Parcel E.
Navy Response: Yes, this scope of work only covers the Parcel D-1 boundary. Please refer to the site boundary map to estimate the Parcel D-1/E boundary.

61. The Scope of Work does not indicate a schedule submittal requirement. Is there a schedule submittal requirement? If a schedule for the work is submitted, should that be included in the 15 pages page limitation? If not and required, can it be included with the cost estimate?

Navy Response: Yes, a schedule should be included with the 15 page limitation.

Solicitation: N62473-09-D-2614, PTO X003

Title: Parcel D-1 Phase II Radiological Remediation and Support, Hunters Point Shipyard (HPS), San Francisco, CA

CS/Phone: Cynthia Mafara, 619-532-0978

PL/Phone: Melanie Kito, 619-532-0995

THE PURPOSE OF THIS AMENDMENT IS TO OPEN DISCUSSIONS WITH ALL PARTICIPATING OFFERORS, AND MAKE CLARIFICATIONS AND/OR CHANGES TO THE RFP AS FOLLOWS:

ADMINISTRATIVE CHANGES:

1. Discussions under the subject RFP are hereby opened and you are afforded the opportunity to respond to questions regarding your technical proposal, and to revise your price proposal in response to this Amendment.

2. Any Technical revision to your proposal resulting from this Amendment must be received before **10:00 AM on July 2, 2012, local time, PST**, if it is to be considered.

3. Acknowledgement of all Amendments must be made and submitted with your revised technical proposal. **A Final Proposal Revision, including revised Prices must be labeled "Revised."**

4. The receipt of this information is subject to FAR 52.215-1, "INSTRUCTIONS TO OFFORERS – COMPETITIVE ACQUISITIONS (JAN 2004)," which is contained in this basic contract.

5. TECHNICAL CLARIFICATIONS AND / OR CHANGES: Responses to the attached questions are limited to 5 pages and may be e-mailed.

6. All of the terms and conditions set forth in the RFP apply to any additional information that may result from this Amendment.

WAGE DETERMINATION

CA120029 MOD 4 REVISED 04/27/12 CA29

******** THIS WAGE DETERMINATION WAS REPLACED ON 04/27/12********

General Decision Number: CA120029 04/20/2012

Superseded General Decision Number: CA20100029

State: California

Construction Types: Building, Heavy (Heavy and Dredging) and

Highway

Counties: Alameda, Calaveras, Contra Costa, Fresno, Kings,

Madera, Mariposa, Merced, Monterey, San Benito, San Francisco,
San Joaquin, San Mateo, Santa Clara, Santa Cruz, Stanislaus and
Tuolumne Counties in California.

BUILDING CONSTRUCTION PROJECTS; DREDGING PROJECTS (does not include hopper dredge work); HEAVY CONSTRUCTION PROJECTS (does not include water well drilling); HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	01/06/2012
1	01/20/2012
2	01/27/2012
3	03/02/2012
4	04/20/2012

ASBE0016-001 08/01/2011

AREA 1: ALAMEDA, CONTRA COSTA, LAKE, MARIN, MENDOCINO, MONTEREY, NAPA, SAN BENITO, SAN FRANCISCO, SAN MATEO, SANTA CLARA, SANTA CRUZ, SOLANO, & SONOMA COUNTIES

AREA 2: ALPINE, AMADOR, BUTTE, CALAVERAS, COLUSA, DEL NORTE, EL DORADO, FRESNO, GLENN, HUMBOLDT, KINGS, LASSEN, MADERA, MARIPOSA, MERCED, MODOC, MONO, NEVADA, PLACER, PLUMAS, SACRAMENTO, SAN JOAQUIN, SHASTA, SIERRA, SISKIYOU, STANISLAU, SUTTER, TEHEMA, TRINITY, TULARE, TUOLUMNE, YOLO, & YUBA COUNTIES

INSPECTION AND ACCEPTANCE TERMS

Supplies/services will be inspected/accepted at:

CLIN	INSPECT AT	INSPECT BY	ACCEPT AT	ACCEPT BY
0001	N/A	N/A	N/A	Government
000101	N/A	N/A	N/A	Government

ATTACHMENT 3

RADIATION PROTECTION PLAN

FINAL
RADIATION PROTECTION PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared under:

Contract Number N63473-10-D-0808
Contract Task Order Number 0004
Document Control Number ITSI-0808-0004-0013

Prepared for:

U.S. Department of the Navy
BRAC Program Management Office West
1455 Frazee Road, Suite 900
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Under contract to:

U.S. Department of the Navy
Naval Facilities Engineering Command Southwest
1220 Pacific Highway
San Diego, California 92132

Prepared by:

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July 2013 **ITSI Gilbane Project No. 07204.0004**

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Appendix A Radiation Protection Plan Acknowledgment Form

ACRONYMS AND ABBREVIATIONS

AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
APP	Accident Prevention Plan
CFR	Code of Federal Regulations
DAC	derived air concentration
DOT	U.S. Department of Transportation
HPNS	Hunters Point Naval Shipyard
HRA	Historical Radiological Assessment
MOU	Memorandum of Understanding
NRC	U.S. Nuclear Regulatory Commission
PPE	personal protective equipment
QC	quality control
Ra-226	radium-226
RASO	Radiological Affairs Support Office
RCA	radiologically controlled area
RMA	radioactive material area
RML	radioactive material license
RPP	Radiation Protection Plan
RSO	Radiation Safety Officer
RSOR	Radiation Safety Officer Representative
RSOP	radiation safety operating procedure
RST	Radiation Safety Technician
RWP	radiation work permit
SSHP	Site Safety and Health Plan
TEDE	total effective dose equivalent

1.0 PURPOSE/INTRODUCTION

The purpose of this Radiation Protection Plan (RPP) is to detail the ITSI Gilbane Company (ITSI Gilbane) requirements for activities conducted under Radioactive Material License (RML) No. 04-29353-01, issued and subject to regulatory enforcement by the United States Nuclear Regulatory Commission (NRC). The following activities are subject to this RPP: project activities that involve the use and/or handling of licensed by-product, source, and/or special nuclear material (hereafter referred to as radioactive material); tasks with the potential for radioactive material to be present based on available data and historical records; and work in locations posted and controlled because of radioactive material. Project activities will incorporate the requirements within to maintain compliance in parallel with the current version of corporate procedure RSP-001, Radiation Safety Program.

Project activity performance steps are detailed in site-specific Work Plans, Radiation Safety Operating Procedures (RSOPs), Work Instructions, Task-Specific Plans, etc. (Agencies that may have jurisdiction or an interest in project activities are also identified in such documents.) Project staff tasked to perform assignments involving the presence of radioactive material (e.g., those identified in the applicable portions of Section 2.0) will complete a review of this document and indicate an understanding of all requirements by completing a Radiation Protection Plan Acknowledgment Form (Appendix A).

1.1 POLICY

It is ITSI Gilbane policy that work with radioactive material be purposeful and performed in a manner that protects project staff, members of the general public, and the environment. Radiologically oriented work may not begin unless it can be performed in a safe and reliable manner that is compliant with the exposure reduction rules, regulations, and principles described in Section 1.3.

1.2 PROJECT-SPECIFIC RADIATION PROTECTION PLAN

Corporate procedure RSP-001, Radiation Safety Program, provides the foundation for the RPP and its use for any project or activity that involves the possession or use of radioactive materials, including the subsequent potential for exposure to ionizing radiation. Content provided within

this RPP reflects corporate policy and provides the guidance needed for project management to execute the scope of work in a safe manner. Site-specific guidance for radiological safety and control is further detailed in RSOPs. RSOPs are subject to approval by the company's Radiation Safety Officer (RSO) or designee. A current set for each viable project is available upon request.

1.3 AS LOW AS REASONABLY ACHIEVABLE

Work involving radioactive material and any corresponding exposure to ionizing radiation must be purposeful and performed in a manner sufficient to ensure the protection of staff, members of the public, and the environment. ITSI Gilbane applies industry recognized principles to radiological work so that exposure to ionizing radiation is maintained in accordance with corporate policy.

1.4 AUTHORIZATION TO STOP WORK

In accordance with corporate procedure RSP-001, Radiation Safety Program, and as detailed in Section 2.9, employees are authorized to stop work if an unsafe condition exists or safety protocol is being violated, and immediately report the condition to project management.

Work performed under a Radiation Work Permit (RWP) will stop, and the Radiological Affairs Support Office (RASO) will be notified if any of the following atypical work site conditions are encountered:

- An individual total effective dose equivalent (TEDE) exceeding 500 millirems
- The collective TEDE for the job exceeding 1 rem
- Individual airborne exposures exceeding 10 derived air concentration (DAC) hours in a 7-day period
- General area exposure rates exceeding limits of current radiological posting
- Contamination levels exceeding 100 times the limits requiring classification of an area as a Contaminated Area

In cases where the RASO must be notified, the license RSO, with concurrence from the RASO, must approve the RWP prior to restarting work.

1.5 SCOPE OF WORK

The project-specific scope of work involves the following activities:

- Task-specific training of personnel

- Site controls and establishment of work zones at sites with, or having the potential for, radioactive commodities or contaminants
- Handling and management of collected radioactive commodities, radiologically contaminated soil, or other radiologically contaminated material
- Site investigation and remediation including characterization surveys and sampling, excavation, screening for and removal of commodities, and surveys and sampling to document final conditions

1.6 QUALITY CONTROL AND AUDITING

To maintain continued compliance and evaluate overall RPP effectiveness, quality control (QC) measures including self-assessment and management reviews will be used. Formal audits, including those conducted at field projects, will be coordinated and tracked to completion by the RSO as will any need for adjustments to audit frequencies.

1.6.1 Self-Assessment, Management Reviews, and Audits

A self-assessment and management review of RPP use will be conducted. Project personnel including the Project Manager, Radiation Safety Officer Representative (RSOR), and on-site personnel will support and cooperate with any audit conducted.

1.6.2 Responses and Corrective Actions

Radiological deficiencies must be responded to in a timely fashion. Deficiencies that represent an imminent threat to radiological control or safety (e.g., compromise of procedural protocol, etc.) will be immediately reported to the RSOR, RSO, and Project Manager or designee(s). Subsequent corrective actions will be tracked to completion by the RSOR. Radiological deficiencies, including corrective actions, will be promptly reported by the RSOR to the project client (e.g., the Navy; for the purposes of this RPP, Navy means U.S. Department of the Navy, Naval Facilities Engineering Command Southwest; U.S. Department of the Navy, Base Realignment and Closure, Program Management Office; and Naval Sea Systems Command Detachment, RASO). Responses to findings will be submitted to the RSO for review, approval, and final disposition.

1.6.3 Daily Instrumentation Check

As addressed in Section 3.16, survey instruments procured for field use will have proof of current calibrations in accordance with the manufacturers' procedures, employing applicable standards and sources traceable to the National Institute of Standards and Technology. Copies of

instrument calibration certificates will be maintained on-site for reference. Instruments will be response-checked daily in accordance with applicable RSOP. (In addition to the manufacturers' instruction manuals, typical project instruments and their performance characteristics are identified in site-specific controlling documents such as a Site-Specific Work Plan.)

2.0 RADIATION PROTECTION PERSONNEL

This section details the radiological safety responsibilities vested with key personnel within the project. [Non-radiological safety responsibilities will be detailed in a separate project-specific Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP)]. Reporting relationships between ITSI Gilbane support personnel and the client (e.g., the Navy) will be referenced in a site- specific controlling document as well (e.g., task-specific plan).

2.1 SENIOR VICE PRESIDENT, ENVIRONMENTAL

The Senior Vice President, Environmental, has overall responsibility for ITSI Gilbane's safety operations and is responsible for:

- Ensuring proper maintenance of the RPP consistent with applicable regulatory mandates, ITSI Gilbane corporate policy, and recognized industry practice
- Establishing and maintaining all necessary management oversight specific to the RPP
- Implementing a management review process to ensure applicable use of RPP requirements

2.2 RADIATION SAFETY OFFICER

The RSO is appointed by the Senior Vice President, Environmental, as the senior health physicist for ITSI Gilbane. The RSO is responsible for:

- Reviewing and making recommended revisions to:
  - The RPP, RML procedures, radiation protection guidelines, and supporting documents
  - Project plans involving the use or handling of radioactive materials, or access to areas of radiological concern to ensure compliance with RPP requirements and supporting guidelines
- Acting as the corporate- level or license RSO
- Designating an RSOR to provide day-to-day guidance on radiological protection issues
- Ensuring compliance as the license RSO, with RML No. 04-29353-01, including:
  - Primary point of contact for all communications to the NRC
  - Identification and training of RML authorized users, and assignment of RSORs
  - Coordination of investigations involving radiological occurrences to include review and approval of a resulting Corrective Action Plan
  - Advance NRC notification in writing at least 14 days before initiating at a temporary job site under ITSI Gilbane RML jurisdiction any activity, or change to scope

involving new activities, in areas of radiological concern (excluding routine packaging or repackaging for purposes of transporting and not requiring a job- or site-specific work package, and characterization and/or final surveys where radioactive materials and/or radiation are not likely to be detected)

- Refrain from taking ownership of licensed materials in excess of possession limits without prior notification and written NRC approval
- Advance NRC notification in writing within 30 days of the temporary job site completion status involving decontamination and decommissioning activities, and disposition of any licensed material as related to RML jurisdiction
- Placement of reciprocity request with applicable Agreement States when necessary
- Maintenance of radiological exposure records
- Development and/or approval of radiation safety training materials and/or courses
- Performance of program audits
- Providing guidance on radiological protection issues
- Identification of appropriate project staffing needs to implement RPP requirements
- Assistance with the development and approval of site health and safety plans for projects that involve the use or handling of radioactive materials or access to areas of radiological concern
- Resource specialist review for procedures or work instructions for proposed projects involving exposure to radiation or radioactive materials

- Delegating project responsibilities to other company health physicists (also referred to as RSORs), as necessary

2.3 RADIATION SAFETY OFFICER REPRESENTATIVE

The RSOR is assigned by the RSO and vested with corporate-level authority to implement the RPP and the ITSI Gilbane RML at a project site. Whenever radiological work is actively ongoing under the ITSI Gilbane RML, the RSOR or designee identified as an authorized user will be present at the project site. The RSOR is vested with the following responsibilities at projects subject to jurisdiction involving the ITSI Gilbane RML:

- Providing health physics guidance on an as-needed basis
- Conducting required radiological safety training
- Reviewing and approving project field procedures that involve the handling of radioactive materials or access to areas of radiological concern
- Conducting radiation incident investigations and project inspections
- Maintaining a project site file that details radiological protection training provided, dosimetry records generated, radiological surveys performed, and other documentation

pertinent to the RPP, RML procedures, radiation protection guidelines, and supporting documents; copies of these will be provided to the RSO at the conclusion of the project

- Arranging for and assisting in program radiation protection audits
- Assisting in the development and approval of the site EHS plan
- Helping in the identification of project radiological analysis needs and selection of analytical support contractors
- Coordinating required ALARA reviews
- Ensuring appropriate staff work practices are employed to maintain occupational radiation exposures ALARA
- Ensuring items needed to perform work in accordance with the RPP, RML, and supporting documents are available, such as appropriate instrumentation, protective devices, dosimetry, etc.
- Directing the preparation of, and performing the review and approval of, RWPs
- Stopping work if necessary to ensure radiological safety
- Communicating with the Project Manager and RSO as needed to ensure the RPP is implemented correctly
- Ensuring proper operation of radiation-measuring equipment, including the performance of daily function and QC tests, and removing out-of-compliance instruments from service
- Maintaining radiation-measuring equipment in accordance with manufacturers' recommendations
- Directing and supervising the performance of radiological surveys and sampling in accordance with the most current version of this RPP and supporting RSOPs
- Reviewing survey reports and instrument performance data for accuracy, completeness, and compliance with project, procedural, and regulatory requirements
- Ensuring work is performed in accordance with current versions of project plans, procedures, and the RPP

The RSOR reports to and receives technical direction from the RSO, advises the Project Manager on radiation protection and radiological operation matters, coordinates with the Project Manager on day-to-day project activities, and communicates and coordinates radiation protection and radiological operation activities with the RSO and the client. The RSOR may delegate project responsibilities to other staff members deemed qualified for the task assigned.

2.4 PROJECT MANAGER

The Project Manager is responsible for:

- Ensuring implementation of and compliance with the RPP requirements and current versions of the following support documents applicable to the project:
  - ITSI Gilbane RML procedures (i.e., applicable NRC License Procedures)
  - ITSI Gilbane radiation protection guidance
- Forwarding any procedure or work instruction involving exposure to ionizing radiation or radioactive material to the RSO or designee for input and review (involvement includes the use of subcontractors who may use radioactive materials or radiation- generating devices in the course of corresponding work such as field radiography, soil density gauges, well logging, etc.)
- Determining with the assistance of the RSO or designee if the project is required to use the ITSI Gilbane RML or if activities will fall under a Department of Energy, NRC, Agreement State, or other license
- Working with the RSO in accordance with corporate procedure RSP-001, Radiation Safety Program, to identify applicable NRC and Agreement State requirements for projects that will not use the ITSI Gilbane RML
- The safe conduct of work in compliance with all permits, client contracts, and other controlling documents that apply
- Exposure to radiation ALARA by project staff
- Adequate resources and staffing to develop and implement this RPP in compliance with applicable regulations and requirements

The Project Manager reports to the ITSI Gilbane Program Manager.

2.5 CONSTRUCTION MANAGER/SITE SUPERVISOR

Responsibilities for the Construction Manager/Site Supervisor include:

- Ensuring assigned personnel comply with radiological requirements
- Supplying relevant information to the RSOR regarding planned work activities and proposed applications necessary to maintain occupational radiation exposures ALARA
- Timely RSOR and Project Manager notification of radiological problems or issues encountered
- Verifying staff is sufficiently prepared for assigned tasks (e.g., appropriate tools and equipment needed to minimize the time spent in areas of radiological concern)
- Confirming that escorted visitors accessing areas of radiological concern are properly supervised and exhibiting safe work practices in accordance with RPP protocol

The Construction Manager/Site Supervisor reports to the Project Manager.

2.6 RADIATION SAFETY TECHNICIAN SUPERVISOR

The Radiation Safety Technician (RST) Supervisor is the ITSI Gilbane representative responsible for RST oversight and corresponding field operations conducted in areas of radiological concern. Designated as an authorized user at projects subject to jurisdiction under the ITSI Gilbane RML, the RST Supervisor is vested with the following responsibilities:

- Supporting required ALARA reviews
- Coordinating plans for field activities with the Construction Manager/Site Supervisor to ensure exposure to radiation is maintained ALARA and in accordance with corresponding RWPs
- Supervising the preparation of, and performing review of, RWPs
- Stopping work if necessary to ensure radiation safety
- Maintaining communication with the RSOR, Project Manager, Construction Manager/Site Supervisor as needed to ensure the RPP is fully implemented
- Confirming proper operation of radiation survey instruments, including the validation of daily function and QC checks, and removing noncompliant instruments from service
- Ensuring radiation survey instruments are maintained in a way that complies with manufacturer instructions and recommendations
- Directing and supervising the performance of radiological survey and sampling practices in accordance with the RPP, current versions of applicable SOPs, and corresponding RWPs
- Validating field survey reports and instrument performance data for accuracy, completeness, and compliance with the RPP, applicable SOPs, and corresponding RWPs
- Participating in periodic internal and external reviews of RPP content and implementation
- Supporting self-assessments and management reviews as needed and correcting identified deficiencies within the allotted time frame

The RST Supervisor reports to and receives technical direction from the RSOR.

2.7 RADIATION SAFETY TECHNICIANS

The RSTs are responsible for:

- Ensuring occupational exposure to radiation is maintained ALARA
- RWP preparation, use, and adherence
- Stopping work if necessary to ensure radiological safety

- Performing radiation surveys and other radiological safety tasks in accordance with the RPP, applicable SOPs, and corresponding RWPs
- Confirming proper operation of assigned radiation survey instruments prior to field use to include verification of daily function and QC performance checks, and removing noncompliant instruments from service
- Using radiation survey instruments in accordance with the RPP, applicable RSOPs, and corresponding RWPs and maintaining the instruments in a way that complies with manufacturers' instructions and recommendations

The RCTs report to and receive technical direction from the RST Supervisor.

2.8 RADIATION WORKERS (FIELD PERSONNEL)

Project staff (including the general labor force associated with the Company and subcontractors) who have the potential to receive occupational exposure to radiation while on the job site, and who are expected to work under the requirements of this RPP as radiation workers, will:

- Receive sufficient training, prior to beginning work
- Report to an RST or RST Supervisor non-occupational radiation exposures that result from the use of medical or dental applications more aggressive than a standard X-ray
- Comply with requirements of all procedures and guidelines applicable to the project
- As required, exercise stop work authority and report radiological safety issues or concerns, including incidents and unplanned events, immediately to project management; respond promptly to any stop-work and/or evacuate orders
- Display use of industry recognized radiological work practices when inside areas of radiological concern, and conform promptly to instructions when provided by RSTs
- Strictly adhere to radiological control procedures, guidelines, and postings including information provided in RWPs
- Immediately report lost dosimetry devices to an RST or RST Supervisor
- Report planned medical radiation treatments in advance to supervision and the RSOR and prior to entering areas of radiological concern or wearing dosimetry
- Periodically confirm personal radiation exposure status and ensure that administrative dose guidelines are not exceeded
- Notify the RST of faulty or alarming radiological protection equipment.

When in areas of radiological concern, workers report to the RST Supervisor.

2.9 STOP WORK AUTHORITY

Company and subcontractor personnel will have the responsibility and authority to stop work when controls are inadequate or imminent danger exists. In any situation in which stop work authority is used, the following requirements will apply:

- Exercise stop work authority in a justifiable and responsible manner
- Once work is stopped, do NOT resume until proper controls have been established
- Resumption of work will require concurrence by the Project Manager or designee.

3.0 TASK-SPECIFIC HAZARD ANALYSIS/CONTROLS

A task-specific hazard analysis is performed on a daily basis to allow for risk identification associated with site work, including physical, chemical, and radiological components. (Radiation exposures that result from naturally occurring background sources and medical applications conducted under the care of a physician are examples of dose that is independent of occupational monitoring requirements but considered when planning task assignments. In instances of verifiable therapeutic applications, employee-furnished notifications will be used as an informational reference and included as part of a corresponding radiation exposure file.) Risk-based hazards and controls are defined in a site-specific Activity Hazard Analysis. Anticipated physical and chemical risks are described in detail in the project-specific APP/SSHP. Radiological risk controls are categorized in the sections to follow, and protective measures apply as defined in task-specific RWPs and corresponding SOPs.

3.1 IDENTIFICATION OF RADIATION RISKS

Project tasks subject to RPP protocol indicate a known or suspected likelihood of activities occurring in radiologically impacted areas (e.g., locations with sources of radium-226 [226Ra], areas with similar radionuclides of concern as identified in a site-specific Historical Radiological Assessment [HRA]).

3.2 CONTROLLING DOCUMENTS

Unless indicated otherwise in Section 1.0, work conducted under the RPP will be subject to requirements detailed in ITSI Gilbane RML No. 04-29353-01and in accordance with any project- specific Memorandum of Understanding (MOU) criteria and applicable radiological control work documents (e.g., site-specific Base-wide Radiological Plan, RSOPs). ITSI Gilbane will incorporate site-specific versions of RSOPs as needed to implement and satisfy license commitments. Title 10 of the Code of Federal Regulations (CFR) Section 20 applies to the RPP standards used. In parallel, industrial safety requirements and U.S. Environmental Protection Agency regulations detailed in 29 and 40 CFR also have applicability for a variety of regulatory subjects including Comprehensive Environmental Response, Compensation, and Liability Act; the Resource Conservation and Recovery Act; and the National Emission Standards for Hazardous Air Pollutants.

3.3 EVALUATION OF POTENTIAL EXPOSURE TO WORKERS

RPP dose limits for the control of occupational exposure to ionizing radiation are listed in 10 CFR 20.1201-1208. Dose limits for individual members of the pubic are detailed in 10 CFR 20.1301-1302. In accordance with company policy, all exposures will be minimized to the extent practical. Administrative guidelines, established below the federal limits, will be used as detailed in the current version of corporate procedure RSP-001, Radiation Safety Program. Occupational exposures for project personnel will be maintained below ITSI Gilbane administrative values for annual TEDE.

Occupational dose, if any, is expected to originate from external sources (e.g., Ra-226, cesium-137, or strontium-90 or similar known radionuclides of concern as listed in a site-specific reference document [e.g., HRA]). Dose resulting from internal exposures are not anticipated. External exposure controls are addressed in Section 3.8, and controls to prevent or limit internal exposures are detailed in Section 3.9. Dose rates for general area work sites are expected to reflect naturally occurring background values.

3.4 EVALUATION OF PUBLIC DOSE

Based on the scope of planned work, the limited activity of radionuclides expected, and low concentration of naturally occurring radioactive material anticipated, public dose associated with tasks performed under this RPP is not projected. To validate the maintenance of public dose goals, ITSI Gilbane will implement necessary survey and sampling protocol in areas of intrusive work, conspicuously post and restrict access to intrusive work locations that require monitoring (e.g., areas where soil excavations and/or handling, etc., may disturb sources of radioactive material), and validate survey and sampling results and frequencies with the client (e.g., RASO), RSO, RSOR, and RST Supervisor to ensure established controls are effective.

3.5 TRAINING PROGRAM

Site personnel tasked to conduct project-oriented activities must satisfy corresponding AAP/SSHP training requirements. Persons subject to assignments involving a known or suspected potential for occupational radiation dose will receive additional training commensurate with radiological awareness requirements as defined in 10 CFR 19.12, Instructions to Workers.

Visitors and escorted persons must receive a site briefing and will be assigned to a qualified radiation worker aide when in an area of radiological concern.

3.5.1 Site Briefing

An RPP site briefing is designed for an escorted person and is presented when access is needed to radiologically impacted locations. Specific to the area(s) of concern where access is needed, the RPP brief will cover at a minimum:

- Applicable portions of 10 CFR 19, 10 CFR 20, the RPP, RWPs, site-specific reference documents (e.g., HRA), and supporting SOPs
- A description of radiation exposure risks and monitoring requirements
- Access and egress protocol specific to the radiologically impacted location(s) requiring entry
- Radiation exposure reduction techniques for an embryo/fetus
- Completion of applicable briefing/exposure monitoring documentation
- Notification of contacts as needed to complete training requirements

3.5.2 Radiation Worker Training

RPP training for the radiation worker is provided when unescorted access is needed to impacted site locations subject to radiological control. Inclusive of material that may be required by project-specific Work Plans and documents (e.g., APP/SSHP, Task-Specific Plans), training may be presented in the form of a group overview, video presentation, etc., with use of printed handouts approved by the RSOR. Training will address at a minimum:

- Applicable portions of 10 CFR 19, 10 CFR 20, the RPP, site-specific reference documents (e.g., Hunters Point HRA), and supporting SOPs specific to task performance
- A description of radiation exposure risks, monitoring requirements, and techniques
- Access and egress protocol specific to radiologically impacted locations
- Required contacts and expected actions in the event of an emergency
- Expected actions and contacts if radioactive material is discovered in an area where it is not expected
- Understanding "hands and feet" and "whole body" monitoring requirements
- Risks with radioactive material and radiation-producing devices unique to the site
- ALARA work principles and techniques

- Understanding the requirements for and compliance with RWPs including protocol for dosimetry and personal protective equipment (PPE)
- Radiation exposure reduction techniques for the embryo/fetus
- Completion of applicable training and exposure monitoring documentation
- Notification of contacts as needed to complete training requirements

3.5.3 Radiological Control Technician Training Qualification

As coordinated between the RSO and RSOR, ITSI Gilbane will evaluate and ensure acceptable qualification of RSTs. When selected for project assignment, RST qualifications are evaluated between the RSO and RSOR in accordance with the requirements detailed in NRC License No. 04-29353-01. Project-specific training is provided to RCTs commensurate with anticipated duties and assignments.

3.6 DECLARED PREGNANT FEMALE WORKER

To maintain embryo/fetus radiation exposure ALARA, female employees who are pregnant or attempting to become pregnant are encouraged to declare this information to project management in writing to allow for criteria to be exercised as detailed in:

- 10 CFR 20.1208, Dose Equivalent to an Embryo/Fetus
- NRC Regulatory Guide 8.13, Instruction Concerning Prenatal Radiation Exposure, Revision 3, Washington, DC (NRC 1999)
- NRC Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, Revision 1, Washington, DC (NRC 1996)

Because of the small anticipated annual dose for workers associated with project activities (i.e., less than 10 millirems/year) it is unlikely in instances of pregnancy that separate dose tracking for the embryo/fetus will be necessary. Managing occupational exposures for all staff within annual ITSI Gilbane administrative TEDE guidelines is expected to satisfy parallel maintenance of less than 500 millirems total dose for any pregnant female worker over the course of an entire gestation period.

3.7 AS LOW AS REASONABLY ACHIEVABLE PROGRAM

ITSI Gilbane is committed to maintaining radiation exposure to workers and the public as far below company guidelines and regulatory limits as practical. RPP requirements are established for field operations in an effort to meet that commitment.

3.8 EXTERNAL EXPOSURE CONTROL

The following steps will be taken to control external radiation exposure to levels that are ALARA:

- Employ basic dose reduction strategies as detailed in corporate procedures and site-specific SOPs using the ALARA concepts of time, distance, and shielding
- Use instruments at frequencies sufficient to accurately determine the level and extent of radiation fields
- Present adequate staff training to ensure the ability to recognize situations involving objects that might be radioactive, to be wary of objects that are unfamiliar, and to rely on valid instrument readings to limit and safely manage external exposure

3.9 INTERNAL EXPOSURE CONTROL

Internal exposure is expected to be below all the recognized DAC values as specified in 10 CFR 20. Should the potential for internal dose be confirmed during fieldwork (e.g., due to the nature of the planned activity such as remediation efforts), the activity will be temporarily suspended and the work area secured pending determination and use of corrective protocol as decided among the RSO, RSOR, and Project Manager.

3.10 MONITORING AND MEASURING EXTERNAL EXPOSURE

A vendor accredited by the National Voluntary Laboratory Accreditation Program will be used to provide project-related dosimetry services. Dosimetry applications and considerations will apply to field staff designated as radiation workers (i.e., personnel needing unescorted access to impacted site locations subject to radiological control). Prior to dosimetry issue, a radiation worker will have satisfactorily completed requirements as detailed in Section 3.5.2.

3.11 MONITORING AND MEASURIING INTERNAL EXPOSURE

The monitoring of work practices conducted in areas of radiological concern will be coordinated among the RSTs, the RST Supervisor, and members of project management designated as radiation workers using frequencies necessary to confirm the application of correct techniques and PPE to minimize potential transfer of external contaminants inside the body.

Air sampling will be performed during intrusive activities conducted in areas of radiological concern. Air sample results will be reviewed and tracked among the RSOR, RST Supervisor, and the designated RSTs to determine whether trends (e.g., concentrations greater than 10 percent of

DAC) exist that require work stoppage and/or re-engineering of task-specific contamination controls.

3.12 SURVEYS AND MONITORING

A project-based summary of historic survey and monitoring information is typically available in site-specific documentation (e.g., an HRA manual or Base-wide Radiological Management Plan). Protection of workers, the public, and the environment depends on accurate assessment and interpretation of past historic information as compared to present-day survey data collected in accordance with prescribed procedures and project support documents.

In situations subject to this RPP, guidance for determining survey frequency and technique is detailed in the applicable RSOPs. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.12.1 Surveys of Equipment and Materials

Equipment and material passing through areas controlled for radiological concern will be subject to survey criteria and techniques detailed in the applicable RSOPs. In parallel, supplemental site-specific documentation may be authorized for use by the RSO.

3.13 ACTION LEVELS

Action levels represent transition points at which concentrations of radioactivity require additional response and/or investigation (e.g., PPE upgrades or increased work technique controls). Action levels for radiological controls are detailed in the RSOPs. In parallel, supplemental site-specific documentation may be authorized by the RSO for use. Modification to project- specific action levels requires client (e.g., Navy) concurrence.

3.14 RADIOLOGICALLY CONTROLLED AREAS AND POSTING

Site structures, outdoor locations, and/or perimeter boundaries posted with yellow and magenta markings are established to identify areas designated for radiological control, prevent (to the extent practical) access by unauthorized persons, and protect members of the public from exposure to radiation. A description of scenarios and postings employed for control purposes are detailed in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.14.1 Controlled Area

A Controlled Area may be established where access to impacted portions of a work site requires specialized qualification and approval. A Controlled Area (which may also be called a Restricted Area) is intended to serve as the outermost boundary around planned and established work zones.

Controlled Area access requires prior authorization and use of PPE as defined in a project specific APP/SSHP. Visitors must have requisite training as specified in an SSHP. Personnel who enter a Controlled Area may not cross into more restrictive areas posted within unless prior authorization is obtained.

Where the perimeter to a Controlled Area is first encountered for radiological purposes, posting applications will have the wording "Caution Controlled Area" (or Restricted Area) and provide a contact phone number. (Supplemental information as specified by the RSOR or designee may also be included as magenta [preferred], purple, or black markings on a yellow [preferred] or white background). A minimum of one sign will be posted on each straight run of the Controlled Area (or Restricted Area) boundary. Note that areas not typically accessed by pedestrians (e.g., windows) need not be posted. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.2 Access Control Point

When used, an Access Control Point is part of a Controlled Area (or Restricted Area) boundary. Intended to serve as a transition corridor, an Access Control Point allows for the accountability of personnel, tools, and equipment that pass through. When established as a radiological control mechanism, an Access Control Point RST will be present any time activities within are ongoing. During periods of inactivity, control point gates (part of the contiguous area boundary) are closed and locked.

3.14.3 Radiologically Controlled Area

A Radiologically Controlled Area (RCA) represents an area in which a person who works for a year might receive a whole body dose in excess of 100 millirems from all pathways (excluding natural background and medical exposures). For external sources, the RCA is typically posted when the dose rate of 30 centimeters exceeds 50 microrems per hour, although this may be

modified at the discretion of the RSOR based on accurately assessed occupancy factors. Intended to include (for posting purposes) the nearest boundary or perimeter associated with the affected area, RCA restrictions and corresponding access protocol can be located in the applicable RSOP or supplemental site-specific documentation authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the RCA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary. For waterfront areas, signs should be posted at areas accessible by watercraft.

3.14.3.1 Radioactive Materials Area

A Radioactive Materials Area (RMA) identifies any area or room in which there is used or stored an amount of licensed material exceeding 10 times the quantity of such material specified in Appendix C, Title 10 Part 20 of the CFR. Intended to warn of the potential for occupational dose, a description of RMA scenarios and postings employed for control purposes can be located in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the RMA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.4 Contaminated Area

A Contaminated Area is any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed the removable surface contamination values specified in Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors (AEC 1974), but do not exceed 100 times those values. Contamination is radioactive material that is deposited on a surface where it is unwanted. Subject to license control, a description of Contaminated Area scenarios and postings employed for control purposes can be located in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the RCA boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.5 High Contamination Area

A High Contamination Area is any area, accessible to individuals, where removable surface contamination levels exceed or are likely to exceed 100 times the removable surface contamination values specified in Regulatory Guide 1.86 (AEC 1974). High Contamination Area scenarios and postings employed for control purposes are detailed in applicable portions of supplemental site-specific documentation (e.g., Department of Energy Procedures for Radiologically Restricted Areas - Posting and Access Control per 10 CFR 835) and may be authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the High Contamination Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.6 Radiation Area

A Radiation Area means any area accessible to individuals in which radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.005 rem (0.05 millisievert) in 1 hour at 30 centimeters from the source or from any surface that the radiation penetrates. A description of Radiation Area scenarios and postings employed for control purposes can be located in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the Radiation Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.7 High Radiation Area

A High Radiation Area means any area, accessible to individuals, in which radiation levels could result in an individual receiving a deep dose equivalent in excess of 0.1 rem (0.001 sievert) in 1 hour at 30 centimeters from the radiation source or from any surface that the radiation

penetrates. A description of High Radiation Area scenarios and postings employed for control purposes can be located in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

When used, a minimum of one sign will be posted on each straight run of the High Radiation Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.14.8 Airborne Radioactivity Area

An Airborne Radioactivity Area is a room, enclosure, or area in which airborne radioactive materials, composed wholly or partly of licensed material, exist in concentrations:

- In excess of the DACs specified in Appendix B to 10 CFR 20.1001-20.2401, or
- To such a degree that an individual present in the area without respiratory protective equipment could exceed, during the hours an individual is present in a week, an intake of 0.6 percent of the annual limit on intake or 12 DAC hours.

As an example, for Ra-226, the most likely airborne contaminant at Navy radiological remediation projects, the applicable DAC value is 3.0E-10 microcuries/milliliter. A description of Airborne Radioactivity Area scenarios and postings employed for control purposes can be located in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized for use by the RSO.

When used, a minimum of one sign will be posted on each straight run of the Airborne Radioactivity Area boundary. Additional signs should be placed at approximately 30-meter intervals on long runs of any boundary.

3.15 CONTAMINATION CONTROL

Contamination control practices are established to preclude the spread of contaminants into uncontrolled areas. Recognized applications are detailed in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.15.1 Physical Boundary

A physical boundary will be established using criteria referenced in Section 3.14.4 to fully enclose a location established as a Contaminated Area.

3.15.2 Entry

Entry into a Contaminated Area will be compliant with pre-established requirements as detailed on a job-specific RWP. In such instances, an RST will be present to assist in radiological control and support. (See Section 3.17.1 for details related to RWP use.)

3.15.3 Exit

Exit from a Contaminated Area will be compliant with pre-established requirements as detailed on a job-specific RWP. In such instances, an RST will be present to assist in radiological control and support. (See Section 3.17.1 for details related to RWP use.)

3.15.4 Limitations on Entry

Personnel with open wounds or sores are not generally granted access into a Contaminated Area. Entry may be authorized by the RSOR or designee, on a case-by-case basis, if appropriate protection of the wound or sore is verified, planned work activities are unlikely to compromise the protection, and there is no other medical reason to restrict entry.

Jewelry and personal items are not allowed in Contaminated Areas; only project furnished tools, materials, and equipment necessary to accomplish the planned task are acceptable. Container wrappings, packing, and similar materials must be segregated from essential items prior to entry.

3.15.5 Control of Items

Items such as equipment and tools to be removed from a Contaminated Area must meet unconditional release criteria as detailed in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.16 INSTRUMENTATION

As detailed in the applicable RSOP, field survey instruments will be calibrated annually at a minimum in accordance with the manufacturers' specifications. Instruments will be removed from service on or before calibration due dates and returned to the supplier for recalibration. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.17 CONTROL OF RADIOLOGICAL WORK

All radiological work activities will be planned in consultation with the RSOR, the Project Manager, and other project personnel tasked with oversight responsibilities. Work performed in

areas of radiological concern require establishment of an RWP, which details radiologically based requirements and protective measures.

3.17.1 Radiation Work Permits

RWPs detail the protective measures and controls needed to perform tasks in areas of radiological concern. Information considered during RWP development is detailed in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.17.2 Task-Specific Work Instructions

Task-specific work instructions are used to supplement RWP requirements and address in greater detail corresponding activities planned while personnel are inside areas of radiological concern. These instructions are required for tasks scheduled to occur in locations as determined by the Project Manager, RSOR, or the Construction Manager/Site Supervisor. The RSO or designee will finalize, control, and issue radiologically based work instructions.

3.18 CREDENTIALING OF STAFF

Qualification and training requirements for RSTs are provided in NRC License No. 04-29353-01and as detailed in the applicable RSOPs. The RSO verifies qualifications and conducts required license-specific training with any RSOR designated on the license as an authorized user.

To supplement and validate the correct use and implementation of this RPP and NRC License No. 04-29353-01, a health physicist certified by the American Board of Health Physicists provides support to active field projects.

3.19 PROCUREMENT, RECEIPT, AND INVENTORY OF SEALED RADIOACTIVE SOURCES

It is not anticipated that field projects will receive radioactive material shipments other than exempt-quantity radioactive check sources. As detailed in the applicable RSOPs, check sources are controlled, stored, posted, and managed as radioactive material.

3.19.1 Leak Testing

Radioactive sealed sources with quantities exceeding the licensable threshold will be leak-tested as detailed in the applicable RSOP. In parallel, supplemental site- specific documentation may be authorized by the RSO for use.

3.19.2 Transport of Sources

Check sources will be used on field projects only for the period of time necessary to execute planned work, will not be introduced onto a project location prior to project initiation, and will be returned to the provider immediately following the completion of planned field activities.

Check sources will be maintained as detailed in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized for use by the RSO.

3.19.3 Reporting Lost, Damaged, or Stolen Sources

As detailed in the applicable RSOP, if a check source is lost, damaged, or stolen, the event will be reported immediately to the RSOR or designee. The RSOR will immediately notify the RSO, the Project Manager, and the client (e.g., the Navy) and initiate appropriate recovery actions. In consultation with the client, a report will be filed by the RSO or designee with the appropriate law enforcement agency if it is determined that radioactive material was stolen. The RSO will make any necessary notifications to the NRC.

Supplemental site-specific documentation may be authorized for use by the RSO.

3.20 SHIPPING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

Off-site shipment of radioactive materials other than exempt-quantity radioactive check sources by ITSI Gilbane is not anticipated. Information pertinent to an authorized shipper for a field project is provided in Section 6.0.

3.21 CONTROL OF RADIOACTIVE WASTE

Radioactive waste will be minimized by compliance with contamination control practices (Section 3.15) combined with segregation and survey practices. A waste shipment provider contracted to the client (e.g., the Navy through the Army Joint Munitions Command) will provide brokerage services including waste characterization sampling, waste containers, and transportation of radioactive materials/waste generated from a field project. Soil and used PPE

will typically be processed for final disposition in disposal bins. When filled, bins will be transferred to the custody and control of the authorized shipper. As detailed in the applicable RSOP, commodities are stored in a locked radioactive materials storage area, controlled by the RSOR or designee, and will periodically be packaged and transferred to the authorized shipper for disposal. Radioactive material will be packaged, stored, shipped, and disposed of as required by U.S. Department of Transportation (DOT) regulations. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

3.22 RADIATION PROTECTION RECORDS

As detailed in the applicable RSOP, the RSO or designee is responsible for ensuring that airborne monitoring, contamination surveys, and exposure/dose rate surveys are reviewed for accuracy and completeness as an on-going process. Individual exposure records including dosimetry and bioassay reports for personnel are reviewed for results as generated.

3.23 REPORTS AND NOTIFICATIONS

Workers who have previous occupational work history with radiological environments will supply the RSO or designee with prior estimated or reported dose histories on an NRC Form 4 or equivalent as defined in 10 CFR 20.2104.

Records of radiation exposures to workers who have been issued external dosimetry monitoring devices will be maintained. Dosimetry monitoring results for workers will be reported to the RSO annually at a minimum. Annual occupational exposure greater than or equal to 100 millirems for the previous calendar year, or otherwise when requested, requires a summary of individual exposure to be reported to the employee monitored.

3.24 LICENSES

Entities subject to the use of this RPP will conduct radiological-based tasks with use of ITSI Gilbane NRC License No. 04-29353-01. ITSI Gilbane will ensure that the Radiation Safety Program and work practices are implemented and performed in accordance with the NRC license requirements and the RPP. (Any client-designated waste shipment provider may implement their NRC-issued license to conduct waste characterization sampling of waste material in support of low-level radioactive waste shipment and disposal. An MOU between ITSI Gilbane and a waste

shipment provider will be developed, identifying interfaces and commitments for the transfer of radioactive materials. Active MOUs will be maintained by the RSO or designee.)

3.25 REVIEW AND APPROVALS OF RADIATION PROTECTION PLANS

The RSO or designee will prepare the RPP, which will then be reviewed for approval with subject matter experts (e.g., the Project Manager, RSOR). In addition, the client (e.g., the Navy) will have an opportunity to review the draft content, provide input, and indicate acceptance of the plan. Changes to the RPP will be reviewed and accepted following the same process.

3.26 PLANNED SPECIAL EXPOSURES

No anticipated event within work scopes subject to this RPP will require use of a planned special exposure. In the event it is necessary to initiate such a need, an activity-specific work instruction including a formal ALARA review and an RWP will be prepared and submitted for acceptance following the same process as the RPP submittal in Section 3.25.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Minimum PPE requirements based on chemical contaminants are established in a project-/task-specific APP/SSHP. This primary level of PPE, Modified Level D, is historically sufficient for radiological work activities and is supplemented by activity-specific RWPs based on the radiological conditions and field tasks required to perform planned activities. Information considered for PPE during RWP development is detailed in the applicable RWP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

4.1 SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

Personnel must wear PPE commensurate with contamination hazards associated with both the work area and the planned activity. Activities that require heavy physical effort or that have an increased potential for damage to PPE may require additional layers or different PPE materials, even in areas of low contamination. Site- or task-specific PPE requirements beyond the minimum traditionally used will be detailed in a corresponding RWP. In parallel, supplemental site-specific documentation may be authorized for use by the RSO.

4.2 DONNING AND DOFFING PPE

To prevent contamination of personnel or the spread of contamination, PPE must be donned and doffed in a specific manner. Directions for donning and doffing standard PPE ensembles are provided in the applicable RSOP. In parallel, supplemental site-specific documentation may be authorized by the RSO for use. Additional instructions for non-standard site- or task-specific PPE requirements will be provided in the applicable RWP.

5.0 DECONTAMINATION PROCEDURES

Following details identified in the applicable RSOP, decontamination will be performed at a dedicated location (e.g., decontamination pad, room). In parallel, supplemental site-specific documentation may be authorized by the RSO for use.

6.0 SHIPPING AND TRANSPORTATION OF RADIOACTIVE MATERIALS

Field projects subject to the use of this RPP will conduct radiological-based activities with use of ITSI Gilbane NRC License No. 04-29353-01. The client-designated waste shipment provider associated with a field project (e.g., Environmental Management Services, Inc. for the Navy) may implement their NRC-issued license to conduct waste characterization sampling of waste material in support of low-level radioactive waste shipment and disposal. An MOU between ITSI Gilbane and a waste shipment provider will be used, identifying interfaces and commitments for the transfer of radioactive materials. In such instances, a current MOU will be maintained by the RSOR for projects subject to the requirements of the RPP.

Environmental samples shipped for off-site analysis and exempt-quantity radioactive check sources are packaged and shipped in accordance with DOT regulations via commercial carriers.

7.0 REFERENCES

AEC (Atomic Energy Commission). 1974. Regulatory Guide 1.86, Termination of Operating Licenses for Nuclear Reactors. June.

CFR (Code of Federal Regulations), Title 10, Part 19, Notices, Instructions, and Reports to Workers: Inspection and Investigations. U.S. Government Printing Office via GPO Access, Washington D.C., January 1, 2003.

CFR, Title 10, Part 20, Standards for Protection Against Radiation. U.S. Government Printing Office via GPO Access, Washington D.C., January 1, 2003.

CFR, Title 49, Volume 2, Transportation, U.S. Government Printing Office via GPO Access, Washington D.C., April 1, 2006.

NRC (U.S. Nuclear Regulatory Commission). 1996. Regulatory Guide 8.29, Instruction Concerning Risks from Occupational Radiation Exposure, Revision 1, Washington, DC. February.

NRC. 1999. Regulatory Guide 8.13, Instruction Concerning Prenatal Radiation Exposure, Revision 3, Washington, DC. June.

APPENDIX A

RADIATION PROTECTION PLAN ACKNOWLEDGMENT FORM

Radiation Protection Plan Acknowledgment Form

I have reviewed, understand, and agree to follow the Radiation Protection Plan. Additionally, I understand that there are additional non-radiological health and safety requirements, which are presented in the Site Safety and Health Plan. I agree to abide by the requirements of the Radiation Protection Plan for the work that I will perform.

Printed Name	Signature	Representing	Date

ATTACHMENT 4

DUST CONTROL PLAN

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

Ser BPMOW.cny/0120

NOV 29 2010

Mr. Mark Ripperda (SFD 8-1)
U.S. Environmental Protection Agency, Region IX
75 Hawthorne Street
San Francisco, CA 94105-3901

Mr. Larry Morgan
California Department of Public Health
1616 Capitol Avenue, MS 7402
P.O. Box 997377
Sacramento, CA 95899-7377

Dear Regulatory Team Members:

Enclosed please find the Final Dust Control Plan, Revision 1, Hunters Point Shipyard, San Francisco, California. Minor revisions to Sections 4.1, 4.6, and 5.1 have been included to clarify current work practices at the project site.

If you have any questions regarding the enclosed document, please contact Mr. Chris Yantos at (619) 532-0912, or Mr. Keith Forman at (619) 532-0913 at your earliest convenience.

Sincerely,

KEITH FORMAN
BRAC Environmental Coordinator
By direction of the Director

Enclosure: 1. Final, Dust Control Plan, Revision 1, Hunters Point Shipyard, San Francisco, California, November 2010

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CONTRACT NO. N62473-07-D-3211
CTO NO. 0018

FINAL

BASEWIDE DUST CONTROL PLAN
REVISION 1

November 29, 2010

DCN: ECSD-3211-0018-0002.R1

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

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ABBREVIATIONS AND ACRONYMS

$\mu g/m^3$	micrograms per cubic meter
ALI	annual limit
ATCM	Airborne Toxic Control Measure
BAAQMD	Bay Area Air Quality Management District
Cal/OSHA	California Occupational Safety and Health Administration
CCR	*California Code of Regulations*
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
DAC	derived airborne concentration
DON	Department of the Navy
EPA	U.S. Environmental Protection Agency
ft^3/min	cubic feet per minute
HPS	Hunters Point Shipyard
L/min	liters per minute
mg/m^3	milligrams per cubic meter
mph	miles per hour
NIOSH	National Institute for Occupational Safety and Health
NOA	naturally occurring asbestos
PEL	permissible exposure limit
PESM	Project Environmental Safety Manager
PM_{10}	particulate matter smaller than 10 microns in diameter
QC	quality control
ROC	radionuclide of concern
SSHO	Site Safety and Health Officer
TCRA	time-critical removal action
TSP	total suspended particulates
TWA	time-weighted average

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1.0 INTRODUCTION

1.1 DUST CONTROL PLAN FOR TIME-CRITICAL REMOVAL ACTIONS

This Basewide Dust Control Plan was prepared for all work performed by contractors during the time-critical removal actions (TCRAs) at Hunters Point Shipyard (HPS) in San Francisco, California (Figure 1-1). This plan was developed to ensure that the Department of the Navy (DON) maintains a coordinated approach for dust control and air monitoring activities across multiple contracts. At a minimum, all contactors will be required to adhere to the requirements set forth in this document.

This document will be evaluated as new contracts are awarded to ensure that the dust mitigation requirements meet the substantive dust mitigation requirements presented in the Asbestos Airborne Toxic Control Measure (ATCM) for Construction, *California Code of Regulations* (CCR) Title 17, Section 93105. Contractors may be required to submit addenda to address work activities not presented in this plan.

1.2 REGULATORY BASIS

The TCRAs at HPS are being conducted in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). Regulatory oversight and guidance are provided by the U.S. Environmental Protection Agency (EPA), the California Environmental Protection Agency, and the Regional Water Quality Control Board. The project areas are located within the jurisdiction of the Bay Area Air Quality Management District (BAAQMD). However, as TCRAs under CERCLA, the projects are not required to have permits from the BAAQMD. Nevertheless, the projects need to meet the substantive aspects of BAAQMD air quality requirements.

This Basewide Dust Control Plan specifically identifies the steps that will be taken to reduce fugitive dust emissions during excavation, transportation of soil and debris, and installation/removal of construction site infrastructure. This plan describes measures to address the substantive requirements of the following applicable regulations:

- CCR Title 17, Section 93105 (e), ATCM for Construction Grading, Quarrying, and Surface Mining Operations – Requirements for Construction and Grading Operations – Areas Greater Than One Acre
- BAAQMD Regulation 6, Particulate Matter and Visible Emissions, 6-301 Ringelmann No. 1 Limitation, 6-302 Opacity Limitation, and 6-305 Visible Particles

1.3 REPORT ORGANIZATION

Section 2.0 of this Basewide Dust Control Plan provides site background and history. Section 3.0 describes potential sources of fugitive dust. Section 4.0 discusses control measures for dust generated by general construction activities. Section 5.0 describes air monitoring requirements. Section 6.0 presents references cited in this plan. Tables and figures follow the text.

2.0 BACKGROUND

2.1 SITE DESCRIPTION AND HISTORY

HPS is located in the City and County of San Francisco, California, on a long promontory in the southeastern part of San Francisco that extends east into San Francisco Bay (Figure 1-1). Presently, HPS includes 866 acres (420 acres on land and 446 acres under water). The land portion of HPS was purchased by the DON in 1939 and leased to Bethlehem Steel Corporation. At the start of World War II in 1941, the DON took possession of the property and operated it as a shipbuilding, repair, and maintenance facility until 1974. Throughout the 1940s, 1950s, and 1960s, the DON excavated the hills surrounding the shipyard, and used the resulting spoils along with available dredge material and engineered fill material to expand the shipyard's shoreline into San Francisco Bay. The DON deactivated HPS in 1974. From 1976 to 1986, the DON leased HPS to Triple A Machine Shop, Inc., a private ship repair company. In 1986, Triple A Machine Shop ceased operations at HPS, and the DON resumed occupancy through 1989.

Because of previous hazardous operations on the site, HPS was placed on the National Priorities List in 1989 as a Superfund site pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986. HPS then came under the administrative jurisdiction of the Treasure Island Naval Station in April 1990.

In 1991, HPS was placed on the Navy's Base Realignment and Closure list, and its mission as a Navy shipyard ended in April 1994. Closure activities at HPS involve environmental remediation activities and making the property available for non-defense use. On March 31, 1994, control of HPS was transferred from the Treasure Island Naval Station to the Naval Facilities Engineering Command, Western Division (now Engineering Field Activity West) in San Bruno, California. In October 1999, Naval Facilities Engineering Command Southwest assumed management of HPS.

2.2 SCOPE OF WORK

The DON has various active contracts at HPS. The contracts cover the removal and remediation of potentially radiologically impacted sanitary sewer and storm drain lines, radiological and nonradiological waste disposal, long-term monitoring, site investigations, and other remedial actions.

In general, work activities may consist of one or more of the following: removal of asphalt pavement, geophysical investigations and utility clearance of excavation areas, establishment of soil and debris stockpile areas, excavation of impacted soil and piping, backfill of excavations, building demolition, soil/groundwater sampling, and site restoration.

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3.0 POTENTIAL SOURCES OF FUGITIVE DUST

Site activities have the potential to generate air emissions in the form of fugitive dust. Possible sources of emissions include the following activities:

- Construction Traffic – Movement of construction equipment around the construction areas is capable of creating construction emissions in excavated or cleared areas.
- Site Preparation – Asphalt and vegetation removal will increase the potential for fugitive dust emissions through wind erosion.
- Excavation – Removal of soil from the ground and loading it either onto screening pads or into waiting vehicles could cause fugitive dust emissions.
- Material Stockpiles – Soil that has been cleared of radioactivity may be stockpiled prior to being used as backfill or shipped to appropriate disposal facilities. Soil will be loaded into trucks for final disposal. Fugitive emissions during stockpiling and truck loading, as well as wind erosion, are possible.
- Building Demolition – Demolition of buildings may produce fugitive dust emissions. Structures will be evaluated for lead and asbestos contamination by a California-certified consultant. Based on the resulting data, site-specific Demolition Plans will be developed that describe the controls necessary to minimize fugitive dust.
- Transportation of Solid Bulk Material – If material is left uncovered, fugitive emissions could occur.
- Site Restoration – Backfilling and revegetating/restoration of the excavated areas may produce fugitive dust emissions.
- Recycling – Asphalt and concrete are typically recycled on-site, which may produce fugitive dust emissions.

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4.0 GENERAL CONSTRUCTION DUST CONTROL METHODS

Control methods for fugitive dust are described for the following emissions generated from the construction activities at the project sites:

- Dust entrained during on-site travel on paved and unpaved surfaces
- Dust entrained during travel to/from HPS
- Dust entrained during vegetation removal, excavation, material screening, use of conveyors, backfill, and final grading at the construction site
- Dust entrained during soil stockpiling, and loading and unloading operations
- Wind erosion of areas disturbed during construction activities
- Vehicle emissions associated with construction equipment

4.1 CONSTRUCTION TRAFFIC

4.1.1 Track-out Prevention

Track-out of loose materials will be controlled by use of tire-cleaning rumble grid plates at the access point from project sites to the paved road to prevent track-out of mud or loose soils onto roadways. These track-out prevention control points will be established at the primary HPS site access and egress points. The locations of the track-out prevention control points are shown on Figure 4-1. To ensure that the tires are free from mud or loose soils prior to leaving the site, the bulk-loaded trucks and commercial vehicles will be required to pass over a gravel pad (at least 50 consecutive feet in length from the intersection with the paved public road) and over the rumble grid plates where the soil residue from the tires will be removed.

Any visible track-out onto a paved road where vehicles exit the HPS project site will be removed by wet sweeping at the end of the work day or at least once per day.

All bulk-loaded trucks used to transport naturally occurring asbestos (NOA)-containing material off-site will be cleaned by a wheel wash station before leaving the site.

4.1.2 Traffic Control

Fugitive dust emissions from construction traffic traveling on unpaved surfaces will be controlled through the following mitigation methods:

- Actively used unpaved roads in the project construction sites will be watered every 2 hours or frequently enough to maintain adequate wetness. The frequency of watering can be reduced or eliminated during periods of precipitation. Watering frequency may be increased during hotter periods or windy conditions.

- No vehicle will exceed 15 miles per hour (mph) within the construction site and 5 mph in work areas.

The following mitigation measures will be followed for fugitive dust emissions from construction traffic traveling on paved streets:

- Bulk-loaded trucks used for transportation of soil and other heavy earth-moving equipment will not be allowed to exit the construction sites, except through one of the track-out prevention control points.
- Construction areas adjacent to any paved roadway will be treated with best management practices, as specified in the Stormwater Pollution Prevention Plan.
- Roadways within the site will be swept with a wet sweeper or washed down to remove soils. The accumulated soils will be routinely removed from non-traffic areas such as gutters and curbs.
- No vehicle will exceed 15 mph within the construction site and 5 mph in work areas.

If any of the preceding mitigation methods fail to properly control fugitive dust emissions, one or more of the following reasonably available control measures will be applied:

- Unpaved active portions of the construction sites will be watered or treated with dust control solutions to minimize windblown dust and dust generated by vehicle traffic.
- Paved portions of the construction sites will be cleaned more frequently to control windblown dust and dust generated by vehicle traffic. Water may also be applied to the paved roads if necessary.
- Gravel, recrushed/recycled asphalt, or other material of low silt content (less than 5 percent) will be applied to a depth of 3 or more inches, if necessary. Serpentine-containing material will not be used for this purpose.
- Vehicle trips will be reduced if necessary.

4.2 SITE PREPARATION AND REMEDIATION ACTIVITIES

Fugitive dust emissions from site preparation, excavation, loading, spreading, stockpiling, backfill, and compaction activities will be controlled using the following methods:

- During asphalt removal, surface soils will be pre-wetted in the area to be removed prior to commencing the activity. Soil moisture content will be sufficiently maintained to minimize fugitive dust creation.
- All unpaved, inactive portions of the work area and inactive storage piles that are inactive for more than 7 days will be watered or chemical soil stabilizer applied to minimize fugitive dust creation.

4.3 EXCAVATION ACTIVITIES

Fugitive dust emissions from excavation and loading activities will be controlled using the following methods:

- Soil will be wetted prior to excavation activities to reduce dust migration. Additional water will be added during active excavation, material handling, and loading on an as-needed basis. Active excavation areas will be wetted every 2 hours during periods of dry weather or in windy conditions. A water truck or water buffalo shall be dedicated to excavation and removal operations.
- The area subject to excavation and other construction activity will be limited at any one time. A chemical soil stabilizer will be applied to on-site storage piles of soil or sand.
- The height from which excavated soil is dropped either to trucks, stockpiles, or pads will be minimized.
- Trucks moving potentially radiologically impacted soils will be loaded over a plastic liner to assist in the cleanup of any soil from the loading process.
- Trucks shall be equipped with tarping systems to cover loads during soil transport.
- Truck traffic shall be minimized to the shortest haul routes from the work areas, screening yard, and stockpile areas.
- Chemical soil stabilizer will be applied in sufficient quantities to disturbed areas so as to create a stabilized surface.
- Backfill materials will be wetted on an as-needed basis to maintain moisture. Loader buckets will be emptied slowly and drop height from loader bucket minimized. A water truck or water buffalo will be dedicated to backfilling operations.
- A chemical soil stabilizer will be applied to backfill material and storage piles when not actively handled (i.e., no activity in 7 days).

4.4 MATERIAL STOCKPILES

Fugitive dust emissions from soil storage piles will be controlled by using a temporary cover, water, or a chemical soil stabilizer.

4.5 BUILDING DEMOLITION

Structures will be evaluated for lead and asbestos contamination by a California-certified consultant. Based on the resulting data, site-specific Demolition Plans will be developed that describe the controls necessary to minimize fugitive dust.

4.6 BULK SOLID MATERIAL TRANSPORT

- All trucks used to transport import solid bulk material to HPS will be covered (tarped) or the material will be loaded in such a manner that the material does not touch the front, back, or sides of the cargo compartment at any point less than 6 inches from the top and that no point of the load extends above the top of the cargo compartment.
- All trucks used to transport solid bulk material from the HPS project site will be covered (tarped for non-radiologically impacted material or hard-top containers/bins used for radiologically impacted material) prior to leaving the site.
- Vehicles will be checked to ensure that they are tarped or covers are closed to prevent any spillage, and any spillage material on the shelf, on exterior surfaces of the cargo compartment, or on wheels will be removed prior to leaving the site.
- Trucks used for solid bulk material transport will be inspected to ensure that no spillage can occur from holes or other openings in the cargo compartment.
- Bulk loaded trucks will exit the HPS project site via an established track-out control point.

4.7 POST-CONSTRUCTION STABILIZATION OF DISTURBED AREAS

Unpaved areas disturbed during excavation, grading, and/or construction activities will be covered with one of the following to reduce dust generation on the site:

- An approved vegetative cover
- Surface swales to control stormwater
- Coverage with a minimum of 3 inches of non-asbestos-containing material
- Hard surface paving

4.8 RECYCLING

Non-impacted asphalt and concrete are typically recycled on-site and may produce fugitive dust emissions. Fugitive dust emissions from recycling activities will be controlled using the following methods:

- Asphalt and concrete will be wetted prior to handling to reduce dust migration. A water truck or water buffalo shall be dedicated to this activity.
- Additional water will be added during active grinding, sorting, material handling, and loading, as needed, to control fugitive dust.
- The height from which crushed material is dropped either to trucks, stockpiles, or pads will be minimized.
- Trucks shall be equipped with tarping systems to cover loads during transport.

- Truck traffic shall be minimized to the shortest haul routes from the work areas, screening yard, and stockpile areas.
- A chemical soil stabilizer will be applied in sufficient quantities to stockpiles so as to create a stabilized surface.

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5.0 AIR MONITORING

Air monitoring is performed to ensure worker and community safety in accordance with NIOSH approved air sampling methodology. Figure 5-1 presents a map of known sensitive community receptors within 1 mile of HPS. Three types of air monitoring are conducted during construction activities:

- Air quality monitoring (total suspended particulates [TSP], manganese, lead, particulate matter smaller than 10 microns in diameter [PM_{10}], and asbestos)
- Radionuclides of concern (ROCs) air monitoring
- Personnel monitoring

During prolonged precipitation events (greater than 8 hours of precipitation in a 24-hour period), the air monitoring units will not be operated. An air monitoring station or individual units being inoperable shall not preclude construction activities at the associated work site.

5.1 AIR QUALITY MONITORING

The air monitoring for HPS will include ambient air quality monitoring stations that will be established to perform monitoring during field activities. Air samples will be collected at the monitoring stations and will be analyzed for the airborne chemicals of concern, which include TSP, manganese, lead, PM_{10}, and asbestos. The air quality sampling will be used to assess the status of air quality compliance and to evaluate modifications to basewide activities in the event of compliance concerns. The meteorological data for the general work areas, specifically wind speed and direction, will be used to identify the most appropriate locations for the air monitoring stations. Air samplers and monitoring stations will be located upwind and downwind of work areas, using wind direction data, and in the most practical locations.

Analytical results for TSP will be compared with a standard of 0.5 milligram per cubic meter (mg/m^3) (level chosen to minimize overall permissible dust release from site), 200 micrograms per cubic meter ($\mu g/m^3$) for manganese (California Occupational Safety and Health Administration [Cal/OSHA] permissible exposure limit [PEL]), 50 $\mu g/m^3$ time-weighted average (TWA) 30 days for lead (Cal/OSHA), and 5 mg/m^3 for PM_{10} (California Ambient Air Quality Standard). If HPS activities are the cause of exceedances, additional control measures may be considered.

During prolonged precipitation events (greater than 8 hours of precipitation in a 24-hour period), the air monitoring units will not be operated. An air monitoring station or individual units being inoperable shall not preclude construction activities at the associated work site.

5.1.1 Monitoring Site Locations

Air monitoring stations will be installed to collect air samples upwind and downwind of work areas for the duration of the activities. The predominant wind direction at HPS is from the west. Established locations of air monitoring stations are shown on Figure 4-1. Air monitoring is performed to estimate and assess the impact of the field activities. The locations of the air monitoring stations to be used will be determined based on the prevailing wind direction and work activities and may be modified as needed. Monitoring stations will not be moved while they are sampling. Radiological air monitoring will be conducted both upwind and downwind of the excavations and in the immediate vicinity of each excavation site in accordance with the applicable radiation work permit requirements and the Hunters Point Shipyard Standard Operating Procedure, HPO-Tt-008, Air Sampling and Sample Analysis (TtEC 2005). In addition, a windsock will be set up at each site to show wind direction.

Each monitoring station will include three different monitoring systems: one each for TSP (that will be analyzed for manganese and lead), PM_{10}, and asbestos. Descriptions of these samplers are provided below. Sampling frequency and monitoring methods are listed in Table 5-1.

5.1.2 Total Suspended Particulates, Manganese, and Lead

TSP will be sampled with a high-volume (39 to 60 cubic feet per minute [ft^3/min]) air sampler in accordance with EPA's reference sampling method for TSP, described in Title 40 *Code of Federal Regulations* (CFR), Part 50, Subpart B. Each sample will be collected on a filter over the course of a period not to exceed 54 hours; the filter is then weighed to determine the amount of TSP collected. Once the filter weight has been determined, the sample will be analyzed for manganese in accordance with one of the IO-3 methods identified in EPA's Compendium of Methods for the Determination of Inorganic Compounds in Ambient Air (EPA 1999) and lead in accordance with a modified EPA Method 12. The equipment specifications and sampling procedures will comply with the specifications provided in the regulations for the sampler, filter, accuracy, calibration, and quality assurances.

The flow of the high-volume air sampler will be properly calibrated to establish traceability of the field measurement. Calibrations shall follow the guidelines specified in 40 CFR, Part 50, Section 9.3, and Section 2.6 of the EPA Quality Assurance Handbook for Air Pollution Measurement Systems, Volume II: Ambient Air Specific Methods (EPA 1998).

Field logs should be used to properly record information after collecting the samples. Appropriate field data, such as date, time, sample identification, calibration data, sample location, ambient temperature and pressure, and any additional information or observations that could influence analyses of the results, will be entered on the field logs.

5.1.3 PM_{10}

PM_{10} will be sampled in accordance with EPA's reference sampling method for PM_{10}, described in 40 CFR 50, Subpart J. Each sample be collected on a filter over a period not to exceed 54 hours; the filter is then weighed to determine the amount of PM_{10} collected.

5.1.4 Asbestos

Asbestos will be sampled and analyzed in accordance with the National Institute for Occupational Safety and Health (NIOSH) Method 7400, from the NIOSH Manual of Analytical Methods (NIOSH 1994). Method 7400 requires that samples be collected on three-piece cellulose ester filters fitted with conductive cowlings at a sampling rate of between 0.5 liter per minute (L/min) and 16 L/min. Each sample will be collected over a period not to exceed 54 hours.

5.2 AIR SAMPLING FOR RADIONUCLIDES OF CONCERN

As specified in the Base-wide Radiological Work Plan (TtEC 2007), airborne radioactivity monitoring (continuous or grab samples) will be conducted during the course of work. To control occupational exposures, establish personal protective equipment, and determine respiratory protection requirements, monitoring and trending for airborne radioactive material will be performed as necessary. Each ROC, as specified in 10 CFR 20, Appendix B, has a derived airborne concentration (DAC) value. DAC is defined as the concentration in air that will result in an intake of 1 annual limit (ALI) if breathed for a working year under high working conditions (inhalation rate of 1.2 cubic meters of air per hour). ALI is the derived limit for the quantity of radioactive material intake into the body of a worker by inhalation or ingestion in a year.

Engineered controls will be developed in conjunction with the Radiological Affairs Support Office. They will be implemented if required to maintain airborne concentrations below 10 percent of the applicable DAC value for the ROCs at the sites. Table 5-2 shows the ROCs and their respective DAC values.

5.3 PERSONNEL MONITORING

The Site Safety and Health Officer (SSHO) will conduct monitoring to ensure that each site worker is adequately protected. Site monitoring and sampling includes real-time air monitoring and perimeter monitoring. In consultation with the Project Environmental Safety Manager (PESM), the SSHO will determine if personal or addition perimeter monitoring is required to evaluate the potential for personnel exposure. All air quality monitoring results that exceed the Cal/OSHA PELs (asbestos – 0.1 fiber/cubic centimeter, PM_{10} – 5,000 $\mu g/m^3$, TSP – 10 mg/m^3, manganese – 200 $\mu g/m^3$, lead – 50 $\mu g/m^3$) will be immediately reported to the PESM, who will evaluate the results. If the evaluation finds elevated results, personnel monitoring may be

required. Depending on the elevated results, addition sampling may be conducted for asbestos, particulate matter, or lead.

5.4 QUALITY CONTROL PROCEDURES

A quality control (QC) program will be implemented to ensure that collected data are accurate and precise in order to effectively characterize both the magnitude and variations in ambient conditions at the monitoring stations. Complete documentation of the results of routine operations and QC aspects of the program, including all log notes, calibration forms, and certifications, will be maintained on file. Key elements of the routine field QC program will include:

- Routine visits to each sampling station over the sampling period to check sampler pump flow rates, verify operation and sample conditions, and note any ambient conditions that could affect the accuracy or representativeness of the sample
- Calibration of the sampling pumps and flow devices
- Routine preventive maintenance of all equipment components

The analytical laboratory performing the sample analyses will establish a QC program that will also ensure the accuracy of the data as the data are being analyzed. Key elements of the routine QC procedures implemented during the sample analyses will include analysis of laboratory blanks and spikes and calibration of the analytical instruments, as specified in the appropriate methodology.

Dust control activities will be documented during construction activities and included in the Daily Contractor Production Reports. Available air data will be submitted monthly to the DON for distribution to interested parties and will be posted online to the Base Realignment and Closure Program Management Office web page at:

- http://www.bracpmo.navy.mil/basepage.aspx?baseid=45&state=California&name=hps

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TABLES

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TABLE 5-1

SAMPLING FREQUENCY AND MONITORING METHODS

Test Scenario	Type of Analysis	Monitoring Method	Frequency
Excavation and soil handling (upwind and downwind)	TSP	40 CFR, Part 50, Subpart B Analysis Method IO-3 (Mn) Analysis Method 12 (Pb)	1 sample per workday 2–3 samples per workweek
	PM_{10}	40 CFR, Part 50, Subpart J	1 sample per workday 2–3 samples per workweek
	Asbestos	NIOSH Method 7400	1 sample per workday 2–3 samples per workweek
	ROCs	HPO-TtFW-008*	1 sample per workday 2–3 samples per workweek
Backfill and site restoration (upwind and downwind)	TSP	40 CFR, Part 50, Subpart B Analysis Method IO-3 (Mn) Analysis Method 12 (Pb)	1 sample per workday 2–3 samples per workweek
	PM_{10}	40 CFR, Part 50, Subpart J	1 sample per workday 2–3 samples per workweek
	Asbestos	NIOSH Method 7400	1 sample per workday 2–3 samples per workweek
	ROCs	HPO-TtFW-008*	1 sample per workday 2–3 samples per workweek

Notes:

* PO-TtFW-008, Air Sampling and Sample Analysis (TtEC 2005), is a standard operating procedure used for radiological air sampling activities supporting Hunters Point Shipyard field projects.

Abbreviations and Acronyms:

CFR – Code of Federal Regulations
Mn – manganese
NIOSH – National Institute for Occupational Safety and Health
Pb – lead
PM_{10} – particulate matter smaller than 10 microns in diameter
ROC – radionuclide of concern
TSP – total suspended particulates

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TABLE 5-2

RADIONUCLIDE AIRBORNE CONCENTRATION GUIDELINES

Radionuclide	Worker*	
	DAC (μCi/mL)	10% DAC (μCi/mL)
Radium-226	3.0E-10	3.0E-11
Strontium-90	2.0E-9	2.0E-10
Cesium-137	6.0E-8	6.0E-9

Notes:

* The guideline values were determined using the NRC's 10 CFR, Part 20, Appendix B.

Abbreviations and Acronyms:

μCi/mL – microcuries per milliliter (activity)
CFR – *Code of Federal Regulations*
DAC – derived airborne concentration
NRC – Nuclear Regulatory Commission

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FIGURES

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LEGEND

- STATE HIGHWAY
- US HIGHWAY
- INTERSTATE HIGHWAY
- HUNTERS POINT SHIPYARD
- WATER

2.5 0 2.5 5 Miles

Scale: 1" = 5 Miles

N

BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE DUST CONTROL PLAN

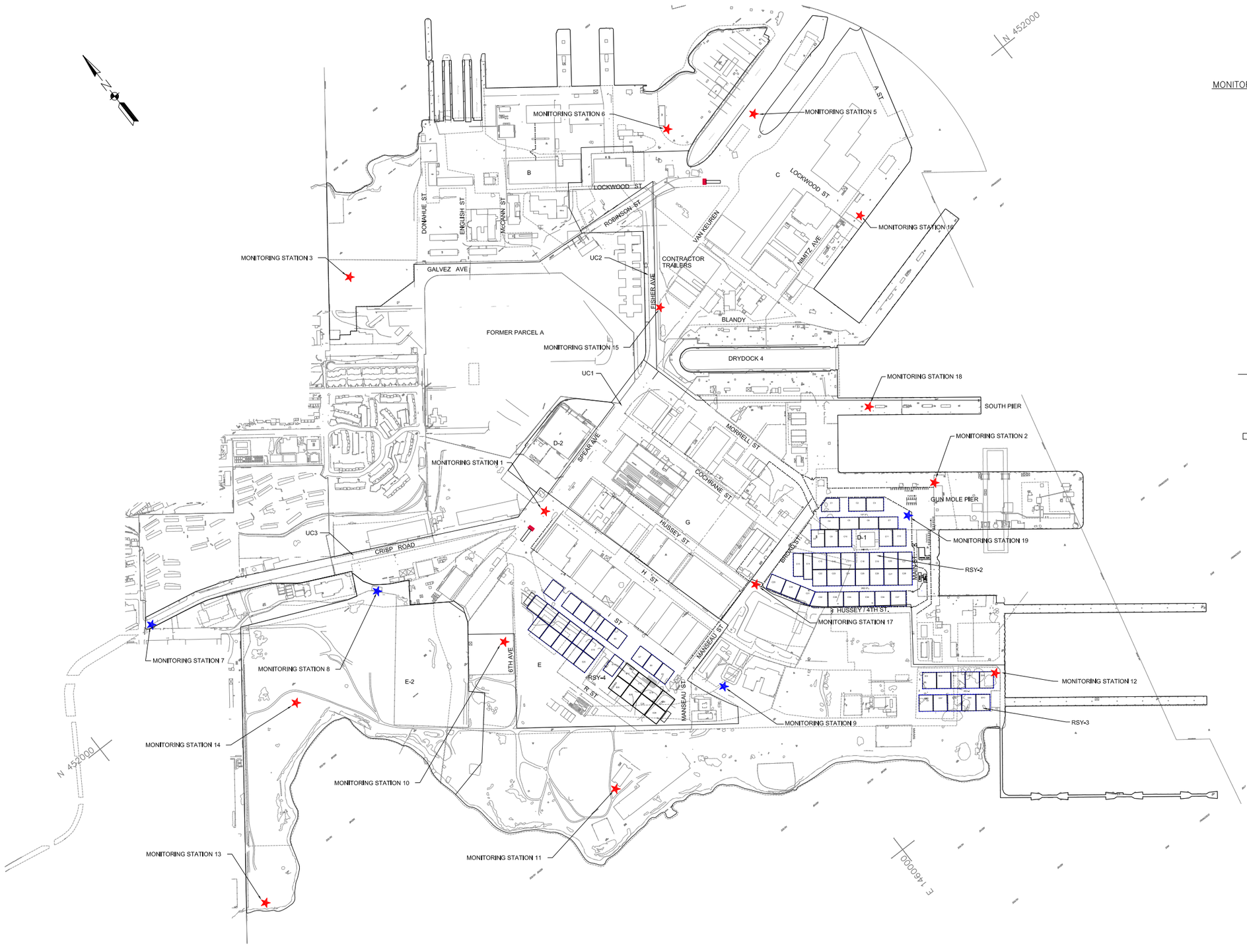
FIGURE 1-1

HUNTERS POINT SHIPYARD LOCATION MAP

HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

REVIEW: 0
AUTHOR: GFG
DCN: ECSD-3211-0018-0002.R1
FILE NUMBER: 090544R4748.mxd

TETRA TECH EC, INC.



LEGEND

MONITOR STATION	LOCATION	IN USE
1	– PARCEL E-1 –	NO
2	– PARCEL D –	NO
3	– PARCEL B –	NO
4	– NOT USED –	NO
5	– PARCEL C –	NO
6	– PARCEL B –	NO
7	– PARCEL E-1 –	YES
8	– PARCEL E-1 –	YES
9	– PARCEL E-1 –	YES
10	– PARCEL E-1 –	NO
11	– PARCEL E-1 –	NO
12	– PARCEL E-1 –	NO
13	– PARCEL E-2 –	NO
14	– PARCEL E-2 –	NO
15	– PARCEL G –	NO
16	– PARCEL C –	NO
17	– PARCEL D-1 –	YES
18	– PARCEL D-1 –	YES
19	– PARCEL D-1 –	YES

MONITORING STATION LOCATION (TETRA TECH CONTROLLED)

MONITORING STATION LOCATION (NOT IN USE OR OPERATED BY OTHERS)

PARCEL BOUNDARY

LOCATION OF 10' X 16' RUMBLE STRIP

LOCATION OF 10' X 50' GRAVEL CLEAN-OUT PAD

BASE REALIGNMENT AND CLOSURE PROGRAM MANAGEMENT OFFICE WEST SAN DIEGO, CALIFORNIA

BASEWIDE DUST CONTROL PLAN

FIGURE 4-1

DUST CONTROL TRACK-OUT POINTS AND AIR MONITORING LOCATIONS

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

REVISION: 0
AUTHOR: A. CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

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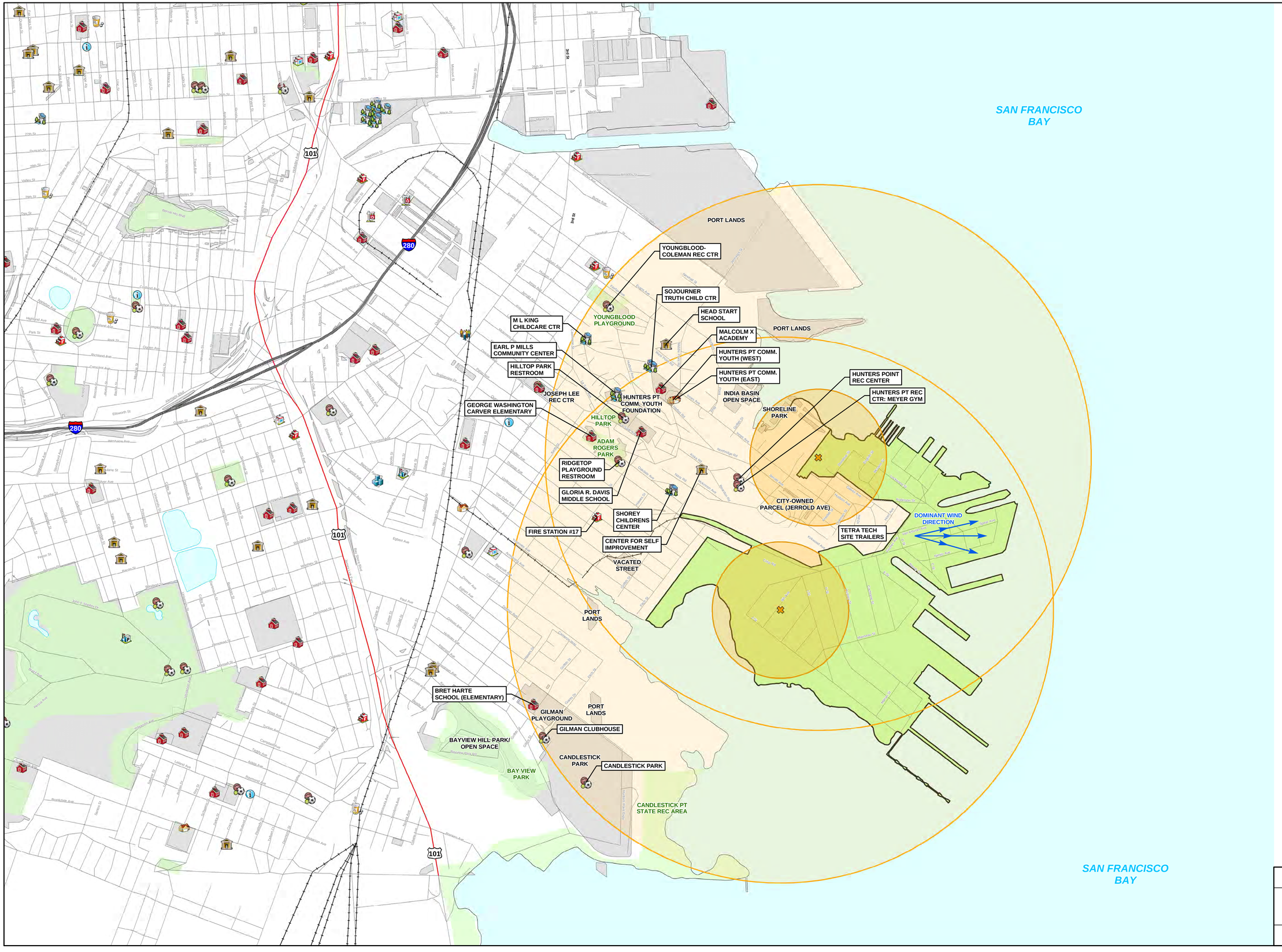

LEGEND

- FIRE DEPARTMENT
- HUMAN SERVICES
- JUVENILE PROBATION
- MAYOR/COMMUNITY DEVELOPMENT
- MENTAL HEALTH
- POLICE STATION
- PUBLIC HEALTH
- PUBLIC LIBRARY
- PUBLIC WORKS
- REAL ESTATE/ADMINISTRATIVE SERVICES
- RECREATION AND PARK
- SAN FRANCISCO COMMUNITY COLLEGE DISTRICT
- SAN FRANCISCO PRIVATE SCHOOL
- SAN FRANCISCO UNIFIED SCHOOL DISTRICT
- SHERIFF
- RADIUS CENTERPOINT
- ROAD
- HIGHWAY
- INTERSTATE HIGHWAY
- RAILROAD
- PARK
- WATER
- SAN FRANCISCO PUBLIC LAND
- QUARTER MILE BUFFER
- ONE MILE BUFFER
- HUNTERS POINT SHIPYARD BOUNDARY

SOURCE:

WIND DIRECTION
AS PER SOUTHWEST DIVISION NAVAL FACILITIES ENGINEERING COMMAND WIND ROSE PLOTS OF HUNTERS POINT SHIPYARD 08/06/00 - 10/12/00

SAN FRANCISCO FACILITIES LOCATIONS
RETRIEVED FROM THE CITY AND COUNTY OF SAN FRANCISCO ONLINE WEBSITE (SFGIS DATA DOWNLOAD).

N

400 0 400 800
Feet

BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE DUST CONTROL PLAN

FIGURE 5-1

HUNTERS POINT POTENTIAL COMMUNITY RECEPTORS AND BUFFER AREAS

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CALIFORNIA

REVIEW: 0
AUTHOR: GFG
DCN: ECSD-3211-0018-0002.R1
FILE NUMBER: 0905441A747.mxd

TETRA TECH EC INC.

ATTACHMENT 5

STORMWATER POLLUTION PREVENTION PLAN

FINAL
STORMWATER PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared Under:

Contract Number N62473-10-D-0808
Contract Task Order Number CTO 0004
Document Control Number: ITSI-0808-0004-0013

Prepared for:

Base Realignment and Closure
Program Management Office, West
1455 Frazee Road, Suite 900
San Diego, California 92108

DEPARTMENT OF THE NAVY
Naval Facilities Engineering Command Southwest
San Diego, California
Prepared by:

ITSI Gilbane Company
2730 Shadelands Drive
Walnut Creek, CA 94598

July 2013

ITSI Project No. 07204.0004

Final CERCLA Stormwater Plan

Phase II

Radiological Remediation and Support

Parcel D-1 Hunters Point Naval Shipyard

San Francisco, California

RISK LEVEL ***2***

Contract Number N62473-10-D-0808
Task Order Number CTO-0004
Document Control Number: ITSI-0808-0004-0013

Prepared for:

Department of the Navy
Base Realignment and Closure
Program Management Office West
San Diego, California

SWP Prepared by:

ITSI Gilbane Company

2730 Shadelands Drive, Walnut Creek, California 94598

Cenk Ergin, P.E. #C 75056, QSD

SWP Preparation Date

July 2013

Estimated Project Dates:

Start of Construction	Completion of Construction
May 20, 2013	**November 1, 2013**

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Acronyms and Abbreviations

ARAR Applicable or Relevant and Appropriate Requirement
ATS Active Treatment System
BAT/BCT Best Available Technology/Best Control Technology
Bay San Francisco Bay
BMP best management practice
CASQA California Stormwater Quality Association
CERCLA Comprehensive Environmental Response, Compensation, and Liability Act
CFR Code of Federal Regulations
CoC chain of custody
CSMP Construction Site Monitoring Program
CTO contract task order
DP discharge point
EPA U.S. Environmental Protection Agency

HPNS	Hunters Point Naval Shipyard
IR	Installation Restoration
ITSI Gilbane	ITSI Gilbane Company
K factor	soil-erodibility factor
LS factor	hill slope length and slope factor
MDL	method detection limit
ml	milliliter
MSA	material storage area
MS4	municipal separate storm sewer system
NAL	numeric action level
Navy	U.S. Department of the Navy
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric turbidity unit
P	potable toilet area
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
QA/QC	quality assurance and quality control
QSD	Qualified SWPPP Developer
QSP	Qualified SWPPP Practitioner
REAP	Rain Event Action Plan
R factor	rainfall erosivity factor
ROC	radionuclide of concern
RRO	radiological remediation objective
RSY	Radiological Screening Yard
RUSLE	Revised Universal Soil Loss Equation
RWQCB	Regional Water Quality Control Board
SFO	San Francisco International Airport
Site	Parcel D-1, Phase II at Hunters Point Naval Shipyard (HPNS), San Francisco, California
SOW	scope of work
SP	sampling point
SWP	Stormwater Plan
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TMDL	Total Maximum Daily Load
TPH	total petroleum hydrocarbons
TPH-g	TPH-gasoline range
TtEC	Tetra Tech EC, Inc.
ug/L	microgram per liter
V	vehicle storage area
VOC	volatile organic compound
ºC	degrees Celsius
§	Section

Qualified SWPPP Developer (QSD)

Approval and Certification of the CERCLA Stormwater Plan

Project Name:	*Phase II Radiological Remediation and Support, Parcel D-1* *Hunters Point Naval Shipyard, San Francisco, CA*
Project Number/ID	*Contract #: N62473-10-D-0808* *Task Order #: CTO-0004* *ITSI Gilbane Company Project #: 07204.0004*

"This CERCLA Stormwater Plan and Appendices were prepared under my direction to meet the requirements of the California Construction General Permit (State Water Resources Control Board [SWRCB] Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ). I certify that I am a Qualified Stormwater Pollution Prevention Plan (SWPPP) Developer (QSD) in good standing as of the date signed below."

QSD Signature	*January 2013* *Date*
Cenk Ergin *QSD Name*	*00375* *QSD Certificate Number*
Senior Project Engineer, ITSI Gilbane Company *Title and Affiliation*	*925-946-3260* *Telephone Number*
cergin@itsi.com *Email*	

Amendment Log

Project Name: *Phase II Radiological Remediation and Support, Parcel D-1, Hunters Point Naval Shipyard, San Francisco, CA*

Contract #: N62473-10-D-0808

Task Order #: CTO-0004

Project Number/ID: *ITSI Gilbane Company Project #: 07204.0004*

Amendment Number	**Date**	**Brief description of amendment, include section and page number**	**Prepared and approved By**
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#

Section 1 CERCLA SWP Requirements

1.1 INTRODUCTION

This Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Stormwater Plan (SWP), or CERCLA SWP, presents the substantive measures that will be implemented to minimize sediment and other pollutants in stormwater runoff during the implementation of the Phase II storm drain and sanitary sewer removal actions within Parcel D-1, at Hunters Point Naval Shipyard (HPNS), San Francisco, California (Site). The site location is shown on Figure 1.

This CERCLA SWP has been prepared to specifically address the activities associated with the removal actions at HPNS for the Base Realignment and Closure Program Management Office West under Naval Facilities Engineering Command Southwest Contract No. N62473-10-D-0808, Contract Task Order (CTO) No. 0004. The U.S. Department of the Navy (Navy) is directing these removal actions in accordance with the requirements of CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan.

The Navy will implement the substantive provisions of the California State Water Resources Control Board (SWRCB) National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, "Stormwater Discharges Associated with Construction and Land Disturbance Activities" Order Number 2009-0009-DWQ (SWRCB, 2009), as amended by Order No. 2010-0014-DWQ (SWRCB, 2010), to comply with federal Clean Water Act Applicable or Relevant and Appropriate Requirements (ARARs) and California water quality ARARs for discharges to surface waters. These SWRCB orders are hereafter referred to as the "General Permit", and a copy is included in Appendix H.

This CERCLA SWP was designed to address the following objectives.

- Control all pollutants and their sources, including sources of sediment associated with construction, construction site erosion, and other activities associated with construction activity.
- Identify and either eliminate, control, or treat all non-stormwater discharges where not otherwise required to be under a Regional Water Quality Control Board (RWQCB) permit.
- Implement site best management practices (BMPs) that are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the best available technology/best control technology (BAT/BCT) standard.
- Follow complete and correct calculations and design details, as well as BMPs, for site run-off management.
- Identify and implement stabilization BMPs to reduce or eliminate pollutants after construction is completed.

1.2 SUBSTANTIVE REQUIREMENTS

Being that the construction and land disturbance activity are remediation as an on-site action defined by CERCLA, a Notice of Intent, a Legally Responsible Party Certification Statement, a Waste Discharge Identification Number, a Notice of Termination; an Annual Report, and other procedural requirements of the General Permit are not ARARs and the Navy is therefore not required to submit them. Under CERCLA, the federal government is also exempt from paying permit fees, such as the annual permit fee.

The Navy and its contractor (ITSI Gilbane Company [ITSI Gilbane]) are responsible for abiding by the substantive requirements of the General Permit, including performing a risk assessment, preparing a site map, implementing BMPs, and complying with substantive federal and state requirements during construction and land disturbance activities as indicated above and described herein.

1.3 CERCLA SWP AVAILABILITY AND IMPLEMENTATION

This CERCLA SWP will be available at the construction site (in the Construction Office Trailer at HPNS) during working hours while construction and/or field activities by the contractor are occurring, and will be made available upon request by a Navy, state, or municipal inspector. When the original CERCLA SWP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs, maps, and drawings will be left with the field crew and the original CERCLA SWP will be made available via a request by radio or telephone. The CERCLA SWP will be implemented concurrently with the start of ground-disturbing activities, under the direct supervision of a Qualified SWPPP Practitioner (QSP).

1.4 CERCLA SWP AMENDMENTS

The CERCLA SWP will be amended or revised when:

- There is a reduction or increase in total disturbed acreage;
- BMPs do not meet the objectives of reducing or eliminating pollutants in stormwater discharges;
- There is a change in construction or operations that may affect the discharge of pollutants to surface waters, groundwater, or a municipal separate storm sewer system;
- There is a change in the project duration that changes the project's risk level; or
- Deemed necessary by the CERCLA SWP developer or implementer.

The following items will be included in each amendment:

- The name and project title of the individual who requested the amendment;
- The location(s) of the proposed change(s);
- The reason for the change(s);

- The original BMP(s) proposed, if any; and
- The new BMP(s) proposed, as applicable.

Amendments will be logged at the front of the CERCLA SWP. The CERCLA SWP text will be revised, replaced, and/or hand annotated as necessary to properly convey the amendment.

1.5 RETENTION OF RECORDS

Paper or electronic records of documents required by this CERCLA SWP will be retained for a minimum of 3 years from the date generated or for the time frame required by Navy Contract N62473-10-D-0808, CTO-0004, whichever is longer.

These records will be available at HPNS until construction is complete. Records assisting in the determination of compliance with the General Permit will be made available within a reasonable time, to the RWQCB, SWRCB, or U.S. Environmental Protection Agency (EPA) upon request. Requests by the RWQCB for retention of records for a period longer than 3 years will be accommodated.

1.6 NOTICE OF TERMINATION

As the Navy contractor, ITSI Gilbane will prepare a final site map and take photographs to verify that all CERCLA SWP requirements have been met. The final site map and photographs will be submitted as part of the final report following completion of the construction project, and within 90 days of meeting all requirements for termination and final stabilization, including the following:

- The Site will not pose any additional sediment discharge risk than the Site did prior to construction activities.
- All construction-related equipment, materials, and any temporary BMPs no longer needed are removed from the Site.
- Post-construction stormwater management measures are installed.
- The San Francisco Bay RWQCB will consider a construction site complete when the conditions of the General Permit, Section II.D have been met.

Section 2 Project Information

2.1 PROJECT AND SITE DESCRIPTION

2.1.1 Site Location

HPNS is located in the city and county of San Francisco, California (Figure 1). HPNS is located on a long promontory in the southeastern part of San Francisco that extends east into San Francisco Bay (Bay). The latitude and longitude of HPNS are 37.725634 and -122.362461, respectively. HPNS includes 866 acres (420 acres on land and 446 acres under water in San Francisco Bay) and is divided into 11 parcels: B, C, D-1, D-2, E, E-2, F, G, UC-1, UC-2, and UC-3 (Figure 1). Parcel A was transferred to the city and county of San Francisco in November 2004.

2.1.2 Site Description

In 1940, the Navy obtained ownership of HPNS for shipbuilding, repair, and maintenance. After World War II, activities at HPNS shifted to submarine maintenance and repair. However, the Navy continued to operate carrier overhaul and ship maintenance and repair facilities through the 1960s. Other significant activities after World War II included decontamination of ships used during Operation Crossroads (i.e., nuclear weapons tests that occurred mainly in 1946 and 1947). HPNS was also the site of the Naval Radiological Defense Laboratory from the late 1940s until 1969. Initial tasks for the laboratory included research into decontamination methods, personnel protection, and development of radiation detection instrumentation. Laboratory responsibilities grew to also include practical and applied research into the effects of radiation on living organisms and on natural and synthetic materials, in addition to continued decontamination experimentation. HPNS was deactivated in 1974 and remained largely unused until 1976. Between 1976 and 1986, the Navy leased most of HPNS to Triple A Machine Shop, Inc., a private ship repair company. The Navy resumed occupancy of HPNS in 1987.

After review of the operational history of HPNS and site-specific investigation data, the Navy has determined that the storm drain and sanitary sewer systems at HPNS may contain radioactive material as a result of past practices.

2.1.3 Existing Site Topography and Stormwater Flows

HPNS consists of relatively level lowlands that were mostly constructed by placing borrowed fill material from a variety of sources, including serpentine bedrock from the shipyard and surrounding area, construction debris, and waste materials (such as sandblast materials). The majority of HPNS has surface elevations between 0 to 10 feet above mean sea level. The topography generally slopes down to the south and the east.

Surface water at HPNS drains primarily in a sheet-flow pattern from either the highlands north of the Navy property to the surrounding lowlands or from the lowlands themselves. At HPNS, runoff has historically been collected by the storm drain system and discharged to San Francisco Bay through outfalls.

At completion of remediation work activities in each work area, site topography and storm water flow characteristics will be similar to pre-construction conditions.

2.1.4 Existing Drainage

Parcel D-1 (see Figure 2) encompasses approximately 34 acres not including the pier controlled by another Navy contractor. The topography of Parcel D-1 gently slopes toward San Francisco Bay. The drainage encompasses the sanitary drain swales and pipes per the existing as-built information (Figure 3). The surface elevations of the work area range from a high of 10 feet above mean sea level to an average of 6 feet above mean sea level.

Surface waters are either collected in subsurface storm drains and swales or allowed to sheet flow into San Francisco Bay. Flow directions and existing drainage are shown on Figure 3.

Precipitation is the main source of surface water runoff at Parcel D-1, with precipitation greatest in the winter months (November through April). Precipitation is less than 0.2 inches per month from June through September (http://www.wrh.noaa.gov/images/mtr/avgprecip1.gif for San Francisco International Airport).

2.1.5 Geology and Groundwater

The peninsula that forms HPNS is within a northwest-trending belt of Franciscan Complex bedrock known as the Hunters Point Shear Zone. In some locations, the Marin Headlands Terrain underlies this shear zone. HPNS is underlain by five geologic units, the youngest of Quaternary age and the oldest, the Franciscan Complex bedrock, of Jurassic-Cretaceous age. In general, the stratigraphic sequence of these geologic units, from youngest (willowest) to oldest (deepest), is artificial fill; undifferentiated upper sand deposits; Bay mud deposits; undifferentiated sedimentary deposits; and Franciscan Complex bedrock.

The hydrostratigraphic units (at Parcel D-1 include the A-aquifer, the aquitard zone, the B-aquifer, and a bedrock water-bearing zone (SulTech, 2007). In addition, groundwater may be present in a thin layer of fill overlying bedrock and the bedrock at a portion of Parcel D-1. Groundwater beneath Parcel D-1 includes the shallow A-aquifer and the deeper B-aquifer. Groundwater is not currently used for any purpose at Parcel D-1.

Groundwater in the A-aquifer is not suitable as a potential source of drinking water (SulTech, 2007).. Groundwater in the B-aquifer underneath Parcel D-1 has a low potential as a future source of drinking water. Use of the B-aquifer groundwater is controlled by the city and county of San Francisco, and the San Francisco Public Utility Commission prohibits the use of groundwater in this area of the city. The San Francisco RWQCB concurred with the Navy's conclusion that the groundwater in the A-aquifer is not suitable as a source of drinking water (RWQCB, 2011).

Groundwater flow patterns at Parcel D-1 and Parcel UC-1 are complex because they are potentially affected by (1) a groundwater sink located in adjacent Parcel E; (2) a groundwater mound located near the western boundary of Parcel G; (3) leaks of groundwater into former sanitary sewers or storm drains; (4) recharge from water supply lines; and (5) tides in the Bay. The groundwater at Parcels D-1 and UC-1 flows toward the Bay. The groundwater sink located in Parcel E is believed to have been caused by seepage of groundwater into sanitary sewer lines.

This groundwater was then pumped off site to the local publicly owned treatment works, thereby lowering groundwater levels in the area. Flow patterns continue to change now that the pumping has been discontinued and as sanitary sewer and storm drain lines are removed throughout HPNS.

2.1.6 Project Description

The site activities included in this CTO's scope of work (SOW) include the following.

- Perform the radiological investigation and any remediation necessary to achieve free release, and final status surveys of the ship berths adjacent to Parcel D-1.
- Remove, sample, survey, remediate, backfill, and restore a minimum of 5,700 lineal feet of sewer and storm drain lines (Figure 2).

The sewer and storm drain line removal actions will involve excavating soil and piping along the existing sewer and storm drain lines containing any radioactive contaminants that may be present at levels above the criteria established as part of the radiological remediation objectives (RROs) (Navy, 2006).

Soil excavated during the removal action activities will be transported to Radiological Screening Yards (RSYs) that will be established within Parcel D-1 for processing the soil. Processing activities in the RSYs include surveying, characterizing, remediating (as necessary), radiologically clearing the materials for either reuse or disposal, and sampling for chemical analysis (non-radiological) of soil derived from this Installation Restoration (IR) Program site. The radiological survey activities of excavated soil are consistent with EPA (2000) guidance. The objective of processing excavated soil at the RSY is to demonstrate that identified residual radioactivity levels for the radionuclides of concern (ROCs) in the material to be used as backfill meet the release criteria identified in Worksheet 15 of the Sampling and Analysis Plan (Appendix A of the Project Execution Plan [ITSI Gilbane, 2013a]). As necessary, the soil spread on the screening pads will be allowed to dewater before radiological surveys are initiated. Water collected from the screening pads will be characterized for chemical and radiological constituents, prior to proper disposal. Wastewater sampling will be conducted according to procedures detailed in the Sampling and Analysis Plan (Appendix A of the Project Execution Plan [ITSI Gilbane, 2013a]). Figure 2 presents a site layout map for Parcel D-1 at HPNS.

The excavated areas will be backfilled with released soil (soil that is not contaminated) or clean fill, with the backfill material compacted and graded per details in the Execution Plan (ITSI Gilbane, 2013a).

Radiological surveys will be conducted at Parcel D-1 Ship Berths to support the Final Status Survey goal and free release of the Site. Survey work may require asphalt removal to support clean closure. Contaminated areas will be remediated and re-surveyed to support clean closure (Figure 2, ship berth areas)

Several large stockpiles of rail ties will be radiologically surveyed and released from radiological controls (identified in Figure 2 as wooden ties)

The approximate disturbed area will be less than 1 acre.

The project consists of the following work elements

- Permitting and notifications
- Preparatory activities and meetings
- Environmental resources surveying
- Clearing vegetation
- Initial geophysical surveying
- Mobilization
- Stormwater, sediment, and erosion control
- Excavating soils and removing piping systems
- Radiological surveys and sampling
- Final Status Surveys
- Backfill placement and compaction
- Installing drainage swales and sediment traps
- Site restoration
- Free release survey and decontamination of equipment
- IR Program soil reuse sampling
- Waste classification, storage, and disposal
- Demobilization.

Detailed descriptions of the above activities are provided in the Project Execution Plan (ITSI Gilbane, 2013a), to which this CERCLA SWP is an attachment.

2.1.7 Developed Condition

Post-construction surface drainage will be unchanged from the pre-construction surface drainage because there will be no change in the percentage of pervious and non-pervious covers and the existing surface topography.

2.2 STORMWATER RUN-ON FROM OFFSITE AREAS

This CERCLA SWP addresses calculations and design details, as well as BMP controls, for site run-on.

Run-on to Parcel D-1 is predominantly from Parcel G, the uphill portion of HPNS. The run-on is captured by a drainage system located southwest and west of Parcel D-1 and channeled into existing outfalls. During the removal actions, the ground surface will be graded to direct flow to existing storm drain systems and outfalls to the maximum extent practicable. Upon completion of the removal actions, a series of drainage swales will be constructed throughout the Site (by others, swale construction is not included in this CTO scope of work) to prevent excessive ponding/flooding, filter sediment, keep haul roads open, and maintain flow to existing outfalls.

Off-site run-on to Parcel D-1 is anticipated to be minimal for the following reasons:

1. Nearly all surface water runoff generated upslope of Parcel D-1 is channeled into existing sanitary drain swales/pipes that drain into the Bay (Figure 3).
2. There are no point source discharges from upgradient land uses, creeks, streams, or other water bodies that run through the Site.

Based on reasons above, run-on is either adequately managed or diverted upstream of Parcel D-1, and the risk of erosion by run-on stormwater is low. Consequently for these reasons, run-on calculations are not warranted. If conditions or the scope of work changes such that run-on from off-site areas becomes significant, the CERCLA SWP will be amended to include a calculation of run-on volumes, and areas where run-on may enter the Site will be assigned BMPs to divert or redirect flow away from Parcel D-1.

2.3 FINDINGS OF THE CONSTRUCTION SITE SEDIMENT & RECEIVING WATER RISK DETERMINATION

A construction site risk assessment has been performed for the project and the resultant risk level is Risk Level 2.

Risk from construction site sediment and receiving water was evaluated using the procedure outlined in the General Permit to guide the development of the stormwater monitoring program presented in this CERCLA SWP. The procedure to calculate the risk level involves two steps: (1) evaluating the project sediment risk factor, and (2) evaluating the receiving water risk factor. The calculated sediment level is provided in Table 2.1. Monitoring and sampling requirements are based on the risk level assigned.

Sediment risk was determined using the Risk Determination Worksheet provided in Appendix 1 of the General Permit, which is an interactive tool available from the SWRCB website (SWRCB, 2012a). Three factors are used to calculate the sediment risk factor: (1) rainfall erosivity factor (R factor), (2) soil-erodibility factor (K factor), and (3) hill slope length and slope factor (LS factor). The R factor was determined using the method described in the Construction Rainfall Erosivity Waiver (EPA, 2012). The method in determining the R factor used the construction dates and location of Parcel D-1, and the calculation of the R factor is shown in Appendix A to this CERCLA SWP. The determined R factor for Parcel D-1 is 5.28. The K factor was set to 0.64, and derived from Appendix 1 of the General Permit. The LS factor was determined from topographic data for the project areas. The average length of slope and slope percent for the project areas were determined using a weighted average, which provided an LS factor of 0.27.

The watershed erosion estimate was determined to be 0.91 tons per acre, equivalent to a low sediment risk factor. Appendix A to this CERCLA SWP contains all documentation for the risk factor calculations.

Receiving water risk was determined through a review of the SWRCB's Impaired Water Bodies database, available on their website (SWRCB, 2012b) and the RWQCB Basin Plan (RWQCB, 2011). On October 11, 2011, EPA issued its final decision regarding the water bodies and pollutants EPA added to California's 2010 Clean Water Act § 303(d) List. Parcel D-1 is impacted by non-radiological constituents such as arsenic, benzo(a)pyrene,

benzo(b)fluoranthene, and manganese (Navy, 2009). Sediment and soil in Parcel D-1 may contain some of these compounds, and surface runoff from Parcel D-1 drains directly into central San Francisco Bay. Therefore, the receiving water risk level for the project is high.

The combined risk level for the project site was determined to be Risk Level 2. The stormwater management requirements for a Risk Level 2 site provided in Attachment C of the General Permit (Appendix H of this CERCLA SWP) were used as a guide for developing the stormwater monitoring program presented herein. Table 2.1 and Table 2.2 summarize the sediment and receiving water risk factors, respectively, and document the sources of information used to derive the factors.

Table 2.1 Summary of Sediment Risk

RUSLE[(1)] Factor	**Value**	**Method for establishing value**
R	5.28	Fact Sheet 3.1 (EPA, 2012)
K	0.64	K is derived from Appendix 1 of the General Permit
LS	0.27	LS is derived from Appendix 1 of the General Permit
Total Predicted Sediment Loss (tons/acre)		**0.91**
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre		☒ **Low** ☐ **Medium** ☐ **High**

[1] RUSLE - revised universal soil loss equation

Table 2.2 Summary of Receiving Water Risk

Receiving Water Name	**303(d) Listed for Sediment Related Pollutant[(1)]**	**TMDL[(2)] for Sediment Related Pollutant[(1)]**	**Beneficial Uses of COLD, SPAWN, and MIGRATORY[(1)]**
San Francisco Bay	☒ Yes ☐ No	☐ Yes ☒ No	☐ Yes ☒ No
Overall Receiving Water Risk			☐ **Low** ☒ **High**

(1) If yes is selected for any option the Receiving Water Risk is High
(2) TMDL – total maximum daily load

A Risk Level 2 site is subject to both the narrative effluent limitations and numeric effluent standards. The narrative effluent limitations require stormwater discharges associated with construction activity to minimize or prevent pollutants in stormwater and authorized non-stormwater through the use of controls, structures, and BMPs. Discharges from a Risk Level 2 site are subject to numeric action levels (NALs) for pH and turbidity shown in Table 2.3. This CERCLA SWP has been prepared to address Risk Level 2 requirements (General Permit Attachment H).

Table 2.3 Numeric Action Levels

Parameter	Unit	Numeric Action Level (NAL)
pH	pH units	Lower NAL = 6.5 (acidic pH) Upper NAL = 8.5 (alkaline pH)
Turbidity	Nephelometric Turbidity Unit (NTU)	250 NTU (Daily Average)

2.4 CONSTRUCTION SCHEDULE

The site sediment risk was determined based on construction taking place between May 20, 2013, and November 1, 2013. Modification or extension of the schedule (start and/or end dates) may affect risk determination and permit requirements. The QSP will contact the QSD if the schedule changes during land disturbance activities associated with the project to address potential impact to the CERCLA SWP. The estimated schedule for planned work can be found in Appendix F.

2.5 POTENTIAL CONSTRUCTION ACTIVITY AND POLLUTANT SOURCES

Appendix B includes a list of construction activities and associated materials that are anticipated to be used on site. These activities and associated materials will or could potentially contribute pollutants, other than sediment, to stormwater runoff.

The anticipated activities and associated pollutants were used in Section 3 to select the BMPs for the project. Locations of temporary BMPs are identified on Figure 3.

Sampling requirements for non-visible pollutants associated with construction activity for this project are discussed in Section 7.7.1. A chemical inventory of products used by on-site personnel is retained on site at the construction trailer.

2.6 IDENTIFICATION OF NON-STORMWATER DISCHARGES

Non-stormwater discharges consist of discharges that do not originate from precipitation events. The General Permit provides allowances for specified non-stormwater discharges that do not cause erosion or carry other pollutants.

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit and listed in the CERCLA SWP, or authorized under a separate NPDES permit, are prohibited.

Non-stormwater discharges that are authorized from this project site include the following:

- Irrigation of vegetative erosion control measures;
- Water to control dust;
- Discharges from emergency fire-fighting activities;
- Waters used to wash vehicles and equipment, provided that there is no discharge of soaps, solvents, or detergents used for such purposes; and
- Uncontaminated air conditioning or compressor condensate.

These authorized non-stormwater discharges will be minimized by the QSP by implementing the stormwater and non-stormwater BMPs described in Section 3 of this CERCLA SWP.

The activities or project activities at this Site that may result in unauthorized non-stormwater discharges include:

- Diesel and gasoline fuel used for mechanical equipment;
- Fluids in vehicles and equipment that include fuels, coolants and other non-fuel oil-based fluids, and lubricating and hydraulic oils;
- Use of portable toilets for field personnel; and
- Decontamination of field equipment.

Steps will be taken, including the implementing appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on site.

Discharges of construction materials and wastes, such as fuel or marking paint, resulting from dumping, spills, or direct contact with rainwater or stormwater runoff, are also prohibited.

2.7 REQUIRED SITE MAP INFORMATION

The site layout map for the removal actions to be performed within Parcel D-1 Phase II at HPNS is shown in Figure 2.

The map will be updated accordingly as changes occur in the field. Figure 1, Figure 2, and Figure 3 show the project location, surface water boundaries, geographic features, construction site perimeter, and other requirements identified in Attachment H of the General Permit. Table 2.4 identifies the figure where required elements are illustrated.

Table 2.4 Required Map Information

Included on Figure Number (1)	**Required Element**
Figure 1	The project's surrounding area (vicinity map)
Figure 2	Site layout
Figure 2	Construction site boundaries- Parcel boundary is the construction boundary.
Figure 3	Drainage areas

Table 2.4 Required Map Information

Included on Figure Number (1)	Required Element
Figure 3	Discharge locations
Figure 3	Sampling locations
Not Applicable	Areas of soil disturbance (temporary or permanent)
Not Applicable	Active areas of soil disturbance (cut or fill)
Figure 3	Locations of runoff BMPs (as temporary BMPs)
Figure 3	Locations of erosion control BMPs (as temporary BMPs)
Figure 3	Locations of sediment control BMPs (as temporary BMPs)
Not Applicable	Locations of sensitive habitats, watercourses, or other features which are not to be disturbed – Not applicable for the Site
Not Applicable	Locations of all post construction BMPs (as temporary BMPs)
Figure 3	Vehicle storage areas
Figure 3	Material storage areas (i.e., laydown area)
Figure 3	Entrance and Exits
Figure 3	Fueling Locations

Notes: (1) Indicates figure on which that information is included (e.g., Vicinity Map, Site Map, Drainage Plans, etc.)

Section 3 Best Management Practices

3.1 SCHEDULE FOR BMP IMPLEMENTATION

In consideration of the objectives identified in Section 1.1, this CERCLA SWP includes actions and practices to address the following.

- Identify potential pollution sources associated with stormwater, including soil-disturbing activities that increase the potential for erosion and transport of soil, discharges of polluting materials related to activities, and discharges of stored materials or wastes.
- Ensure that the potential impact of rainfall and surface water run-on from off site are properly assessed and managed.
- Identify, construct, and implement BMPs in accordance with the time schedule and maintain the BMPs for prevention of the potential discharges identified above, using appropriate levels of technology, field practices, and monitoring.
- Develop a maintenance schedule for BMPs installed during field activities designed to reduce or eliminate pollutants after site characterization is completed (post-construction BMPs).
- Establish an inspection and monitoring plan and program to ensure that the BMP prevention and control measures remain effective throughout the period of field activities.
- Include a Stormwater Site Monitoring Program designed to acquire and evaluate information related to the relative effectiveness of this CERCLA SWP.
- Identify a sampling and analysis strategy and sampling schedule for stormwater discharges from the site.

To achieve these actions and practices, BMPs as identified in Table 3.1 will be implemented prior to initiation of land disturbance activities, and as appropriate for each drilling location.

Table 3.1 BMP Implementation Schedule

	BMP	Implementation	Duration
Erosion Control	EC-2, Preservation of Existing Vegetation	Start of Construction	Entirety of Project
	EC-4, Hydroseed	Not Applicable	Not Applicable
	EC-6, Straw Mulch	Start of Construction	Entirety of Project
	EC-9, Earth Dike and Drainage Swales	End of Construction	Remainder of Project
Non-Stormwater	NS-1, Water Conservation Practices	Start of Construction	Entirety of Project
	NS-6, Illicit Connection- Illegal Discharge Connection	Start of Construction	Entirety of Project

Table 3.1 BMP Implementation Schedule

	BMP	Implementation	Duration
	NS-8, Vehicle and Equipment Cleaning	Start of Construction	Entirety of Project
	NS-9, Vehicle and Equipment Fueling	Start of Construction	Entirety of Project
	NS-10, Vehicle/Equipment Maintenance	Start of Construction	Entirety of Project
Sediment Control	SE-1, Silt Fence	Start of Construction	Entirety of Project
	SE-5, Fiber Rolls	Start of Construction	Entirety of Project
	SE-6, Gravel Bag Berm	Start of Construction	Entirety of Project
	SE-8, Sand Bag Barrier	Start of Construction	Entirety of Project
	SE-10, Storm Drain Inlet Protection	Start of Construction	Entirety of Project
Tracking Control	TC-1, Stabilized Construction Entrance and Exit	Start of Construction	Entirety of Project
	TC-3, Entrance Outlet Tire Wash	Start of Construction	Entirety of Project
Wind Erosion	WE-1, Wind Erosion Control	Start of Construction	Entirety of Project

3.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls are required by the General Permit to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the site. Applicable BMPs are identified in this section for erosion control, sediment control, tracking control, and wind erosion control.

3.2.1 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion controls BMPs protect the soil surface by covering and/or binding soil particles.

This construction project will implement the following practices to provide effective temporary and final erosion control during construction.

1. Preserve existing vegetation where required and when feasible.
2. The area of soil disturbing operations will be controlled such that the contractor is able to implement erosion control BMPs quickly and effectively.

3. Stabilize non-active areas within 14 days of cessation of construction activities or sooner if stipulated by local requirements.
4. Control erosion in concentrated flow paths by applying fiber rolls, gravel bag berms, or equivalent methods.
5. Prior to the completion of construction, apply hydroseeding to remaining disturbed soil areas as applicable.

Sufficient erosion control materials will be maintained on site to allow implementation in conformance with this CERCLA SWP.

The following temporary erosion control BMP selection table (Table 3.2) indicates the BMPs that will be implemented to control erosion for the Parcel D-1 field activities. Fact Sheets for temporary erosion control BMPs are provided in Appendix C.

Table 3.2 Temporary Erosion Control BMPs

CASQA Fact Sheet[4]	BMP Name	Meets a Minimum Requirement[1]	BMP Used		If not used, state reason
			YES	NO	
EC-1	Scheduling	✓	✓		
EC-2	Preservation of Existing Vegetation	✓	✓		
EC-3	Hydraulic Mulch	✓[2]		✓	Straw mulch used for short term needs
EC-4	Hydroseed	✓[2]		✓	Not in SOW
EC-5	Soil Binders	✓[2]		✓	Straw mulch used for short term needs
EC-6	Straw Mulch	✓[2]	✓		
EC-7	Geotextiles and Mats	✓[2]		✓	Straw mulch used for short term needs
EC-8	Wood Mulching	✓[2]		✓	Straw mulch used for short term needs
EC-9	Earth Dike and Drainage Swales	✓[3]	✓		
EC-10	Velocity Dissipation Devices			✓	Not Applicable to Construction Area conditions. Discharge points are existing. ITSI Gilbane will verify dissipation devices in field.
EC-11	Slope Drains			✓	Other Methods Used due to Flat Slopes at site
EC-12	Stream Bank Stabilization			✓	Not Applicable to area of field activities
EC-13	Polyacrylamide	✓		✓	Other Methods Used
EC-14	Compost Blankets	✓[2]		✓	Not needed as majority of existing vegetation will remain intact
EC-15	Soil Preparation-Roughening			✓	Not needed as majority of existing vegetation will remain intact
EC-16	Non-Vegetated Stabilization	✓[2]		✓	Not needed as majority of existing vegetation will remain intact
WE-1	Wind Erosion Control	✓	✓		
Alternate BMPs Used:					**If used, state reason:**

Table 3.2 Temporary Erosion Control BMPs

CASQA Fact Sheet[4]	BMP Name	Meets a Minimum Requirement[1]	BMP Used		If not used, state reason
			YES	NO	

[1] Applicability to a specific project will be determined by the QSD.
[2] The QSD will ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the risk level requirements.
[3] Run-on from off site will be directed away from all disturbed areas, diversion of off-site flows may require design/analysis by a licensed civil engineer and/or additional environmental permitting.
[4] California Stormwater Quality Association (CASQA), 2009

Implementation of Erosion Control BMPs

BMPs will be deployed in a sequence to follow the progress of field activities and resulting soil disturbance. As the locations of field activities change, erosion controls will be adjusted accordingly to control storm water run-off at the downgradient site perimeter, as necessary. BMPs will be mobilized as follows:

Throughout Construction:

- The CERCLA SWP implementer will monitor weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.
- Straw/fiber rolls will be placed and secured around all stockpiles.
- Sediment barriers in the form of fiber rolls will be installed around the sanitary sewer and storm drain line removal locations at least 48 hours prior to a significant rainfall event (50% probability of 0.5 inches of precipitation per day or more) until vegetation restoration has been completed.
- Soil-disturbing activities will not be performed during significant rainfall events (50% probability of 0.5 inches of precipitation per day or more). When the planned field activities are interrupted by a significant rainfall event, soil disturbance will not resume until Site soil conditions are suitable.
- Disturbed soil areas will be stabilized with temporary erosion control or with permanent erosion control as soon as practicable after field activity at each construction (remediation) location is completed.

During the Non-Rainy Season

- The project schedule will sequence field activities with the installation of both erosion control and sediment control measures in advance of a significant rainfall event.
- The construction schedule will be arranged to leave existing vegetation undisturbed to the extent practicable.

During the Rainy Season:

- Disturbed areas that are substantially complete will be stabilized with permanent erosion control (soil stabilization) and vegetation (if within window for seed establishment).
- Disturbed areas will be stabilized with temporary or permanent erosion control before significant rainfall events.
- Prior to forecasted significant rainfall events, temporary erosion control BMPs will be deployed and the integrity and effectiveness of these BMPs will be inspected.

These temporary erosion control BMPs will be implemented in conformance with the following guidelines and as outlined in the BMP Fact Sheets provided in Appendix C. If there is a conflict between documents, the Execution Plan (ITSI Gilbane, 2013a) will prevail over narrative in the body of the CERCLA SWP or guidance in the BMP Fact Sheets. The narrative in the body of the CERCLA SWP prevails over guidance in the BMP Fact Sheets.

Scheduling

Grading construction will be sequenced to minimize the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

Preservation of Existing Vegetation

Preservation of existing vegetation will protect soil erosion while decreasing the extent of BMPs required on site. Areas to be preserved from construction traffic will be marked. Temporary roadways, stockpile areas, and laydown areas will be located to avoid damaging existing vegetation.

Hydroseed

Hydroseeding will be used to vegetate the soil cover. The hydroseed will be a mixture of hydraulic mulch, seed fertilizer, stabilizing emulsion, and a native wildflower seed mixture. The stabilizing emulsion in the hydroseed mixture will protect exposed soil from erosion by water and wind. Disturbed areas will be hydroseeded as needed to restore to original condition.

Straw Mulch

Straw mulch will be used only on slopes that have been seeded and have high potential for erosion.

Earth Dike and Drainage Swales

Swales and berms may need to be cut to divert and control stormwater runoff during excavation. Swales and berms can divert sheet flow over slopes, prevent run-on into open excavations or active construction zones, and control erosion along with transport of sediment.

Wind Erosion Control

Water spray will control dust and wind erosion, with water application controlled to prevent surface runoff.

3.2.2 Sediment Controls

Sediment controls are temporary or permanent structural measures that are intended to complement the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.

The following sediment control BMP selection table (Table 3.3) indicates the BMPs that will be implemented to control sediment on the construction site. Fact Sheets for temporary sediment control BMPs are provided in Appendix C.

Table 3.3 Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[1]	BMP used		If not used, state reason
			YES	NO	
SE-1	Silt Fence	✓[2] [3]	✓		
SE-2	Sediment Basin			✓	Other methods used
SE-3	Sediment Trap			✓	Other methods used
SE-4	Check Dams			✓	No constructed drainage swales in area of field activities
SE-5	Fiber Rolls	✓[2][3]	✓		
SE-6	Gravel Bag Berm	✓[3]	✓		
SE-7	Street Sweeping	✓		✓	No paved streets in area field activities or path of surface run-off
SE-8	Sandbag Barrier		✓		
SE-9	Straw Bale Barrier			✓	Other methods used such as fiber rolls
SE-10	Storm Drain Inlet Protection	✓ Risk Level 2 and 3	✓		
SE-11	ATS			✓	Not applicable to the level of risk.
SE-12	Temporary Silt Dike			✓	Other methods used
SE-13	Compost Sock and Berm	✓[3]		✓	Other methods used
SE-14	Biofilter Bags	✓[3]		✓	Not required for this project
TC-1	Stabilized Construction Entrance and Exit	✓	✓		
TC-2	Stabilized Construction Roadway			✓	Not required for this project
TC-3	Entrance Outlet Tire Wash		✓		
Alternate BMPs Used:					**If used, state reason:**

[1] Applicability to a specific project will be determined by the QSD
[2] The QSD will ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the risk level

Table 3.3 Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[1]	BMP used		If not used, state reason
			YES	NO	
requirements [3] Risk Level 2 and 3 will provide linear sediment control along toe of slope, face of slope, and at the grade breaks of exposed slope					

These temporary sediment control BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix C. If there is a conflict between documents, the Execution Plan (ITSI Gilbane, 2013a) will prevail over narrative in the body of the CERCLA SWP or guidance in the BMP Fact Sheets. The narrative in the body of the CERCLA SWP prevails over guidance in the BMP Fact Sheets.

During the Non-Rainy Season

- Temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas before significant rainfall events.
- Fiber rolls and gravel bags will be maintained on site and deployed for barriers as needed.

During the Rainy Season

- Temporary sediment controls will be implemented at the draining perimeter of disturbed soil areas.
- Fiber rolls will be deployed along the toe of slopes to filter storm water run-off.
- Fiber rolls will be used around on the ground surface around the inlets during significant rainfall events (50% probability of 0.5 inches of precipitation per day or more).

Silt Fence

Silt fencing may be used as a temporary sediment trapping and filtering device downgradient of all disturbed areas where sheet flow might occur. Silt fences will be installed on a level contour receiving no more than 1 acre of runoff per 100 linear feet or 0.5 cubic foot per second of concentrated flow draining to any point along the silt fence.

Sand Bags

Sandbags will be used as a drainage diversion and for sediment trapping and stormwater velocity and erosion control. The sandbags will be installed on level contours up to 1 acre and in areas of concentrated flows and drainage courses.

Silt fences and sandbags may be used at the following locations at the site:

Silt fencing or sandbags around and along the downgradient toe of all soil stockpiles.

Silt fencing or sandbags below active construction areas.

Silt fencing along the downgradient toe of any work performed on the shoreline or adjacent steeply sloping bank.

Sandbags in concentrated drainage flow course and in areas downgradient of active work areas, as needed.

Sandbags as a diversion berm to stormwater run-on upgradient of active work areas and excavations.

Fiber Rolls

Fiber rolls can be used to control sediment by reducing flow velocity and allowing sediment to settle. Filter barriers will be installed on the ground surface around the storm

drain inlets. In areas where heavy traffic occurs, filter fabric will be placed inside the inlets.

Filter barriers may be used at the following locations at the Site:

- Around stockpiles and stockpile staging areas;
- Downgradient of any active areas where soil disturbance may be expected; and
- At operational storm drains as a form of inlet protection.

Gravel Bag Berm

Gravel bag berms allow for water to temporarily pond while allowing sediment to settle. Protection of catch basins will be done with gravel bag berms.

Stabilized Construction Entrance and Exit

Track-out of loose materials will be controlled using tire-cleaning rumble grid plates at the access point to the project site from the paved road to prevent track-out of mud or loose soils onto roadways. The rumble strips will be located at the construction entrance and exit and is also indicated in the basewide dust control plan (TtEC, 2010).

In addition, all bulk-loaded trucks and commercial vehicles will be required to pass over a gravel pad (at least 50 feet long) and over the rumble grid plates where the soil residue from the tires will be removed.

Any visible track-out onto a paved road where vehicles exit the work site will be removed by sweeping at the end of the workday or at least once per workday.

Entrance Outlet Tire Wash

All vehicle tires and undercarriages will be inspected prior to exiting Parcel D-1 and washed, if necessary. If visible dirt is identified during the visual inspection of tires and undercarriages, then the vehicle item with visible dirt will be cleaned. Cleaning will be performed by first knocking dirt and mud off vehicles and equipment using shaker plates, brooms, and/or shovels. If water is available on site, tires will be washed to prevent mud tracking to public roadways. If the wet method is used, the following procedures are to be implemented.

1. Designated areas for vehicle and equipment cleaning will be established where runoff is not likely to be generated and away from surface waters and existing storm drains.
2. The washing area will comprise a lined area with a perimeter berm to prevent runoff of wash water.
3. Vehicle wash water will be collected in a bermed area and transferred to a holding tank using a submersible pump. Water remaining at the end of construction will be properly characterized and disposed as investigation-derived waste.
4. Vehicles leaving the Site will be free of loose dirt before exiting.

Storm inlet Protection

Storm drain inlets adjacent to construction activities will be protected from any authorized or unauthorized non-stormwater discharges. Gravel bags and/or fiber rolls will be applied.

Stabilized Construction

Stabilization of the entrance and exit of the construction site will reduce tracking mud and dirt onto public roads from haul trucks and construction vehicles. Entrances and exits will be stabilized using base rock. Stabilized entrances and exits will be maintained throughout the construction period.

3.3 NON-STORMWATER CONTROLS AND WASTE AND MATERIALS MANAGEMENT

3.3.1 Non-Stormwater Controls

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit, are prohibited. Non-stormwater discharges for which a separate NPDES permit is required by the RWQCB are prohibited unless coverage under a separate NPDES permit has been obtained for the discharge. The selection of non-stormwater BMPs is based on the list of construction activities with a potential for non-stormwater discharges identified in Section 2.7 of this CERCLA SWP.

Table 3.4 identifies the non-stormwater control BMPs that will be implemented to control non-sediment discharges to stormwater at the Site. Fact Sheets for temporary non-stormwater control BMPs are provided in Appendix C.

Table 3.4 Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[(1)]	BMP used		If not used, state reason
			YES	NO	
NS-1	Water Conservation Practices	✓	✓		
NS-2	Dewatering Operation			✓	Not Applicable to field activities
NS-3	Paving and Grinding Operation			✓	Not Applicable to field activities
NS-4	Temporary Stream Crossing			✓	Not required for the field activities
NS-5	Clear Water Diversion			✓	Not required for the field activities
NS-6	Illicit Connection- Illegal Discharge Connection	✓	✓		
NS-7	Potable Water Irrigation Discharge Detection			✓	Not required for the field activities
NS-8	Vehicle and Equipment Cleaning	✓	✓		
NS-9	Vehicle and Equipment Fueling	✓	✓		
NS-10	Vehicle and Equipment Maintenance	✓	✓		
NS-11	Pile Driving Operation			✓	Not Applicable to field activities
NS-12	Concrete Curing			✓	Not Applicable to field activities
NS-13	Concrete Finishing			✓	Not Applicable to field activities
NS-14	Material and Equipment Use Over Water			✓	No field activities or materials/equipment use over water
NS-15	Demolition Removal Adjacent to Water		✓		
NS-16	Temporary Batch Plants			✓	Not required for field activities
Alternate BMPs Used:			**If used, state reason:**		

Table 3.4 Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[(1)]	BMP used		If not used, state reason
			YES	NO	
[(1)] Applicability to a specific project will be determined by the QSD					

Non-stormwater BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix C. If there is a conflict between documents, the Execution Plan (ITSI Gilbane, 2013a) will prevail over narrative in the body of the CERCLA SWP or guidance in the BMP Fact Sheets. The narrative in the body of the CERCLA SWP prevails over guidance in the BMP Fact Sheets.

Water Conservation Practices

Appropriate water application and conservation practices will be followed to ensure that water used on site does not create surface flow capable of carrying pollutants off the footprint area for field activities.

Illicit Connection- Illegal Discharge Connection

The contractor will implement this BMP (identified as NS-6) throughout the duration of the project. Any identified illicit connection or discharge will be immediately reported to the Navy and the RWQCB.

Vehicle and Equipment Cleaning

Vehicle and equipment cleaning will occur at the designated entrance and exit location and constructed with containment for decontamination water.

Vehicle and Equipment Fueling

Diesel Fuel

During construction, diesel fuel will be delivered and pumped directly into various equipment. Fueling will occur away from drainage courses to prevent run-on of stormwater and runoff of spills. If a spill occurs as equipment is fueled, the spill will be immediately contained with an earthen berm and an excavation retention trap will be provided. The individual noting the spill will be responsible for contacting the Project Superintendent, who will notify the Navy, who in turn is responsible for notifying the regulatory agencies, as necessary, and managing the cleanup and removal of contaminated soils in accordance with regulations.

Fuels for Passenger Vehicles and Trucks and Vehicle-Related Lubricants

Fueling of passenger vehicles and trucks on site will occur in designated areas located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills. If a spill occurs as equipment is fueled, the spill will be immediately contained with an earthen berm and an excavation retention trap will be provided. The individual noting the spill will be responsible for contacting the Project Superintendent, who will notify the Navy, who in turn is responsible for notifying the regulatory agencies, as necessary, and managing cleanup and removal of contaminated soils in accordance with regulations.

Several types of vehicles and equipment will be used throughout the project, including excavation equipment and trucks. BMPs NS-9 and NS-10 will be used to prevent discharges of fuel and other vehicle fluids in the vicinity of the site for the field activities. Vehicles will be fueled off site or at a temporary fueling area. Vehicle and equipment maintenance, if necessary during field activities, will occur in designated areas outside of the construction site and that have been approved by the Navy.

Vehicle and Equipment Maintenance

Heavy Equipment and Vehicle-Related Lubricants

All heavy equipment and vehicles will be inspected prior to use on site and at the beginning of each workday for oil, lubricant, and hydraulic leaks. Leaking equipment will be repaired or removed from service, and small leaks will be cleaned up immediately. Excessive application of grease during equipment maintenance will be avoided, and accumulated grease will be wiped off and contaminated rags properly disposed of off site. All oil and lubricant supplies will be securely stored in drums or bins to prevent an uncontrolled discharge of spilled materials at the MSA (Figure 3).

Vehicle and equipment maintenance, if necessary during field activities, will occur in designated areas outside of the construction site and that have been approved by the Navy. If a spill associated with heavy equipment/vehicles (e.g., diesel, gasoline, hydraulic fluid, or lubricant leak) occurs, containment will be provided, the Project Superintendent will be notified, the spill area will be excavated, and the material will be containerized and stored in accordance with the Execution Plan (ITSI Gilbane, 2013a) until proper off-site disposal.

Passenger Vehicles and Trucks

Passenger vehicles and trucks will be inspected daily for possible leaks, but any service will be performed off site at commercial facilities.

To the extent practical, vehicle and equipment maintenance will be performed in established and permanent maintenance facilities. When required in the field, drip pans or absorbent pads will be used for all vehicle and equipment maintenance activities that involve grease, oil, solvents, coolants, or other vehicle/equipment fluids.

3.3.2 Materials Management and Waste Management

Materials management control practices consist of implementing procedural and structural BMPs for handling, storing, and using construction materials to prevent the release of those materials into stormwater discharges. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as soil binders for temporary stabilization.

Waste management consists of implementing procedural and structural BMPs for handling, storing, and ensuring proper disposal of wastes to prevent the release of those wastes into stormwater discharges.

Materials and waste management pollution control BMPs will be implemented to minimize stormwater contact with construction materials, wastes, and service areas; and to prevent materials and wastes from being discharged off site. The primary mechanisms for stormwater contact that will be addressed include:

- Direct contact with precipitation;
- Contact with stormwater run-on and runoff;
- Wind dispersion of loose materials;

- Direct discharge to the storm drain system through spills or dumping; and
- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products, which can leach pollutants into stormwater.

A list of construction activities is provided in Appendix B. Table 3.5 identifies the BMPs that will be implemented to handle materials and control construction site wastes associated with these construction activities. Fact Sheets for Materials and Waste Management BMPs are provided in Appendix C.

Table 3.5 Temporary Materials Management BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement[(1)]	BMP used		If not used, state reason
			YES	NO	
WM-01	Material Delivery and Storage	✓	✓		
WM-02	Material Use	✓	✓		
WM-03	Stockpile Management	✓	✓		
WM-04	Spill Preservation and Control	✓	✓		
WM-05	Solid Waste Management	✓	✓		
WM-06	Hazardous Waste Management	✓		✓	No hazardous waste activities
WM-07	Contaminated Soil Management		✓		
WM-08	Concrete Waste Management	✓		✓	No concrete work in current SOW
WM-09	Sanitary-Septic Waste Management	✓	✓		
WM-10	Liquid Waste Management		✓		
Alternate BMPs Used:					**If used, state reason:**

[(1)] Applicability to a specific project will be determined by the QSD.

Material management BMPs will be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix C. If there is a conflict between documents, the Execution Plan (ITSI Gilbane, 2013a) will prevail over narrative in the body of the CERCLA SWP or guidance in the BMP Fact Sheets. The narrative in the body of the CERCLA SWP prevails over guidance in the BMP Fact Sheets.

Material Delivery and Storage

Material deliveries will be coordinated with the Project Superintendent and stored in a manner specified by the manufacturer. To prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses, the following practices will be followed: minimize the storage of hazardous materials on site, store materials in a designated area, install secondary containment for the storage area, conduct regular inspections, properly handle and use materials, and train employees and subcontractors on material handling and storage.

Material Use

Materials are to be used in the manner for which they were designed. Actions to prevent or reduce discharge of pollutants to the storm drain system or watercourses from material use include: using non-pollutant-containing alternative products, minimizing hazardous material use on site, and training employees and subcontractors on material use and handling.

To prevent chemical pollutants from entering the environment, hazardous materials will be stored in a central material storage area (MSA) (see Figure 3 for the MSA location). The MSA is located more than 50 feet from surface waters. Containers will be stored properly when not in use and will be placed in the appropriate storage cabinet or secondary containment structure to reduce the risks of fire and releases.

Stockpile Management

Stockpile management procedures and practices will be designed to reduce or eliminate air and stormwater pollution from stockpiles of soil. During excavation, backfilling, and grading, soils may be stockpiled in areas adjacent to that activity. Because the soil will be stockpiled in a generally non-compacted condition, the soil is subject to erosion. In addressing stockpiling, BMPs may include diversion of drainage from the stockpiles, installation of silt fencing or filter barriers on the downgradient toe of stockpile slopes, and dust control. In addition, large stockpiles will be sloped to reduce the infiltration of rainwater. A soil binder or tackifier will also be applied, as needed, to the stockpiles to prevent erosion.

Spill Preservation and Control

The removal actions at HPNS will be conducted in accordance with the project-specific Execution Plan (ITSI Gilbane, 2013a) to which this SWP is an attachment. These documents will be maintained on site and outline the specific steps to be followed if a spill or release occurs. If changes or revisions to these documents are made, the most recent version will supersede the previous iteration.

Field practices to prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spoils include reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

The BMPs for spill prevention and control include the following controls.

- Train employees and subcontractors in proper spill response procedures.
- Stop the source of a spill immediately, if safe to do so.
- If safe to do so, contain and clean up spills immediately and notify the ITSI Gilbane Project Superintendent immediately.
- Spills of hazardous or pollutant-containing materials that cannot be cleaned up or that have resulted in a release should be immediately reported to ITSI Gilbane's Project Superintendent, who will immediately notify the Navy, who in turn will be responsible for notifying the regulatory agencies, as necessary, and managing cleanup.

Solid Waste Management

All construction waste will be temporarily store in dumpsters, roll-off bins, or other similarly approved containers that will be located in designated areas at HPNS. Specific procedures to handle all types of waste expected within ITSI Gilbane's work areas at HPNS are included in the *Basewide Radiological Management Plan* (TtEC, 2012) and the project-specific Execution Plan (ITSI Gilbane, 2013a), to which this CERCLA SWP is an attachment. These plans will be maintained at the Site.

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular off-site disposal, and training employees and subcontractors.

Contaminated Soil Management

Stockpiles of excavated soil generated during the storm drain and sanitary sewer line removal activities will be stored in a designated storage area, the location of which will be authorized by the Caretaker Site Office. Radiologically contaminated soil will be placed directly in lined and covered bins, and chemical-only contaminated soil will be placed on a polyethylene liner. To provide dust control and prevent runoff, stockpiled soil will be treated with a soil binder or tackifier and surrounded with a filter barrier (see Table 3.5, BMP WM-03).

Open storm drain or sanitary sewer lines left in place during the removal process will be plugged to prevent water from entering or exiting the lines and to eliminate the release of any contamination that may be present in the lines.

Field practices will be implemented to prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting the excavation upon completion of needed services, and

collecting and properly containerizing contaminated soil as generated by excavation activities.

Sanitary-Septic Waste Management

Proper sanitary and septic waste management practices, consisting of providing convenient, well-maintained facilities, and arranging for regular service and disposal, will be implemented to prevent the discharge of pollutants to stormwater from sanitary and septic waste. The location for the sanitary and septic waste management facilities is identified on Figure 3.

Liquid Waste Management

The implementation of liquid waste management will include procedures and practices to prevent the discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and/or disposal of non-hazardous liquid wastes. These management practices will be implemented during removal activities and decontamination at all locations, and while performing other field activities.

3.4 POST CONSTRUCTION STORMWATER MANAGEMENT MEASURES

Post-construction BMPs are permanent measures installed as part of the construction activities, and designed to reduce or eliminate pollutant discharges from the Site after construction is completed.

The Site is located in an area subject to a Phase I or Phase II Municipal Separate Storm Sewer System (MS4) permit approved Stormwater Management Plan. ☐ Yes ☒ No

The following source control post construction BMPs to comply with General Permit Section XIII.B and local requirements have been identified for the site:

- EC-2, Preservation of Existing Vegetation
- EC-9 Earth dyke and drainage swales

A plan for the post-construction funding and maintenance of the BMPs has been developed to address at minimum 5 years following construction. The post-construction BMPs that are described above will be funded and maintained by the Naval Facilities Engineering Command Southwest.

Final graded slopes throughout HPNS will be approximately equal to the current existing slopes. The grading and drainage plans will be designed to maintain sheet flow of stormwater over the site to minimize ponding of water and infiltration.

The project-specific Execution Plan (ITSI Gilbane, 2013a) details the specifics to control drainage at the Site. Upon completion of the removal actions, drainage swales will be established throughout the affected sites to direct flow to previously constructed swale systems, still active drainage systems, and existing outfalls. Parcel D-1 will be turned over to the City of San Francisco for redevelopment, so ITSI Gilbane will work with the Navy and the RWQCB to

determine what, if any, additional measures will need to be installed during this CTO for stormwater management and pollution prevention.

Once soil stockpiles have been removed, stockpile areas will be swept clean. No permanent post-construction BMPs will be required. Post construction BMPs will be in accordance with Table 3.1.

Section 4 BMP Inspection, and Maintenance, and Rain Event Action Plans

4.1 BMP INSPECTION AND MAINTENANCE

The General Permit requires routine weekly inspections of BMPs, along with inspections before, during, and after qualifying rain events producing precipitation of 0.5 inch or more. A BMP inspection checklist must be filled out for inspections and maintained on site with the CERCLA SWP. The inspection checklist includes the necessary information for visual monitoring covered in Section 7.6. A blank inspection checklist can be found in Appendix D. Completed checklists will be kept in Appendix I "Monitoring Records."

Components of the BMPs will be maintained regularly to ensure proper and effective functionality. If necessary, corrective actions will be implemented within 72 hours of identified deficiencies, and associated amendments to the CERCLA SWP will be prepared by the QSD.

Specific details for maintenance, inspection, and repair of Construction Site BMPs can be found in the BMP Factsheets in Appendix C.

4.2 RAIN EVENT ACTION PLANS

The Rain Event Action Plan (REAP) is a written document designed to be used as a planning tool by the QSP to protect exposed portions of project sites and to ensure that the discharger has adequate materials, staff, and time to implement erosion- and sediment-control measures. The BMPs and associated measures in the REAP are intended to reduce the amount of sediment and other pollutants that could be generated during the rain event. The QSP is responsible for being aware of precipitation forecasts, and obtaining and printing copies of forecasted precipitation from the National Oceanographic and Atmospheric Administration's (NOAA) National Weather Service Forecast Office.

The CERCLA SWP includes REAP templates, but the QSP will need to customize them for each rain event. A REAP for the project can be found in Appendix E. The QSP will maintain a paper copy of completed REAPs in compliance with the record retention requirements (Section 1.5 of this CERCLA SWP). Completed REAPs will be maintained in Appendix E.

The QSP will develop an event-specific REAP 48 hours in advance of a significant precipitation event (i.e., forecast to have a 50% or greater chance of producing 0.5 inches more of precipitation in a 24-hour period at the project area). The REAP will be on site and implemented 24 hours in advance of any predicted significant precipitation event.

At a minimum, the REAP will include the following site-specific information:

1. Site address;
2. Calculated risk level 2;
3. Site Stormwater Manager information including the name, company, and 24-hour emergency telephone number;

4. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number;
5. Stormwater Sampling Agent information including the name, company, and 24-hour emergency telephone number;
6. Activities associated with each construction phase;
7. Trades active on the construction site during each construction phase;
8. Trade contractor information; and
9. Recommended actions for each project construction phase.

Section 5 Training

Section 6 identifies the QSD and QSP for the project. To promote stormwater management awareness specific for this project, periodic training of job site personnel will be included as part of routine project meetings (e.g., daily/weekly tailgate safety meetings), or task specific trainings as needed.

The QSP will be responsible for providing information on BMPs and stormwater management practices described herein at the meetings, and subsequently completing the training logs shown in Appendix G. The training logs (Appendix G) will identify the site-specific stormwater topics covered, and the names of site personnel who attended the meeting and received the training. Tasks may be delegated to trained employees by the QSP, under the condition that adequate supervision and oversight are provided. Training will correspond to the specific task delegated; including CERCLA SWP implementation, BMP inspection and maintenance, and recordkeeping.

Documentation of training activities (formal and informal) will be retained in Appendix G.

Section 6 Responsible Parties and Operators

6.1 RESPONSIBLE PARTIES

Table 6.1 lists the project site personnel who will be responsible for CERCLA SWP activities, including the Project Manager, CERCLA SWP developer, and CERCLA SWP implementer.

Table 6.1 Responsible Parties for this CERCLA SWP

CERCLA SWP Development and Revision Contact		
Cenk Ergin, P.E., QSD	ITSI Gilbane Project Engineer	925-946-3260
CERCLA SWP Implementation and Inspection Contact		
Tony Olmstead, QSP	ITSI Gilbane QC Manager	925-250-7875
Project Manager		
Ed Palser	ITSI Gilbane Project Manager	505-400-4076

The CERCLA SWP implementer identified for the project will have primary responsibility and significant authority for the implementation, maintenance, inspection, and monitoring of CERCLA SWP requirements. The CERCLA SWP implementer will be available at all times throughout the duration of the project. Duties of the CERCLA SWP implementer include but are not limited to the following.

- Implementing all elements of the CERCLA SWP, including but not limited to:
  - Ensuring all BMPs are implemented, inspected, and properly maintained;
  - Performing non-stormwater and stormwater visual observations and inspections;
  - Performing non-stormwater and storm sampling and analysis, as required;
  - Performing routine inspections and observations; and
  - Implementing non-stormwater management, and materials and waste management activities, such as: monitoring discharges; general Site clean-up; vehicle and equipment cleaning; fueling, and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities that will have an adverse effect on receiving waters or storm drain systems; etc.
- Ensuring elimination of unauthorized discharges.
- Mobilizing crews to make immediate repairs to the control measures.
- Coordinate with the contractor(s) to assure that all of the necessary corrections/repairs are made immediately, and that the project complies with the CERCLA SWP and the General Permit at all times.
- Notifying the Project Manager immediately of off-site discharges or other non-compliance events.

The QSP may delegate these inspections and activities to an appropriately trained employee, but will ensure adequacy and adequate deployment.

Section 7 Construction Site Monitoring Program

7.1 PURPOSE

This Construction Site Monitoring Program (CSMP) portion of the CERCLA SWP was developed to address the following objectives.

1. Determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.
2. Determine whether immediate corrective actions, additional BMP implementation, and/or CERCLA SWP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges
3. Determine whether BMPs included in the CERCLA SWP and REAP are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

ITSI Gilbane will ensure that all specific monitoring requirements for the remediation at Parcel D-1 are implemented as stated in this CERCLA SWP.

7.2 APPLICABILITY OF PERMIT REQUIREMENTS

This project has been determined to be a Risk Level 2 project. The General Permit identifies the following types of monitoring as being applicable for a Risk Level 2 project.

Risk Level 2

- Visual inspections of BMPs;
- Visual monitoring of the site related to qualifying storm events;
- Visual monitoring of the site for non-stormwater discharges;
- Sampling and analysis of construction site runoff for pH and turbidity;
- Sampling and analysis of construction site runoff for non-visible pollutants when applicable; and
- Sampling and analysis of non-stormwater discharges when applicable.

7.3 WEATHER AND RAIN EVENT TRACKING

Visual monitoring, inspections, and sampling requirements of the General Permit are triggered by a qualifying rain event. The General Permit defines a qualifying rain event as any event that produces 0.5 inches of precipitation within a 24-hour period. A minimum of 48 hours of dry weather will be used to distinguish between separate qualifying storm events.

7.3.1 Weather Tracking

The QSP should consult NOAA daily for the weather forecasts. These forecasts can be obtained at http://www.srh.noaa.gov/.

7.3.2 Rain Gauges

The QSP will install two rain gauges on the project site. Gauges will be located in an open area away from obstructions such as trees or overhangs, and mounted on a post at a height of 3 to 5 feet above the ground surface with the gauge extending several inches beyond the post. The top of the gauge will be level, and the post will not be placed in an area where rainwater can indirectly splash from sheds, equipment, trailers, etc.

The rain gauges will be read daily during normal, working hours at the Site, as identified in Section 7.5. The rain gauge should be read at approximately the same time every day and the date and time of each reading recorded. Rain gauge readings will be submitted to the Navy on-site representative with daily contractor quality control reports. Once the rain gauge reading has been recorded, accumulated rain will be emptied and the gauge reset.

For comparison with the site rain gauges, the nearest appropriate governmental rain gauge is located at the San Francisco International Airport (SFO), approximately 4 miles south of Parcel D-1. The SFO rain gauge is maintained by the Nation Weather Service and hourly readings can be found at http://www.cnrfc.noaa.gov/county_precipMaps. php?group=sfsanmateo&hour=1.

7.4 MONITORING LOCATIONS

Monitoring locations will vary depending on where work is being performed at the time of monitoring. Monitoring locations are described in the Sections 7.6 and 7.7.

Whenever changes in the construction activities at the Site might affect the appropriateness of sampling locations, the sampling locations will be revised accordingly. All such revisions will be implemented as soon as feasible and the CERCLA SWP amended. Temporary changes that result in a one-time additional sampling location do not require a CERCLA SWP amendment.

7.5 SAFETY AND MONITORING EXEMPTIONS

Safety practices for sample collection will be in accordance with the project-specific health and safety plan (ITSI Gilbane, 2013b). Trips, slips, and falls are the primary safety hazard for performing visual monitoring and stormwater sample collection, as necessary. Rip-rap is located on the shoreline and stormwater run-off occurs in inclement weather, so implementation of this CSMP will only occur during the daylight hours of work days at the Site as identified below. If a significant rainfall event (50% probability of 0.5 inches of precipitation or more within a 24-hour period) is anticipated for a work day, stormwater monitoring and sampling will be discussed as part of the tailgate safety meeting at the beginning of the work day.

This project is not required to collect samples or conduct visual observations (inspections) under the following conditions.

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled Site business (work) hours.

Scheduled Site business (work) hours are Monday through Friday 8 a.m. to 4 p.m.

If monitoring (visual monitoring or sample collection) of the Site is unsafe because of the dangerous conditions noted above, then the QSP will document the conditions for why an

exception to performing the monitoring was necessary. The exemption documentation will be filed in Appendix I, Monitoring Records.

7.6 VISUAL MONITORING

Visual monitoring includes observations and inspections. Inspections of BMPs are required to identify and record BMPs that need maintenance to operate effectively, that have failed, and/or that could fail to operate as intended. Visual observations of the Site are required to observe stormwater drainage areas, and to identify any spills, leaks, or uncontrolled pollutant sources.

Table 7.1 identifies the required frequency of visual observations and inspections. Inspections and observations will be conducted at the locations identified in Sections 7.6.1 and 7.6.2.

Table 7.1 Summary of Visual Monitoring and Inspections

Type of Inspection	Frequency
Routine Inspections	
BMP Inspections	Weekly[1]
BMP Inspections – Tracking Control	Daily
Non-Stormwater Discharge Observations	Quarterly during daylight hours
Rain Event Triggered Inspections	
Site Inspections Prior to a Qualifying Event	Within 48 hours of a qualifying event [2]
BMP Inspections During an Extended Storm Event	Every 24-hour period of a rainevent[2]
Site Inspections Following a Qualifying Event	Within 48 hours of the end of a qualifying event[2]

[1] BMPs must be inspected weekly, except for those identified to be inspected more frequently.

[2] Inspections are only required during scheduled operating hours at the Site as identified in Section 7.5.

7.6.1 Routine Observations and Inspections

Routine inspections and visual monitoring of the Site are necessary to ensure that the project is in compliance with the requirements of the General Permit.

7.6.1.1 Routine BMP Inspections

Inspections of BMPs are conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

7.6.1.2 Non-Stormwater Discharge Observations

Each drainage area will be inspected for the presence of or indications of prior unauthorized and authorized non-stormwater discharges. The following inspection findings will be recorded.

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);
- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of discharge.

7.6.2 Rain-Event Triggered Observations and Inspections

Visual observations of the Site and inspections of BMPs are required prior to a qualifying rain event, following a qualifying rain event, and every 24-hour period during a qualifying rain event. Pre-rain inspections will be conducted after consulting NOAA and determining that a precipitation event with a 50% probability of 0.5 inch of precipitation or more within a 24-hour period has been predicted.

7.6.2.1 Visual Observations Prior to a Forecasted Qualifying Rain Event

Within 48 hours prior to a significant rainfall event (50% probability of 0.5 inches or more of precipitation within a 24 hour period, a stormwater visual monitoring Site inspection will include observations of the following locations:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- Location of each BMP to verify proper installation or implementation, appropriate maintenance, and suitable integrity to perform as intended during the significant rainfall event; and
- Any non-stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

BMP inspections and visual monitoring will be triggered by a NOAA quantitative predicted forecast that indicates that a significant rainfall event will occur at the project area.

7.6.2.2 BMP Inspections During an Extended Storm Event

During an extended rain event (multiple consecutive 24-hour periods with 0.5 inches or more of rain), BMP inspections will be conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; and/or
- BMPs that could fail to operate as intended.

If the construction site is not accessible during the rain event, the visual inspections will be performed at all relevant and safely accessed outfalls, discharge points, and downstream locations. The inspections should record any projected maintenance activities.

7.6.2.3 Visual Observations Following a Qualifying Rain Event

Within 48 hours following a qualifying rain event (0.5 inch of rain within a 24-hour period), a stormwater visual monitoring Site inspection is required to observe:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;

- Location of each BMP to verify proper installation or implementation, appropriate maintenance, and/or suitable integrity to perform as intended during the qualifying event;
- Need for additional BMPs;
- Any non-stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard from overflow of rainwater; and
- Discharge of stored or contained rain water.

7.6.3 Visual Monitoring Procedures

Visual monitoring will be conducted by the QSP or designated, staff trained by and under the supervision of the QSP.

The name(s) and contact number(s) of the site visual monitoring personnel are listed below and their training qualifications are provided in Appendix G.

Assigned inspector: Tony Olmstead Contact phone: 925-250-7875

Alternate inspector: Ed Palser Contact phone: 505-400-4076

Stormwater observations will be documented on the Visual Inspection Field Log Sheet (Appendix D, Inspection Forms). BMP inspections will be documented on the site-specific BMP inspection checklist.

Within 7 days of the inspection, the QSP will submit copies of the completed inspection report to the Navy. The completed reports will be kept in Appendix I, Monitoring Records. Any photographs used to document observations will be referenced on the stormwater site inspection report and maintained with the Monitoring Records in Appendix I.

7.6.4 Visual Monitoring Follow-Up and Reporting

Correction of deficiencies identified by the observations or inspections, including required repairs or maintenance of BMPs, will be initiated and completed as soon as possible.

If identified deficiencies require design changes, including additional BMPs, changes will be initiated within 72 hours of identification and be completed as soon as practical. When design changes to BMPs are required, the CERCLA SWP will be amended to reflect the changes.

Deficiencies identified in site inspection reports and correction of deficiencies will be tracked on the Inspection Field Log Sheet or BMP Inspection Report, and will be submitted to the QSP and will be kept in Appendix I, Monitoring Records.

7.6.5 Visual Monitoring Locations

The inspections and observations identified in Sections 7.6.1 and 7.6.2 will be conducted at the locations identified in this section. There are four drainage areas on the project site. Drainage areas are shown on Figure 3 and listed in Table 7.2.

Table 7.2 Site Drainage Areas

Location No.	Location
1	Site Drainage Area #1 (northwest portion of Parcel D-1)
2	Site Drainage Area #2 (central portion of Parcel D-1)
3	Site Drainage Area #3 (southeast portion of Parcel D-1)

The Site has no stormwater storage or containment area(s).

There are nine discharge point locations at the Site. Site stormwater discharge point locations are shown on Figure 3 and described in Table 7.3.

Table 7.3 Site Stormwater Discharge Point Locations

Discharge Point (Sampling Point) No.	Location (see Figure 3)
DP-1 (SP-1)	Berth 14 – Discharge Point 1
DP-2 (SP-2)	Berth 14 – Discharge Point 2
DP-3 (SP-3)	Berth 14 – Discharge Point 3
DP-4 (SP-4)	Berth 21 – Discharge Point 4
DP-5 (SP-5)	Berth 21 – Discharge Point 5
DP-6 (SP-6)	Berth 22 – Discharge Point 6
DP-7 (SP-7)	Berth 22 – Discharge Point 7
DP-8 (SP-8)	Berth 29 – Discharge Point 8
DP-9 (SP-9)	South of Building 526 – Discharge Point 9

7.7 WATER QUALITY SAMPLING AND ANALYSIS

Sampling and testing of stormwater runoff will only occur if the visual monitoring indicates possible pollution. If suspended particulate matter is observed in the stormwater runoff, a sufficient sample volume will be collected and the turbidity and pH of the water measured in the field using the equipment identified in Table 7.12 following equipment manufacturer's procedures. Results of the field tests, including the time and location of sample collection, will be recorded on a Sampling Log Sheet (Appendix D). Following this initial sampling and

analysis with observable suspended particulate matter, a follow-up visual inspection will be conducted, and sampling and testing performed if visible pollutants are observed, on 2-hour intervals during the remainder of the business hours, unless rainfall and runoff have ceased. If stormwater discharge continues to be observed on the subsequent business day(s), the visual monitoring, sampling, and testing will be performed at the beginning of business hours and repeated 6 hours later, unless rainfall and run-off have ceased.

If an oily sheen is observed from the visual monitoring of the stormwater runoff, sufficient stormwater to fill two 1-liter glass jars will be collected and analyzed following procedures described in Section 7.7.1.

7.7.1 Sampling & Analysis Plan for Non-Visible Pollutants in Stormwater Runoff Discharges

This Sampling and Analysis Plan for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater runoff discharges from the project site. Sampling for non-visible pollutants will be conducted when (1) a breach, leakage, malfunction, and/or spill is observed or known to have occurred; (2) the leak or spill has not been cleaned up prior to the rain event; and/or (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

The following construction materials, wastes, or activities, as identified in Section 2.6, are potential sources of non-visible pollutants to stormwater discharges from the Site during construction activities.

- Fuel and lubricants
- Hydraulic fluids
- Sanitary wastes from portable toilets
- Equipment decontamination water.

The following existing site features, as identified in Section 2.6, are potential sources of non-visible pollutants to stormwater discharges from the project.

- Portable Toilets
- Excavation areas
- Fueling area
- Equipment decontamination area.

Based on the discussion of stormwater run-on in Section 2.2, stormwater run-on will be limited, and from locations without known potential to contribute non-visible pollutants to stormwater discharges from the project site.

7.7.1.1 Sampling Schedule

Samples will be collected during the Site's scheduled work hours and will be collected regardless of the time of year and phase of the construction.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during site inspections conducted prior to or during a significant rain event.

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- A construction activity, including but not limited to those in Section 2.6, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) BMPs were observed to be breached, malfunctioning, and/or improperly implemented, and/or (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system. Stormwater runoff from an area contaminated by historical usage of the site has been observed to combine with stormwater runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.

7.7.1.2 Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence, or use; accessibility for sampling; and personnel safety. Planned non-visible pollutant sampling locations are shown on Figure 3 and include the locations identified in Table 7.4, Table 7.5, and Table 7.6.

Two (2) sampling location on the project site and the contractor's yard has been identified for the collection of samples of runoff from planned material and waste storage areas, and areas where non-visible pollutant producing construction activities are planned.

Table 7.4 Non-Visible Pollutant Sample Locations – Contractors' Yard

Sample Location Number	**Sample Location Description**	**Sample Location Latitude and Longitude** (Decimal Degrees)
SP-13 Sampling	Laydown and Fueling Area	37°43'15.56"N 122°21'52.62"W

Table 7.4 Non-Visible Pollutant Sample Locations – Contractors' Yard

Sample Location Number	Sample Location Description	Sample Location Latitude and Longitude (Decimal Degrees)
SP-14 Sampling	Staging/ Material Storage/ Vehicle Storage/ Portable Toilet Storage Area	37°43'6.11"N 122°21'49.26"W (Drainage Area 3)

Seven sampling locations have been identified for the collection of samples of runoff from drainage areas contaminated by historical usage of the site.

Table 7.5 Non-Visible Pollutant Sample Locations – Areas of Historical Contamination

Sample Number	Sample Location	Sample Location Latitude and Longitude (Decimal Degrees)
SP-3	Berth 14 – Discharge Point 3	37°43'19.60"N 122°21'49.86"W
SP-4	Berth 21 – Discharge Point 4	37°43'11.03"N 122°21'47.04"W
SP-5	Berth 21 – Discharge Point 5	37°43'9.51"N 122°21'48.55"W
SP-6	Berth 22 – Discharge Point 6	37°43'8.30"N 122°21'48.78"W
SP-7	Berth 22 – Discharge Point 7	37°43'7.29"N 122°21'47.14"W
SP-8	Berth 29 – Discharge Point 8	37°43'2.63"N 122°21'47.89"W
SP-9	South of Building 526 – Discharge Point 9	37°43'3.82"N 122°21'51.36"W

Two sampling locations have been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. These locations were selected so the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Table 7.6 Non-Visible Pollutant Sample Locations – Background (Unaffected Sample)

Sample Location Number	Sample Location	Sample Location Latitude and Longitude (Decimal Degrees)
SP-1	Berth 14 – Discharge Point 1	37°43'22.67"N 122°21'47.04"W

If a stormwater visual monitoring Site inspection conducted prior to or during a storm event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters or a storm drain system that is at a location not listed above and has not been identified on the site maps, sampling locations will be selected by the QSP using the same rationale as that used to identify planned locations. Non-visible pollutant sampling locations will be identified by the QSP on the pre-rain event inspection form and/or Rain Event Action Plan prior to a forecasted qualifying rain event.

7.7.1.3 Monitoring Preparation

Non-visible pollutant samples will be collected by:

Contractor ☒ Yes ☐ No

Consultant ☐ Yes ☒ No

Laboratory ☐ Yes ☒ No

Samples on the Site will be collected by the following contractor sampling personnel:

Name/Telephone Number: Tony Olmstead / 925-250-7875

Alternate(s)/Telephone Number: Ed Palser /505-400-4076

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the Site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project Site will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, and ice.

7.7.1.4 Analytical Constituents

Table 7.7 lists the specific sources and types of potential non-visible pollutants at the Site and the water quality indicator constituent(s) for that pollutant.

Table 7.7 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent

Table 7.7 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Antifreeze and Other Vehicle Fluids	Visually Observable – No Testing Required	
Batteries	Sulfuric acid, lead, pH	Lead, sulfate, or pH
Contaminated Soil	Petroleum products, polyaromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs)	Extractable petroleum hydrocarbons, PCBs, PAHs (1)
Oily wastes	Petroleum products, PAHs, PCBs	Extractable petroleum hydrocarbons, PCBs, PAHs (1)
Radioactive Impacted Soil	ROCs (i.e., radium-226, cesium-137, and strontium-90)	No testing required.

(1) Petroleum products may be visually observable (surface sheen). PAHs and PCBs may not be visible, and stormwater discharge contacting subsurface soil will be analyzed for PCBs and PAHs.

7.7.1.5 Sample Collection

Samples of discharge will be collected at the designated non-visible pollutant sampling locations shown on Figure 3 or in the locations determined by observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and/or historical site usage areas that triggered the sampling event. Grab samples will be collected and preserved in accordance with the methods identified in Table 7.8. Only the QSP, or personnel trained in water quality sampling under the direction of the QSP will collect samples. Sample collection and handling requirements are described in Section 7.7.6.

Table 7.8 Sample Collection, Preservation, and Analyses for Monitoring Non-Visible Pollutants[1,2]

Constituent	Analytical Method	Minimum Sample Volume	Sample Containers	Sample Preservation	Reporting Limit	Maximum Holding Time
TPH-gas	8015B[4]	40 mL	3 x 40 mL VOA vial	HCL and 4ºC	50 ug/L	14 Days
TPH-d/mo	8015B[4]	1 L	2 x 1 L Glass-Amber	4ºC	50 ug/L	7 Days
PAHs	EPA 8270C SIM[4]	1 x 1 liter	Glass-Amber	Store at 4°C	10 ug/L	7 days
Metals (Arsenic)	EPA 6010C / 6020A[4]	500 ml[7]	Plastic	HNO_3 and 4°C	5 ug/L	180 days
pH	EPA 150.1[5]	Not applicable	Not applicable	Not applicable	0.1 units	Not applicable
Turbidity	EPA 180.1[6]	Not applicable	Not applicable	Not applicable	0.1 NTU	Not applicable

Notes:

[1] Applicable to non-visible pollutants in stormwater and non-stormwater discharges.

[2] Analyses for non-visible pollutants only performed if conditions or observations identified in Section 7.6.1.2 occur.

[3] Abbreviations:

TPH-gas - total petroleum hydrocarbons (TPH), gasoline range
TPH-d - TPH, diesel range
TPH-mo - TPH, motor oil range
mL - milliliter
ug/L – microgram per liter
L – liter
VOA – volatile organic analysis
HCL – hydrochloric acid
HNO_3 – nitric acid
ºC – degrees Celsius

[4] EPA, 2008

[5] EPA, 1983

[6] EPA, 1993

[7] Samples for metal analysis will be field filtered using a disposable 0.45 micron in-line filter prior to placement in the sample containers.

7.7.1.6 Sample Analysis

Samples will be analyzed using the analytical methods identified in the Table 7.8. Samples will be analyzed by:

Laboratory Name:	GEL Labs, LLC
Street Address:	2040 Savage Road
City, State Zip:	Charleston, SC (USA) 29407
Telephone Number:	843-769-7386
Point of Contact:	Heather Shaffer
ELAP Certification Number:	01151CA

7.7.1.7 Data Evaluation and Reporting

The QSP will complete an evaluation of the water quality sample analytical results within 48 hours of receiving data.

Runoff/downgradient results will be compared with the associated upgradient/unaffected results and any associated run-on results. Should the runoff/downgradient sample(s) show an increased level of the tested analyte relative to the unaffected background sample, which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate corrective actions will be implemented, which may involve BMPs being repaired and/or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the CERCLA SWP.

The General Permit prohibits the storm water discharges that contain hazardous substances equal to or in excess of reportable quantities established in the Code of Federal Regulatons (CFR), specifically 40 CFR §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities will be immediately reported to the RWQCB and other agencies as required by 40 CFR §117.3 and §302.4.

7.7.2 Sampling & Analysis Plan for pH and Turbidity in Stormwater Runoff Discharges

Sampling and analysis of runoff for pH and turbidity are required for this project. This Sampling and Analysis Plan describes the strategy for monitoring turbidity and pH levels of stormwater runoff discharges from the project site and run-on that may contribute to an exceedance of a NAL.

Samples for turbidity will be collected from all drainage areas with disturbed soil areas and samples for pH will be collected from all drainage areas with a risk of an acidic or alkaline pH (see Table 2.3).

7.7.2.1 Sampling Schedule

Stormwater runoff samples will be collected for turbidity from all qualifying rain events that result in a discharge from the project site. At a minimum, turbidity samples will be collected from each Site discharge location draining a disturbed area. A minimum of three samples will be collected during normal working hours per day of discharge during a qualifying event, where possible. Samples should be representative of the total discharge from the project each day of discharge during the qualifying event. Typically representative samples will be spaced in time throughout the daily discharge event.

Stormwater runoff samples will be collected for pH from all qualifying rain events that result in a discharge from the project site. At a minimum, pH samples will be collected from each Site discharge location during project phases and drainage areas with a risk of stormwater having an acidic or alkaline pH (see Table 2.3). A minimum of three samples will be collected per day of discharge during a qualifying event. Samples should be representative of the total discharge from the location each day of discharge during the qualifying event. Typically representative samples will be spaced in time throughout the daily discharge event, as practicable during normal work hours.

Stored or collected water from a qualifying storm event when discharged will be tested for turbidity and pH (when applicable). Stored or collected water from a qualifying event may be sampled at the point water is released from the storage or containment area or at the site discharge location.

7.7.2.2 Sampling Locations

Sampling locations are based on the Site runoff discharge locations, accessibility for sampling, and personnel safety. Planned pH and turbidity sampling locations are shown on Figure 3 and identified in Table 7.9.

Nine sampling locations on the project Site and the contractor's yard have been identified for the collection of runoff samples. Table 7.9 also provides an estimate of the Site's area that drains to each location. The project Site is not expected to receive run-on with the potential to exceed NALs. Therefore, sampling of run-on for turbidity and pH is not applicable (see Table 7.10).

Table 7.9 Turbidity and pH Runoff Sample Locations

Sample Location Number	Sample Location	Estimate of Site Drainage Factor (%)
SP-1, SP-2, SP-3	Berth 14	37%
SP-4, SP-5	Berth 21	44%
SP-6, SP-7, SP-8, SP-9	Berth 22, 29, and south of Building 526	19%

Table 7.10 Turbidity and pH Run-On Sample Locations – Not Applicable

Sample Location Number	Sample Location	Sample Location Latitude and Longitude (Decimal Degrees)
NA	NA	NA
NA	NA	NA

7.7.2.3 Monitoring Preparation

Turbidity and pH samples will be collected and analyzed by:

Contractor ☒ Yes ☐ No

Consultant ☐ Yes ☒ No

Laboratory ☐ Yes ☒ No

Stormwater samples from the Site will be collected by the following contractor sampling personnel:

Name/Telephone Number: Tony Olmstead / 925-250- 7875

An adequate stock of monitoring supplies and equipment for monitoring turbidity and pH will be available at the Site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule. Supplies maintained at HPNS will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, pH calibration standards, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, and ice.

The contractor will obtain and maintain the field testing instruments, as identified in Section 7.7.2.6, for analyzing samples in the field by contractor sampling personnel.

7.7.2.4 Field Parameters

Stormwater samples will be analyzed in the field for the parameters listed in Table 7.11.

Table 7.11 Sample Collection and Analysis for Monitoring Turbidity and pH

Parameter	Test Method	Minimum Sample Volume[(1)]	Sample Collection Container Type	Detection Limit (minimum)
Turbidity	Portable field meter with probe that has been calibrated	500 mL	Polypropylene or glass (Do not collect in meter sample cells)	1 NTU

Table 7.11 Sample Collection and Analysis for Monitoring Turbidity and pH

Parameter	Test Method	Minimum Sample Volume[(1)]	Sample Collection Container Type	Detection Limit (minimum)
pH	Portable field meter with probe that has been calibrated, or calibrated pH test kit	100 mL	Polypropylene	0.1 pH units

Notes: [1] Minimum sample volume recommended. Specific volume requirements will vary by instrument; check instrument manufacturer instructions.
mL – milliliter
NTU – Nephelometric turbidity unit

7.7.2.5 Sample Collection

Samples of stormwater discharge will be collected at the designated runoff sampling locations shown on Figure 3. Only personnel trained in water quality sampling and field measurements working under the direction of the QSP will collect samples. Sample collection and handling requirements are described in Section 7.7.6.

7.7.2.6 Field Measurements

Samples collected for field analysis and equipment calibration will be in accordance with the field instrument manufacturer's specifications.

Immediately following collection, samples for field analysis will be tested in accordance with the field instrument manufacturer's instructions and results recorded on the Effluent Sampling Field Log Sheet (Appendix D).

The field instruments listed in Table 7.12 will be used to analyze the following constituents.

Table 7.12 Field Instruments

Field Instrument (Manufacturer and Model)	Constituent
YSI 600XL or equivalent	pH
YSI 600XL or equivalent	Turbidity

Field sampling staff will review the manufacturer's instructions prior to each sampling event and follow the instructions in completing the field measurements for the stormwater samples. In addition, the following practices will be followed:

- The instrument(s) will be maintained in accordance with manufacturer's instructions.
- The instrument(s) will be calibrated before each sampling and analysis event.
- Maintenance and calibration records will be maintained with the CERCLA SWP.

The QSP may authorize alternate equipment provided that the equipment meets the Construction General Permit's requirements and the manufacturer's instructions for calibration and use are added to the daily contractor quality control reports.

7.7.2.7 Data Evaluation and Reporting

Numeric Action Levels

This project is subject to the NALs for pH and turbidity listed in Table 2.3. Compliance with the NAL for turbidity is based on a weighted daily average. Upon receiving the field log sheets, the QSP will immediately calculate the weighted arithmetic average of the turbidity results to determine if the NAL in Table 2.3 have been exceeded. A pH reading either above or below the Upper NAL and Lower NAL, respectively, listed in Table 2.3 will constitute an exceedance.

Table 7.13 Numeric Action Levels (See Table 2.3)

Within 7 days of the sample collection and field analysis, the QSP will submit copies of the completed Effluent Sampling Field Log Sheets to the ITSI Gilbane Project Manager.

In the event that the pH or turbidity NAL is exceeded, the QSP will immediately notify the ITSI Gilbane Project Manager and investigate the cause of the exceedance and identify appropriate corrective action.

A NAL Exceedance Report must be prepared containing the following information and submitted to the Navy within 10 working days of the conclusion of the storm event.

- Analytical method(s) used, method reporting unit(s), and method detection limits (MDLs) of each parameter;
- Date, place, time of sampling, visual observations, and/or measurements, including precipitation; and
- Description of the current BMPs associated with the sample that exceeded the NAL and the proposed corrective action taken.

7.7.3 Sampling and Analysis Plan for Non-Stormwater Discharges

This Sampling and Analysis Plan for non-stormwater discharges describes the sampling and analysis strategy and schedule for monitoring pollutants in authorized and unauthorized non-stormwater discharges from the project site in accordance with the requirements of the General Permit.

Sampling of non-stormwater discharges will be conducted when an authorized or unauthorized non-stormwater discharge is observed discharging from the project Site. In the event that non-stormwater discharges run-on to the project Site, and this run-on has the potential to contribute to a violation of a NAL, the run-on will also be sampled.

The following authorized non-stormwater discharges identified in Section 2.6, have the potential to be discharged from the project site.

- Irrigation of vegetative erosion control measures.
- Water to control dust.

In addition to the above authorized stormwater discharges, some construction activities have the potential to result in an unplanned (unauthorized) non-stormwater discharge if BMPs fail. These activities include:

- Water from equipment decontamination.
- Fuel or oil (leaks from fueling operation).

7.7.3.1 Sampling Schedule

Samples of authorized or unauthorized non-stormwater discharges will be collected when they are observed.

7.7.3.2 Sampling Locations

Samples will be collected from the point of non-stormwater release, as well as the discharge point where the non-stormwater discharge is running off the Site. Site discharge locations are shown on Figure 3 and listed in Table7.3.

The sampling locations on the project Site have been identified where non-stormwater discharges may runoff from the project site. However, if the non-stormwater discharge is running off the project Site at a location other than those described below, samples will be collected from the actual discharge location.

Table 7.14 Non-Stormwater Discharge Sampling Locations

Sample Location Number	**Sample Location**[1]	**Sample Location Latitude and Longitude** (Decimal Degrees)
SP-3	Berth 14	37°43'19.60"N 122°21'49.86"W
SP-4	Berth 16	37°43'16.83"N 122°21'45.10"W
SP-6	Berth 22 – Discharge Point 6	37°43'8.30"N 122°21'48.78"W
SP-13 Sampling	Laydown and Fueling Area	37°43'16.74"N 122°21'50.79"W
SP-14 Sampling	Staging/ Material Storage/ Vehicle Storage/ Portable Toilet Storage Area	37°43'6.11"N 122°21'49.26"W (Drainage Area 3)

Sample Location Number	**Sample Location**[1]	**Sample Location Latitude and Longitude** (Decimal Degrees)

[1] If the non-stormwater discharge is running off the project Site at a location other than those described in the table, samples will be collected from the actual discharge location.

7.7.3.3 Monitoring Preparation

Non-stormwater discharge samples will be collected by:

Contractor	☒ Yes	☐ No
Consultant	☐ Yes	☒ No
Laboratory	☐ Yes	☒ No

Samples on the project site will be collected by the following contractor sampling personnel:

Name/Telephone Number: Tony Olmstead / 925-250- 7875

Alternate(s)/Telephone Number: Ed Palser / 505-400-4076

An adequate stock of monitoring supplies and equipment for monitoring non-stormwater discharges will be available on the project site. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Personnel trained in sampling will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project Site will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, and ice.

The contractor will obtain and maintain the field testing instruments, as identified in Section 7.7.2, for analyzing samples in the field by the contractor's sampling personnel.

7.7.3.4 Analytical Constituents

All non-stormwater discharges that flow through a disturbed area will, at minimum, be monitored for turbidity and pH. Non-stormwater run-on will be monitored, at a minimum, for pH and turbidity. The QSP will identify additional pollutants to be monitored for each non-stormwater discharge incident based on the source of the non-stormwater discharge. If the source of an unauthorized non-stormwater discharge is not known, monitoring for pH, turbidity, methylene blue active substance, total organic content, and residual chlorine or chloramines is recommended to help identify the source of the discharge.

Table 7.15 lists the specific sources and types of potential non-visible pollutants on the project site and the water quality indicator constituent(s) for that pollutant.

Table 7.15 Potential Non-Stormwater Discharge Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Equipment Operation	Petroleum Hydrocarbons	TPH-g, TPH-d, TPH-mo
Equipment Maintenance	Petroleum Hydrocarbons	TPH-g, TPH-d, TPH-mo
Equipment Washing	Petroleum Hydrocarbons	TPH-g, TPH-d, TPH-mo
Equipment Fueling	Petroleum Hydrocarbons	TPH-g, TPH-d, TPH-mo

Notes:
TPH-g - total petroleum hydrocarbons (TPH), gasoline range
TPH-d - TPH, diesel range
TPH-mo - TPH, motor oil range

7.7.3.5 Sample Collection

Grab samples will be collected and preserved in accordance with the methods identified in Table 7.8 for TPH-g, TPH-d and TPH-mo. Only personnel trained in water quality sampling under the direction of the QSP will collect samples.

Sample collection and handling requirements are described in Section 7.7.6.

7.7.3.6 Sample Analysis

Samples will be analyzed using the analytical methods identified in Table 7.16.

7.7.3.7 Data Evaluation and Reporting

The QSP will complete an evaluation of the water quality sample analytical results.

Turbidity and pH results will be evaluated for compliance with NALs as identified in Section 7.7.2.7.

Runoff results will also be evaluated for the constituents suspected in the non-stormwater discharge. Should the runoff sample indicate the discharge of a pollutant that cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs will be recorded as an amendment to the CERCLA SWP.

The General Permit prohibits the non-storm water discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 CFR §117.3 and §302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities will be immediately reported to the RWQCB.

7.7.4 Sampling and Analysis Plan for Other Pollutants Required by the Regional Water Quality Control Board

The RWQCB has not specified monitoring for additional pollutants.

7.7.4.1 Sampling Schedule

Not Applicable.

7.7.5 Training of Sampling Personnel

Training records of designated contractor sampling personnel are provided in Appendix G. The stormwater sampler(s) has received the following stormwater sampling training:

Name	Training
Tony Olmstead	Qualified SWPPP Practitioner (QSP)

7.7.6 Sample Collection and Handling

7.7.6.1 Sample Collection

Samples will be collected at the designated sampling locations shown on Figure 3 and analyzed per Table 7.8. To maintain sample integrity and prevent cross-contamination, sample collection personnel will follow the protocols below.

- Collect samples (for laboratory analysis) only in analytical laboratory-provided sample containers;
- Wear clean, powder-free nitrile gloves when collecting samples;
- Change gloves whenever something not known to be clean has been touched;
- Change gloves between sampling locations;
- Decontaminate all equipment (e.g. bucket, tubing) prior to sample collection using a phosphate-free detergent (e.g., Liquinox®) water wash, potable water rinse, and final rinse with distilled water. Decontamination water will be collected and properly disposed (i.e., not discharged to storm drain or receiving water). Laboratory-provided clean, sample bottles will not be decontaminated;
- Do not smoke during sampling events;
- Never sample near a running vehicle;
- Do not park vehicles in the immediate sample collection area (even non-running vehicles);
- Do not eat or drink during sample collection; and
- Do not breathe, sneeze, or cough in the direction of an open sample container.

The most important aspect of grab sampling is to collect a water sample that represents the runoff stream at the time of sampling. Typically, samples are collected by dipping the collection container in the runoff flow paths and streams as noted below.

1. For small streams and flow paths, simply dip the bottle facing upstream until full.

2. For a larger stream that can be safely accessed, collect a sample in the middle of the flow stream by directly dipping the mouth of the bottle, once again making sure that the opening of the bottle is facing upstream as to avoid any contamination by the sampler.
3. For larger streams that cannot be safely entered, pole-samplers will be used to safely access the middle of the flow stream to collect a representative sample.
4. Avoid collecting samples from ponded, sluggish, or stagnant water.
5. Avoid collecting samples directly downstream from a bridge as the samples can be affected by the bridge structure or runoff from the road surface.

Note, that depending upon the specific analytical test, some containers may contain preservatives. These containers should **never** be dipped into the runoff stream, but filled indirectly from the container used to collect the water sample from the runoff stream. Table 7.8 presents the sample containers and preservation requirements.

7.7.6.2 Sample Handling

Turbidity and pH measurements must be conducted immediately after collection of the water sample. Do not store water samples for later measurement of turbidity or pH.

Samples for laboratory analysis must be handled as follows:

Immediately following sample collection:

- Cap the sample container [Note: For VOA vial samples, confirm that there is no headspace (or bubbles when turned) in capped vial.];
- Label the sample container;
- Seal the container in a re-sealable storage bag;
- Place storage bags with sample containers into an ice-chilled cooler;
- Document sample information on the Effluent Sampling Field Log Sheet; and
- Complete the chain of custody (CoC) documentation.

All samples for laboratory analysis must be maintained between 2 and 6 degrees Celsius (°C) during delivery to the laboratory. Samples must be kept on ice, or refrigerated, from the time of sample collection through delivery to the laboratory. Place samples to be shipped inside coolers with ice. Make sure the sample bottles are well packaged to prevent breakage and secure cooler lids with packaging tape.

Samples for laboratory analysis will be shipped by overnight carrier or delivered to the analytical laboratory by a courier within 24 hours of sample collection. Hold times are measured from the time the sample is collected to the time the sample is analyzed. The analytical laboratory is identified in Section 7.7.1.6.

7.7.6.3 Sample Documentation Procedures

Information entries on sample bottle identification labels, the Effluent Sampling Field Log Sheet, and chain of custody documentation will be completed using waterproof ink. These labels and documents will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. All corrections will be initialed and dated.

Duplicate samples will be identified consistent with the numbering system for other samples to prevent the laboratory from identifying duplicate samples. Duplicate samples will be identified in the Effluent Sampling Field Log Sheet.

Sample documentation procedures include the following:

Sample Bottle Identification Labels: Sampling personnel will attach an identification label to each sample bottle. The sample identification number will uniquely identify each sample collection location and the date of sample collection.

Field Log Sheets: Sampling personnel will appropriately complete the Effluent Sampling Field Log Sheet and Receiving Water Sampling Field Log Sheet for each sampling event.

Chain of Custody (CoC): Sampling personnel will complete the CoC for each sampling event for which samples are collected for laboratory analysis. The sampler will sign the CoC when the sample(s) is turned over to the testing laboratory or courier.

7.8 ACTIVE TREATMENT SYSTEM MONITORING

An Active Treatment System (ATS) will be deployed on the site?

☐ Yes ☒ No

This project does not require a project specific Sampling and Analysis Plan for an ATS because deployment of an ATS is not planned.

7.9 BIOASSESSMENT MONITORING

This project is not subject to bioassessment monitoring because it is not a Risk Level 3 project.

7.10 WATERSHED MONITORING OPTION

This project is not participating in a watershed monitoring option.

7.11 QUALITY ASSURANCE AND QUALITY CONTROL

An effective Quality Assurance and Quality Control (QA/QC) plan will be implemented to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;
- CoCs;
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

7.11.1 Field Logs

The purpose of field logs is to record sampling information and field observations during the collection of samples that may explain any uncharacteristic analytical results. Sampling information to be included in the field log includes the date and time of water quality sample

collection, sampling personnel, sample container identification numbers, and the types of samples that were collected. Field observations should be noted in the field log, including any abnormalities at the sampling location (color, odor, BMPs, etc.). Field measurements for pH and turbidity should also be recorded in the field log. A Visual Inspection Field Log is included in Appendix D, Inspection Forms.

7.11.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed in Section 7.7.6, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

7.11.3 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;
- Completion of CoC forms for all samples submitted for laboratory analysis; and
- Prompt sample delivery to the analytical laboratory.

An example CoC is included in the Sampling and Analysis Plan (Appendix A of the Execution Plan [ITSI Gilbane, 2013a]).

7.11.4 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC will be conducted for this project:

☒ Field Duplicates at a frequency of 1 duplicate minimum per sampling event
(Required for all sampling plans with field measurements or laboratory analysis)

☒ Equipment Blanks at a frequency of 5%.
(Only needed if equipment used to collect samples could add the pollutants to sample)

☐ Field Blanks at a frequency of 5%.
(Only required if sampling method calls for field blanks)

☒ Travel Blanks for each cooler containing samples for volatile organic compound (VOC) or TPH-gas analysis
(Required for sampling plans that include VOC or TPH-gas laboratory analysis)

7.11.4.1 Field Duplicates

Field duplicates provide verification of laboratory or field analysis and sample collection. Duplicate samples will be collected, handled, and analyzed using the same protocols as primary samples. The sample location where field duplicates are collected will be randomly selected from the discharge locations. Duplicate samples will be collected immediately after the primary

sample has been collected. Duplicate samples must be collected in the same manner and as close in time as possible to the original sample.

7.11.4.2 Equipment Blanks

Equipment blanks provide verification that equipment has not introduced a pollutant into the sample. Equipment blanks are typically collected when:

- New equipment is used;
- Equipment that has been cleaned after use at a contaminated site;
- Whenever a new lot of filters is used when sampling metals.

7.11.4.3 Field Blanks

Field blanks assess potential sample contamination levels that occur during field sampling activities. Deioninzed water field blanks are taken to the field, transferred to the appropriate container, and treated the same as the corresponding sample type during the course of a sampling event.

7.11.4.4 Travel Blanks

Travel blanks assess the potential for cross-contamination of VOCs between sample containers during shipment from the field to the laboratory. Travel blanks are prepared by the analytical laboratory using VOC-free water and provided to the contractor. When collecting samples for analysis of VOCs, such as total petroleum hydrocarbons (TPH)-gasoline range (TPH-g), travel blanks are placed in the same cooler as the field samples for VOC analysis.

7.11.5 Data Verification

After results are received from the analytical laboratory, the Project Chemist will verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data must be verified as soon as the data reports are received. Data verification will include:

- Check the CoC and laboratory reports.
  Make sure all requested analyses were performed and all sample analytical results are accounted for in the reports.
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory.
  Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory.
- Check laboratory QA/QC results.
  QA/QC checks will be performed based on acceptable criteria for laboratory analyses. The QA/QC data are reported along with the sample results. The Project Chemist will evaluate the reported QA/QC data to check for contamination (method, field, travel and/or equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside

acceptable ranges, the laboratory must flag the data, and provide an explanation of the potential impact to the sample results.

- Check the data set for QA/QC outlier values and, accordingly, request that the laboratory confirm results and re-analyze samples where appropriate.
  Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.

Field data including inspections and observations must be verified as soon as the field logs are received, typically at the end of the sampling event. Field data verification will include:

- Check field logs to make sure all required measurements and observations were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent with previous results, noting data that are an order of magnitude or more different than similar locations, or are inconsistent with previous data from the same location;
- Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;
- Verify equipment calibrations;
- Review observations noted on the field logs; and
- Review notations of any errors and corrective actions taken.

7.12 RECORDS RETENTION

All records of stormwater monitoring information and copies of reports must be retained for a period of at least 3 years from date of submittal or longer if required by the RWQCB.

Results of visual monitoring, field measurements, and laboratory analyses must be kept in the CERCLA SWP along with CoCs, and other documentation related to the monitoring.

Records are to be kept on site while construction is ongoing. Records to be retained include:

- The date, place, and time of inspections, sampling, visual observations, and/or measurements, including precipitation;
- The individual(s) who performed the inspections, sampling, visual observation, and/or field measurements;
- The date and approximate time of field measurements and sample collection for laboratory analyses;
- The individual(s) who collected the samples for laboratory analyses;
- A summary of all analytical results, the method detection limits and reporting limits, and the analytical techniques or methods used;
- Rain gauge readings from site inspections;
- QA/QC records and results;
- Calibration records;
- Visual observation and sample collection exemption records;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections; and

- NAL Exceedance Reports.

Section 8 References

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Navy (U.S. Department of the Navy), 2006. *Final Basewide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco,* California.

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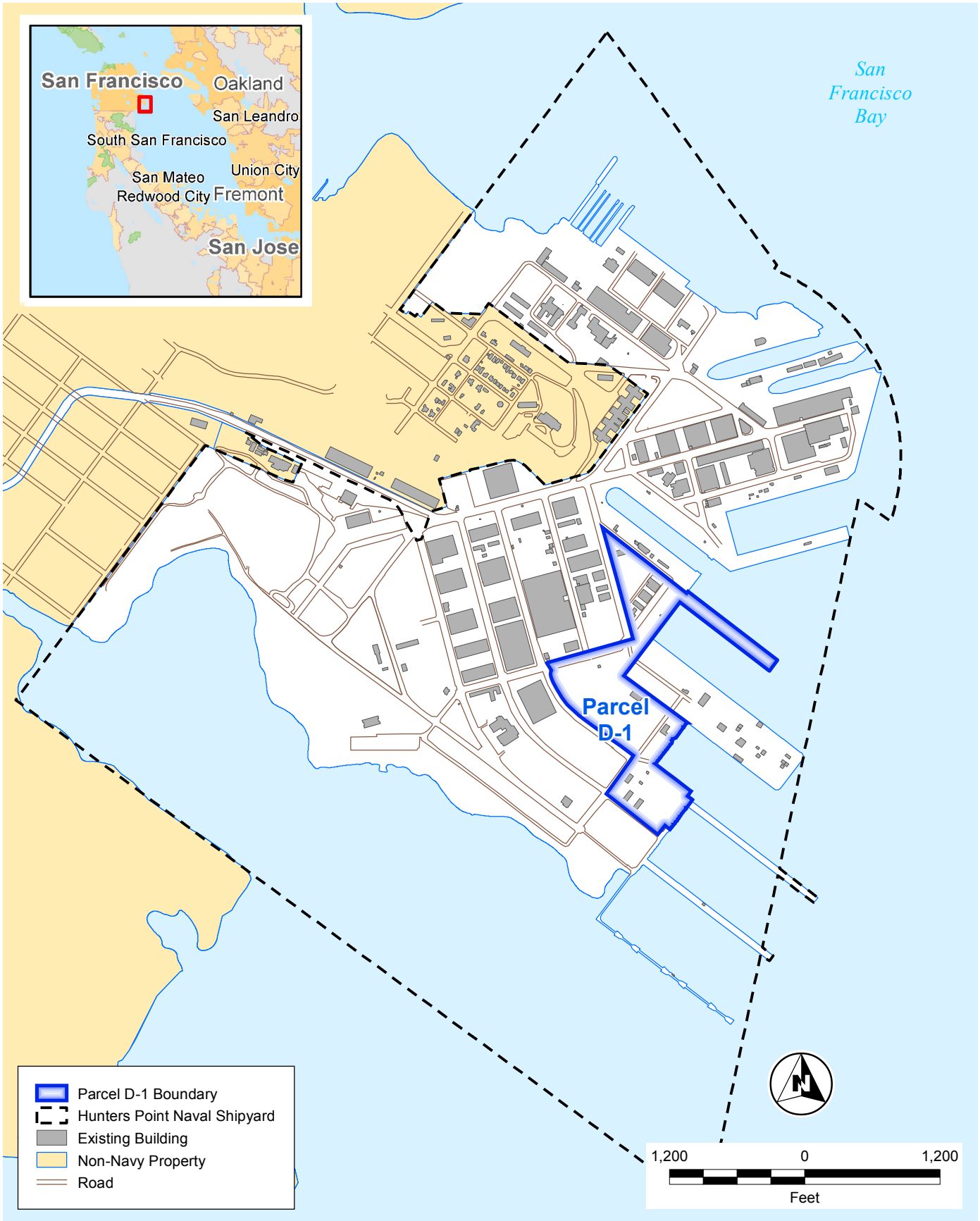
Figures



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ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Parcel D-1 Vicinity Map

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Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2
Site Layout Map

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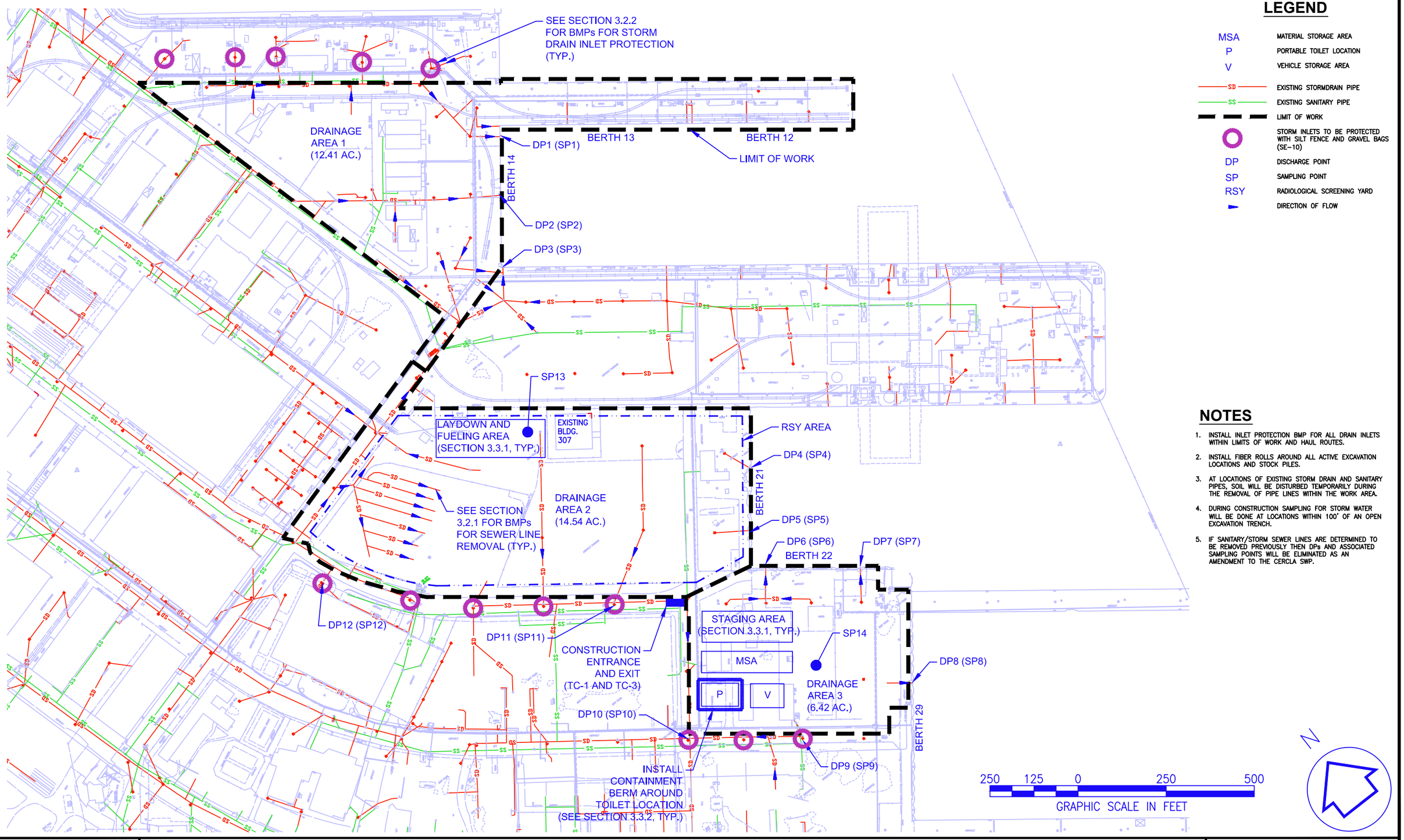

LEGEND

MSA	MATERIAL STORAGE AREA
P	PORTABLE TOILET LOCATION
V	VEHICLE STORAGE AREA
SD	EXISTING STORMDRAIN PIPE
SS	EXISTING SANITARY PIPE
	LIMIT OF WORK
	STORM INLETS TO BE PROTECTED WITH SILT FENCE AND GRAVEL BAGS (SE-10)
DP	DISCHARGE POINT
SP	SAMPLING POINT
RSY	RADIOLOGICAL SCREENING YARD
	DIRECTION OF FLOW

NOTES

1. INSTALL INLET PROTECTION BMP FOR ALL DRAIN INLETS WITHIN LIMITS OF WORK AND HAUL ROUTES.
2. INSTALL FIBER ROLLS AROUND ALL ACTIVE EXCAVATION LOCATIONS AND STOCK PILES.
3. AT LOCATIONS OF EXISTING STORM DRAIN AND SANITARY PIPES, SOIL WILL BE DISTURBED TEMPORARILY DURING THE REMOVAL OF PIPE LINES WITHIN THE WORK AREA.
4. DURING CONSTRUCTION SAMPLING FOR STORM WATER WILL BE DONE AT LOCATIONS WITHIN 100' OF AN OPEN EXCAVATION TRENCH.
5. IF SANITARY/STORM SEWER LINES ARE DETERMINED TO BE REMOVED PREVIOUSLY THEN DPs AND ASSOCIATED SAMPLING POINTS WILL BE ELIMINATED AS AN AMENDMENT TO THE CERCLA SWP.

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Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 3
Drainage Pattern and BMPs
Parcel D

FILENAME:P:\07204.0000 NAVFAC SW RAD\07204.0004 RR& Support Parcel D-1, HPV.7.0 CADD\400_CADD Current Drawings\07204.0004-Parcel D-1 drainage map.dwg
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Appendix A: Risk Level Determination Documentation

Determine Sediment Risk

From: Order No. 2009-0009-DWQ Appendix 1 (Division of Water Quality)

RUSLE Equation - A=R x K x LS

R= 5.28

K = 0.64

LS = 0.27

Therefore, A = 0.91 Tons/Acre < 15 Tons/Acre

R from Construction Rainfall Erosivity Waiver (USEPA 2012)

At Parcel D-1 in Hunters Point Naval Shipyard, San Francisco, CA (see page 4 of this Appendix)

R= 5.28

K from Erickson Triangular Nomograph, Order No. 2009-0009-DWQ Appendix 1 (Division of Water Quality)

Based on the boring logs from Parcel C (SulTech 2007), there are a variety of soil types present. 90% Silt and 10% Sand was used to obtain the K value as it was the most conservative (see Appendix 1 page 6 of the General Permit for the Erickson triangular nomograph).

K= 0.64

LS from Order No. 2009-0009-DWQ Appendix 1 (Division of Water Quality)

A sheet flow length of 1000 feet and a slope of 1.0% to be conservative were used. See Figure H-1 and Order No. 2009-0009-DWQ [Division of Water Quality] Appendix 1 Page 7 for determination of the length-slope factor.

Slope	Length	**LS Factor**
S_1 = 1.0%	L_1 = 1000ft	**0.27**

Watershed Erosion Estimate (=R x K x LS) in tons/acre	0.91
Site Sediment Risk Factor	**Low**
Low Sediment Risk: < 15 tons/acre	
Medium Sediment Risk: >=15 and <75 tons/acre	
High Sediment Risk: >= 75 tons/acre	

Determine Receiving Water Risk

The receiving water risk is low since Hunters Point Shipyard does not discharge to any location from the 303(d) list for sediment impairment and is not listed with a beneficial uses of fish spawning, fish migration, and cold freshwater habitat (see Receiving Water Risk figure on page 20, ref. http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/guidance/rcvng_water_risk.jpg).

A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? For help with impaired waterbodies please visit the link below) or has a **USEPA approved TMDL implementation plan for sediment?** http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR**	**Yes**	**HIGH**
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbquse.asp		

Risk Determination

TABLE 1-4 Combined Risk Level Matrix

COMBINED RISK LEVEL MATRIX				
Receiving Water Risk		Sediment Risk		
		Low	Medium	High
	Low	**Level 1**	Level 2	
	High	**Level 2**		Level 3

R-Factor Calculations

Due to the EPA Rainfall Erosivity Factor Calculator Website (http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm) being under construction, the calculation was based on the Construction Rainfall Erosivity Waiver Fact Sheet 3.1 shown on the EPA Rainfall Erosivity Factor Calculator Website.

Parcel D-1 Phase II (05-20-2013 to 11-01-2013)

From Fact Sheet 3.1 Figure 1, EI Distribution zone is 24

From Fact Sheet 3.1 Table 1, for dates 05-20 to 11-01, use 05-15 and 11-11. The numbers are 58.6 and 71.8.

71.8% –58.6% = 13.2%

From Fact Sheet 3.1 Figure 4, the annual erosion index is 40

R-Factor:

13.2% of 40 = **5.28**

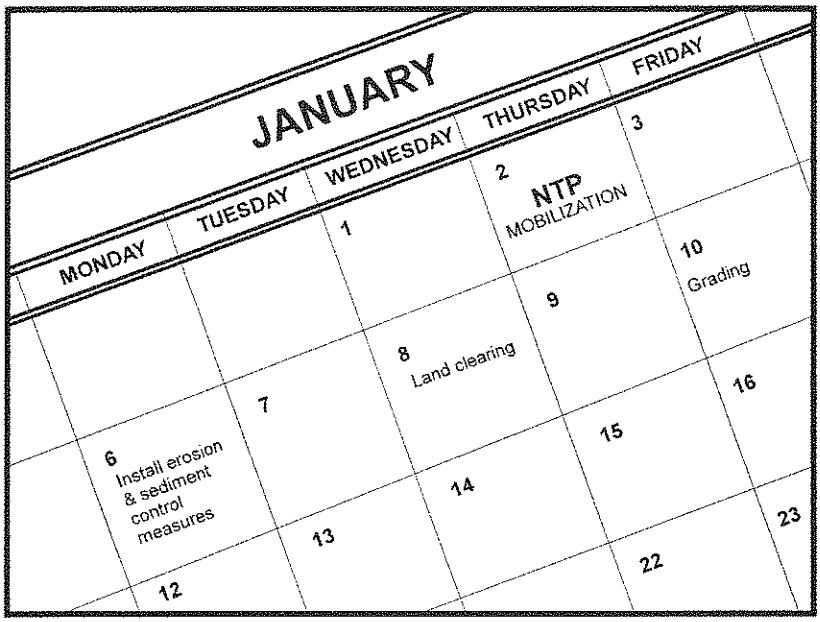
Appendix B: Construction Activities, Materials Used, and Associated Pollutant

Table B.1 Construction Activities and Associated Pollutants

Phase	Activity	Pollutant Source	Pollutant Category
General Construction, Mobilization and Site Preparation	Sanitary waste generation	▪ Portable toilets	Nutrients and bacteria
	Vehicle and equipment mobilization	▪ Equipment operation ▪ Equipment maintenance ▪ Equipment washing ▪ Equipment fueling	Oil and grease, and synthetic organics
Removal of existing storm drain and sanitary sewer pipes.	Vegetation removal, trenching, removal of the pipes, sampling, backfilling, and hydroseeding	▪ Equipment operation ▪ Equipment maintenance ▪ Equipment washing ▪ Equipment fueling ▪ Soil spoils	Chemicals of concern in soil, oil and grease, and synthetic organics
Radioactive Scan of Excavated Soils	Trucking excavated soil to the RSY at Drainage Area 2, Spreading at 6" layers, Scanning, Either Disposal or Re-use for Backfilling of Pipe Removal Areas	▪ Equipment operation ▪ Equipment maintenance ▪ Equipment washing ▪ Equipment fueling ▪ Soil spoils	COCs in soil, oil and grease, and synthetic organics
Site Restoration and Demobilization	Waste transportation and disposal; Vehicle and equipment demobilization	▪ Equipment operation ▪ Equipment maintenance ▪ Equipment washing ▪ Equipment fueling	COCs in sediment, COCs in soil, oil and grease, and synthetic organics

Appendix C: BMP Fact Sheets

Scheduling EC-1



Categories

EC	Erosion Control	☑
SE	Sediment Control	☒
TC	Tracking Control	☒
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Suitable Applications

Proper sequencing of construction activities to reduce erosion potential should be incorporated into the schedule of every construction project especially during rainy season. Use of other, more costly yet less effective, erosion and sediment control BMPs may often be reduced through proper construction sequencing.

Limitations

- Environmental constraints such as nesting season prohibitions reduce the full capabilities of this BMP.

Implementation

- Avoid rainy periods. Schedule major grading operations during dry months when practical. Allow enough time before rainfall begins to stabilize the soil with vegetation or physical means or to install sediment trapping devices.
- Plan the project and develop a schedule showing each phase

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of construction. Clearly show how the rainy season relates to soil disturbing and re-stabilization activities. Incorporate the construction schedule into the SWPPP.

- Include on the schedule, details on the rainy season implementation and deployment of:
  - Erosion control BMPs
  - Sediment control BMPs
  - Tracking control BMPs
  - Wind erosion control BMPs
  - Non-stormwater BMPs
  - Waste management and materials pollution control BMPs
- Include dates for activities that may require non-stormwater discharges such as dewatering, sawcutting, grinding, drilling, boring, crushing, blasting, painting, hydro-demolition, mortar mixing, pavement cleaning, etc.
- Work out the sequencing and timetable for the start and completion of each item such as site clearing and grubbing, grading, excavation, paving, foundation pouring utilities installation, etc., to minimize the active construction area during the rainy season.
  - Sequence trenching activities so that most open portions are closed before new trenching begins.
  - Incorporate staged seeding and re-vegetation of graded slopes as work progresses.
  - Schedule establishment of permanent vegetation during appropriate planting time for specified vegetation.
- Non-active areas should be stabilized as soon as practical after the cessation of soil disturbing activities or one day prior to the onset of precipitation.
- Monitor the weather forecast for rainfall.
- When rainfall is predicted, adjust the construction schedule to allow the implementation of soil stabilization and sediment treatment controls on all disturbed areas prior to the onset of rain.
- Be prepared year round to deploy erosion control and sediment control BMPs. Erosion may be caused during dry seasons by un-seasonal rainfall, wind, and vehicle tracking. Keep the site stabilized year round, and retain and maintain rainy season sediment trapping devices in operational condition.
- Apply permanent erosion control to areas deemed substantially complete during the project's defined seeding window.

Costs

Construction scheduling to reduce erosion may increase other construction costs due to reduced economies of scale in performing site grading. The cost effectiveness of scheduling techniques should be compared with the other less effective erosion and sedimentation controls to achieve a cost effective balance.

Inspection and Maintenance

- Verify that work is progressing in accordance with the schedule. If progress deviates, take corrective actions.
- Amend the schedule when changes are warranted.
- Amend the schedule prior to the rainy season to show updated information on the deployment and implementation of construction site BMPs.

References

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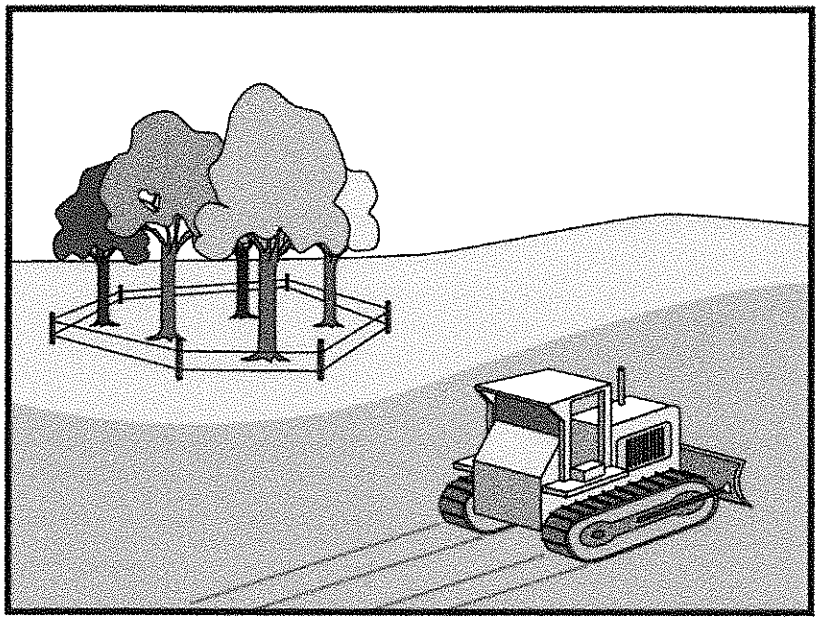
Preservation Of Existing Vegetation EC-2



Objectives

EC	Erosion Control	☑
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Carefully planned preservation of existing vegetation minimizes the potential of removing or injuring existing trees, vines, shrubs, and grasses that protect soil from erosion.

Suitable Applications

Preservation of existing vegetation is suitable for use on most projects. Large project sites often provide the greatest opportunity for use of this BMP. Suitable applications include the following:

- Areas within the site where no construction activity occurs, or occurs at a later date. This BMP is especially suitable to multi year projects where grading can be phased.
- Areas where natural vegetation exists and is designated for preservation. Such areas often include steep slopes, watercourse, and building sites in wooded areas.
- Areas where local, state, and federal government require preservation, such as vernal pools, wetlands, marshes, certain oak trees, etc. These areas are usually designated on the plans, or in the specifications, permits, or environmental documents.
- Where vegetation designated for ultimate removal can be temporarily preserved and be utilized for erosion control and sediment control.

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EC-2 Preservation Of Existing Vegetation

Limitations

- Requires forward planning by the owner/developer, contractor, and design staff.
- Limited opportunities for use when project plans do not incorporate existing vegetation into the site design.
- For sites with diverse topography, it is often difficult and expensive to save existing trees while grading the site satisfactory for the planned development.

Implementation

The best way to prevent erosion is to not disturb the land. In order to reduce the impacts of new development and redevelopment, projects may be designed to avoid disturbing land in sensitive areas of the site (e.g., natural watercourses, steep slopes), and to incorporate unique or desirable existing vegetation into the site's landscaping plan. Clearly marking and leaving a buffer area around these unique areas during construction will help to preserve these areas as well as take advantage of natural erosion prevention and sediment trapping.

Existing vegetation to be preserved on the site must be protected from mechanical and other injury while the land is being developed. The purpose of protecting existing vegetation is to ensure the survival of desirable vegetation for shade, beautification, and erosion control. Mature vegetation has extensive root systems that help to hold soil in place, thus reducing erosion. In addition, vegetation helps keep soil from drying rapidly and becoming susceptible to erosion. To effectively save existing vegetation, no disturbances of any kind should be allowed within a defined area around the vegetation. For trees, no construction activity should occur within the drip line of the tree.

Timing

- Provide for preservation of existing vegetation prior to the commencement of clearing and grubbing operations or other soil disturbing activities in areas where no construction activity is planned or will occur at a later date.

Design and Layout

- Mark areas to be preserved with temporary fencing. Include sufficient setback to protect roots.
  - Orange colored plastic mesh fencing works well.
  - Use appropriate fence posts and adequate post spacing and depth to completely support the fence in an upright position.
- Locate temporary roadways, stockpiles, and layout areas to avoid stands of trees, shrubs, and grass.
- Consider the impact of grade changes to existing vegetation and the root zone.
- Maintain existing irrigation systems where feasible. Temporary irrigation may be required.
- Instruct employees and subcontractors to honor protective devices. Prohibit heavy equipment, vehicular traffic, or storage of construction materials within the protected area.

Costs

There is little cost associated with preserving existing vegetation if properly planned during the project design, and these costs may be offset by aesthetic benefits that enhance property values. During construction, the cost for preserving existing vegetation will likely be less than the cost of applying erosion and sediment controls to the disturbed area. Replacing vegetation inadvertently destroyed during construction can be extremely expensive, sometimes in excess of $10,000 per tree.

Inspection and Maintenance

During construction, the limits of disturbance should remain clearly marked at all times. Irrigation or maintenance of existing vegetation should be described in the landscaping plan. If damage to protected trees still occurs, maintenance guidelines described below should be followed:

- Verify that protective measures remain in place. Restore damaged protection measures immediately.
- Serious tree injuries shall be attended to by an arborist.
- Damage to the crown, trunk, or root system of a retained tree shall be repaired immediately.
- Trench as far from tree trunks as possible, usually outside of the tree drip line or canopy. Curve trenches around trees to avoid large roots or root concentrations. If roots are encountered, consider tunneling under them. When trenching or tunneling near or under trees to be retained, place tunnels at least 18 in. below the ground surface, and not below the tree center to minimize impact on the roots.
- Do not leave tree roots exposed to air. Cover exposed roots with soil as soon as possible. If soil covering is not practical, protect exposed roots with wet burlap or peat moss until the tunnel or trench is ready for backfill.
- Cleanly remove the ends of damaged roots with a smooth cut.
- Fill trenches and tunnels as soon as possible. Careful filling and tamping will eliminate air spaces in the soil, which can damage roots.
- If bark damage occurs, cut back all loosened bark into the undamaged area, with the cut tapered at the top and bottom and drainage provided at the base of the wood. Limit cutting the undamaged area as much as possible.
- Aerate soil that has been compacted over a trees root zone by punching holes 12 in. deep with an iron bar, and moving the bar back and forth until the soil is loosened. Place holes 18 in. apart throughout the area of compacted soil under the tree crown.
- Fertilization
  - Fertilize stressed or damaged broadleaf trees to aid recovery.
  - Fertilize trees in the late fall or early spring.

- Apply fertilizer to the soil over the feeder roots and in accordance with label instructions, but never closer than 3 ft to the trunk. Increase the fertilized area by one-fourth of the crown area for conifers that have extended root systems.

- Retain protective measures until all other construction activity is complete to avoid damage during site cleanup and stabilization.

References

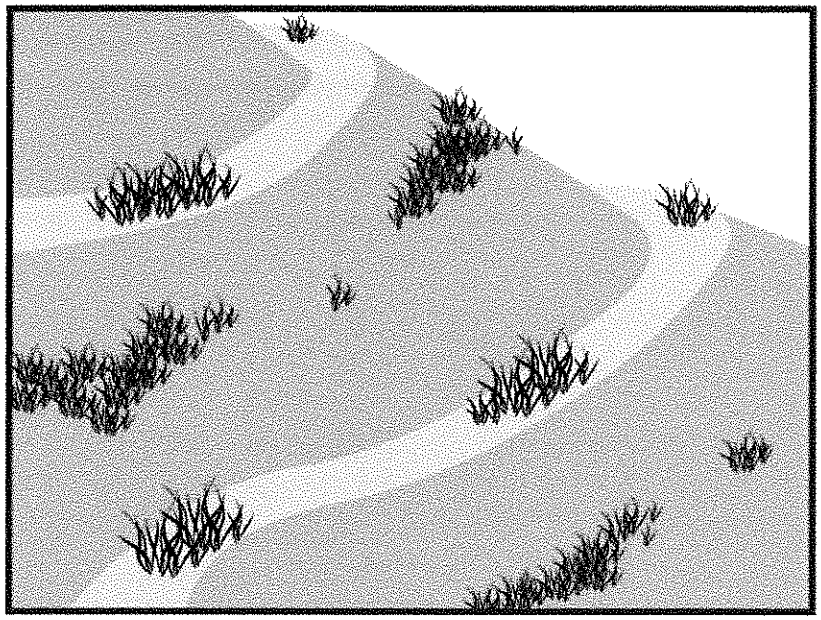
County of Sacramento Tree Preservation Ordinance, September 1981.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for The Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Hydroseeding EC-4



Objectives

EC	Erosion Control	☑
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	☒
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-5 Soil Binders

EC-6 Straw Mulch

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Hydroseeding typically consists of applying a mixture of wood fiber, seed, fertilizer, and stabilizing emulsion with hydro-mulch equipment, to temporarily protect exposed soils from erosion by water and wind.

Suitable Applications

Hydroseeding is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established, and disturbed areas that will be re-disturbed following an extended period of inactivity.

Limitations

- Hydroseeding may be used alone only when there is sufficient time in the season to ensure adequate vegetation establishment and coverage to provide adequate erosion control. Otherwise, hydroseeding must be used in conjunction with mulching (i.e., straw mulch).
- Steep slopes are difficult to protect with temporary seeding.
- Temporary seeding may not be appropriate in dry periods without supplemental irrigation.
- Temporary vegetation may have to be removed before permanent vegetation is applied.
- Temporary vegetation is not appropriate for short term inactivity.

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Implementation

In order to select appropriate hydroseeding mixtures, an evaluation of site conditions shall be performed with respect to:

- Soil conditions
- Site topography
- Season and climate
- Vegetation types
- Maintenance requirements
- Sensitive adjacent areas
- Water availability
- Plans for permanent vegetation

The local office of the U.S.D.A. Natural Resources Conservation Service (NRCS) is an excellent source of information on appropriate seed mixes.

The following steps shall be followed for implementation:

- Avoid use of hydroseeding in areas where the BMP would be incompatible with future earthwork activities and would have to be removed.
- Hydroseeding can be accomplished using a multiple step or one step process. The multiple step process ensures maximum direct contact of the seeds to soil. When the one step process is used to apply the mixture of fiber, seed, etc., the seed rate shall be increased to compensate for all seeds not having direct contact with the soil.
- Prior to application, roughen the area to be seeded with the furrows trending along the contours.
- Apply a straw mulch to keep seeds in place and to moderate soil moisture and temperature until the seeds germinate and grow.
- All seeds shall be in conformance with the California State Seed Law of the Department of Agriculture. Each seed bag shall be delivered to the site sealed and clearly marked as to species, purity, percent germination, dealer's guarantee, and dates of test. The container shall be labeled to clearly reflect the amount of Pure Live Seed (PLS) contained. All legume seed shall be pellet inoculated. Inoculant sources shall be species specific and shall be applied at a rate of 2 lb of inoculant per 100 lb seed.
- Commercial fertilizer shall conform to the requirements of the California Food and Agricultural Code. Fertilizer shall be pelleted or granular form.
- Follow up applications shall be made as needed to cover weak spots and to maintain adequate soil protection.
- Avoid over spray onto roads, sidewalks, drainage channels, existing vegetation, etc.

Costs

Average cost for installation and maintenance may vary from as low as $300 per acre for flat slopes and stable soils, to $1600 per acre for moderate to steep slopes and/or erosive soils.

Hydroseeding		Installed Cost per Acre
High Density	Ornamentals	$400 - $1600
	Turf Species	$350
	Bunch Grasses	$300 - $1300
Fast Growing	Annual	$350 - $650
	Perennial	$300 - $800
Non-Competing	Native	$300 - $1600
	Non-Native	$400 - $500
Sterile	Cereal Grain	$500

Source: Caltrans Guidance for Soil Stabilization for Temporary Slopes, Nov. 1999

Inspection and Maintenance

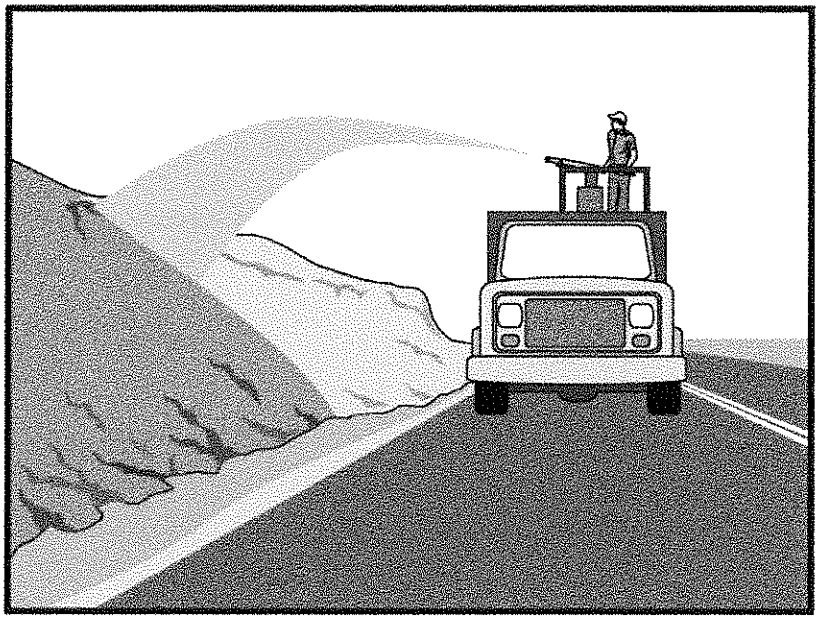
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident shall be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- Where seeds fail to germinate, or they germinate and die, the area must be re-seeded, fertilized, and mulched within the planting season, using not less than half the original application rates.
- Irrigation systems, if applicable, should be inspected daily while in use to identify system malfunctions and line breaks. When line breaks are detected, the system must be shut down immediately and breaks repaired before the system is put back into operation.
- Irrigation systems shall be inspected for complete coverage and adjusted as needed to maintain complete coverage.

References

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Guidance Document: Soil Stabilization for Temporary Slopes, State of California Department of Transportation (Caltrans), November 1999.

Straw Mulch EC-6



Objectives

EC	Erosion Control	☑
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

EC-3 Hydraulic Mulch

EC-4 Hydroseeding

EC-5 Soil Binders

EC-7 Geotextiles and Mats

EC-8 Wood Mulching

Description and Purpose

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or anchoring it with a tackifier stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Suitable Applications

Straw mulch is suitable for soil disturbed areas requiring temporary protection until permanent stabilization is established. Straw mulch is typically used for erosion control on disturbed areas until soils can be prepared for permanent vegetation. Straw mulch is also used in combination with temporary and/or permanent seeding strategies to enhance plant establishment.

Limitations

- Availability of straw and straw blowing equipment may be limited just prior to the rainy season and prior to storms due to high demand.
- There is a potential for introduction of weed seed and unwanted plant material.
- When straw blowers are used to apply straw mulch, the treatment areas must be within 150 ft of a road or surface capable of supporting trucks.
- Straw mulch applied by hand is more time intensive and potentially costly.

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- Wind may limit application of straw and blow straw into undesired locations.
- May have to be removed prior to permanent seeding or prior to further earthwork.
- "Punching" of straw does not work in sandy soils, necessitating the use of tackifiers.

Implementation

- Straw shall be derived from wheat, rice, or barley. Where required by the plans, specifications, permits, or environmental documents, native grass straw shall be used.
- A tackifier is the preferred method for anchoring straw mulch to the soil on slopes.
- Crimping, punch roller-type rollers, or track walking may also be used to incorporate straw mulch into the soil on slopes. Track walking shall only be used where other methods are impractical.
- Avoid placing straw onto roads, sidewalks, drainage channels, sound walls, existing vegetation, etc.
- Straw mulch with tackifier shall not be applied during or immediately before rainfall.
- In San Diego, use of straw near wood framed home construction has been frowned on by the Fire Marshall.

Application Procedures

- Apply straw at a minimum rate of 4,000 lb/acre, either by machine or by hand distribution.
- Roughen embankments and fill rills before placing the straw mulch by rolling with a crimping or punching type roller or by track walking.
- Evenly distribute straw mulch on the soil surface.
- Anchor straw mulch to the soil surface by "punching" it into the soil mechanically (incorporating). Alternatively, use a tackifier to adhere straw fibers.
- Methods for holding the straw mulch in place depend upon the slope steepness, accessibility, soil conditions, and longevity.
  - On small areas, a spade or shovel can be used to punch in straw mulch.
  - On slopes with soils that are stable enough and of sufficient gradient to safely support construction equipment without contributing to compaction and instability problems, straw can be "punched" into the ground using a knife blade roller or a straight bladed coulter, known commercially as a "crimper".
  - On small areas and/or steep slopes, straw can also be held in place using plastic netting or jute. The netting shall be held in place using 11 gauge wire staples, geotextile pins or wooden stakes as described in EC-7, Geotextiles and Mats.
  - A tackifier acts to glue the straw fibers together and to the soil surface. The tackifier shall be selected based on longevity and ability to hold the fibers in place. A tackifier is

typically applied at a rate of 125 lb/acre. In windy conditions, the rates are typically 180 lb/acre.

Costs

Average annual cost for installation and maintenance (3-4 months useful life) is $2,500 per acre. Application by hand is more time intensive and potentially costly.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Areas where erosion is evident should be repaired and BMPs re-applied as soon as possible. Care should be exercised to minimize the damage to protected areas while making repairs, as any area damaged will require re-application of BMPs.
- The key consideration in inspection and maintenance is that the straw needs to last long enough to achieve erosion control objectives.
- Maintain an unbroken, temporary mulched ground cover while disturbed soil areas are inactive. Repair any damaged ground cover and re-mulch exposed areas.
- Reapplication of straw mulch and tackifier may be required to maintain effective soil stabilization over disturbed areas and slopes.

References

Controlling Erosion of Construction Sites, Agricultural Information Bulletin #347, U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) (formerly Soil Conservation Service – SCS).

Guides for Erosion and Sediment Control in California, USDA Soils Conservation Service, January 1991.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

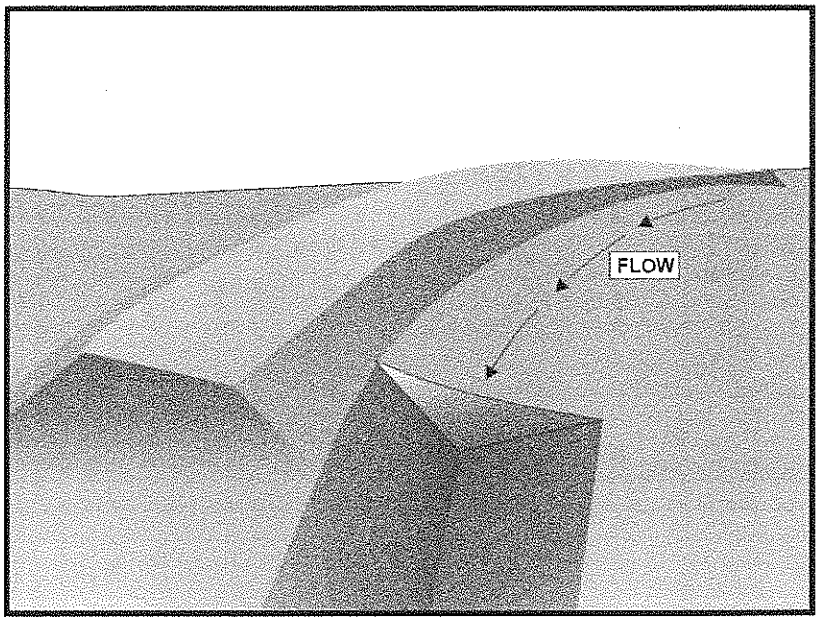
Soil Erosion by Water, Agricultural Information Bulletin #513, U.S. Department of Agriculture, Soil Conservation Service.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Earth Dikes and Drainage Swales EC-9



Categories

EC	Erosion Control	☑
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Suitable Applications

Earth dikes and drainage swales are suitable for use, individually or together, where runoff needs to be diverted from one area and conveyed to another.

- Earth dikes and drainage swales may be used:
  - To convey surface runoff down sloping land
  - To intercept and divert runoff to avoid sheet flow over sloped surfaces
  - To divert and direct runoff towards a stabilized watercourse, drainage pipe or channel
  - To intercept runoff from paved surfaces
  - Below steep grades where runoff begins to concentrate
  - Along roadways and facility improvements subject to flood drainage

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- At the top of slopes to divert runon from adjacent or undisturbed slopes
- At bottom and mid slope locations to intercept sheet flow and convey concentrated flows
- Divert sediment laden runoff into sediment basins or traps

Limitations

Dikes should not be used for drainage areas greater than 10 acres or along slopes greater than 10 percent. For larger areas more permanent drainage structures should be built. All drainage structures should be built in compliance with local municipal requirements.

- Earth dikes may create more disturbed area on site and become barriers to construction equipment.
- Earth dikes must be stabilized immediately, which adds cost and maintenance concerns.
- Diverted stormwater may cause downstream flood damage.
- Dikes should not be constructed of soils that may be easily eroded.
- Regrading the site to remove the dike may add additional cost.
- Temporary drains and swales or any other diversion of runoff should not adversely impact upstream or downstream properties.
- Temporary drains and swales must conform to local floodplain management requirements.
- Earth dikes/drainage swales are not suitable as sediment trapping devices.
- It may be necessary to use other soil stabilization and sediment controls such as check dams, plastics, and blankets, to prevent scour and erosion in newly graded dikes, swales, and ditches.
- Sediment accumulation, scour depressions, and/or persistent non-stormwater discharges can result in areas of standing water suitable for mosquito production in drainage swales.

Implementation

The temporary earth dike is a berm or ridge of compacted soil, located in such a manner as to divert stormwater to a sediment trapping device or a stabilized outlet, thereby reducing the potential for erosion and offsite sedimentation. Earth dikes can also be used to divert runoff from off site and from undisturbed areas away from disturbed areas and to divert sheet flows away from unprotected slopes.

An earth dike does not itself control erosion or remove sediment from runoff. A dike prevents erosion by directing runoff to an erosion control device such as a sediment trap or directing runoff away from an erodible area. Temporary diversion dikes should not adversely impact adjacent properties and must conform to local floodplain management regulations, and should not be used in areas with slopes steeper than 10%.

Slopes that are formed during cut and fill operations should be protected from erosion by runoff. A combination of a temporary drainage swale and an earth dike at the top of a slope can divert

runoff to a location where it can be brought to the bottom of the slope (see EC-11, Slope Drains). A combination dike and swale is easily constructed by a single pass of a bulldozer or grader and compacted by a second pass of the tracks or wheels over the ridge. Diversion structures should be installed when the site is initially graded and remain in place until post construction BMPs are installed and the slopes are stabilized.

Diversion practices concentrate surface runoff, increasing its velocity and erosive force. Thus, the flow out of the drain or swale must be directed onto a stabilized area or into a grade stabilization structure. If significant erosion will occur, a swale should be stabilized using vegetation, chemical treatment, rock rip-rap, matting, or other physical means of stabilization. Any drain or swale that conveys sediment laden runoff must be diverted into a sediment basin or trap before it is discharged from the site.

General

- Care must be applied to correctly size and locate earth dikes, drainage swales. Excessively steep, unlined dikes, and swales are subject to erosion and gully formation.
- Conveyances should be stabilized.
- Use a lined ditch for high flow velocities.
- Select flow velocity based on careful evaluation of the risks due to erosion of the measure, soil types, overtopping, flow backups, washout, and drainage flow patterns for each project site.
- Compact any fills to prevent unequal settlement.
- Do not divert runoff onto other property without securing written authorization from the property owner.
- When possible, install and utilize permanent dikes, swales, and ditches early in the construction process.
- Provide stabilized outlets.

Earth Dikes

Temporary earth dikes are a practical, inexpensive BMP used to divert stormwater runoff. Temporary diversion dikes should be installed in the following manner:

- All dikes should be compacted by earth moving equipment.
- All dikes should have positive drainage to an outlet.
- All dikes should have 2:1 or flatter side slopes, 18 in. minimum height, and a minimum top width of 24 in. Wide top widths and flat slopes are usually needed at crossings for construction traffic.
- The outlet from the earth dike must function with a minimum of erosion. Runoff should be conveyed to a sediment trapping device such as a Sediment Trap (SE-3) or Sediment Basin

(SE-2) when either the dike channel or the drainage area above the dike are not adequately stabilized.

- Temporary stabilization may be achieved using seed and mulching for slopes less than 5% and either rip-rap or sod for slopes in excess of 5%. In either case, stabilization of the earth dike should be completed immediately after construction or prior to the first rain.
- If riprap is used to stabilize the channel formed along the toe of the dike, the following typical specifications apply:

Channel Grade	Riprap Stabilization
0.5-1.0%	4 in. Rock
1.1-2.0%	6 in. Rock
2.1-4.0%	8 in. Rock
4.1-5.0%	8 in. -12 in. Riprap

- The stone riprap, recycled concrete, etc. used for stabilization should be pressed into the soil with construction equipment.
- Filter cloth may be used to cover dikes in use for long periods.
- Construction activity on the earth dike should be kept to a minimum.

Drainage Swales

Drainage swales are only effective if they are properly installed. Swales are more effective than dikes because they tend to be more stable. The combination of a swale with a dike on the downhill side is the most cost effective diversion.

Standard engineering design criteria for small open channel and closed conveyance systems should be used (see the local drainage design manual). Unless local drainage design criteria state otherwise, drainage swales should be designed as follows:

- No more than 5 acres may drain to a temporary drainage swale.
- Place drainage swales above or below, not on, a cut or fill slope.
- Swale bottom width should be at least 2 ft
- Depth of the swale should be at least 18 in.
- Side slopes should be 2:1 or flatter.
- Drainage or swales should be laid at a grade of at least 1 percent, but not more than 15 percent.
- The swale must not be overtopped by the peak discharge from a 10-year storm, irrespective of the design criteria stated above.

- Remove all trees, stumps, obstructions, and other objectionable material from the swale when it is built.
- Compact any fill material along the path of the swale.
- Stabilize all swales immediately. Seed and mulch swales at a slope of less than 5 percent, and use rip-rap or sod for swales with a slope between 5 and 15 percent. For temporary swales, geotextiles and mats (EC-7) may provide immediate stabilization.
- Irrigation may be required to establish sufficient vegetation to prevent erosion.
- Do not operate construction vehicles across a swale unless a stabilized crossing is provided.
- Permanent drainage facilities must be designed by a professional engineer (see the local drainage design criteria for proper design).
- At a minimum, the drainage swale should conform to predevelopment drainage patterns and capacities.
- Construct the drainage swale with a positive grade to a stabilized outlet.
- Provide erosion protection or energy dissipation measures if the flow out of the drainage swale can reach an erosive velocity.

Costs

- Cost ranges from $15 to $55 per ft for both earthwork and stabilization and depends on availability of material, site location, and access.
- Small dikes: $2.50 - $6.50/linear ft; Large dikes: $2.50/yd^3.
- The cost of a drainage swale increases with drainage area and slope. Typical swales for controlling internal erosion are inexpensive, as they are quickly formed during routine earthwork.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspect ditches and berms for washouts. Replace lost riprap, damaged linings or soil stabilizers as needed.
- Inspect channel linings, embankments, and beds of ditches and berms for erosion and accumulation of debris and sediment. Remove debris and sediment and repair linings and embankments as needed.
- Temporary conveyances should be completely removed as soon as the surrounding drainage area has been stabilized or at the completion of construction

References

Erosion and Sediment Control Handbook, S.J. Goldman, K. Jackson, T.A. Bursetynsky, P.E., McGraw Hill Book Company, 1986.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

Metzger, M.E. 2004. Managing mosquitoes in stormwater treatment devices. University of California Division of Agriculture and Natural Resources, Publication 8125. On-line: http://anrcatalog.ucdavis.edu/pdf/8125.pdf

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National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

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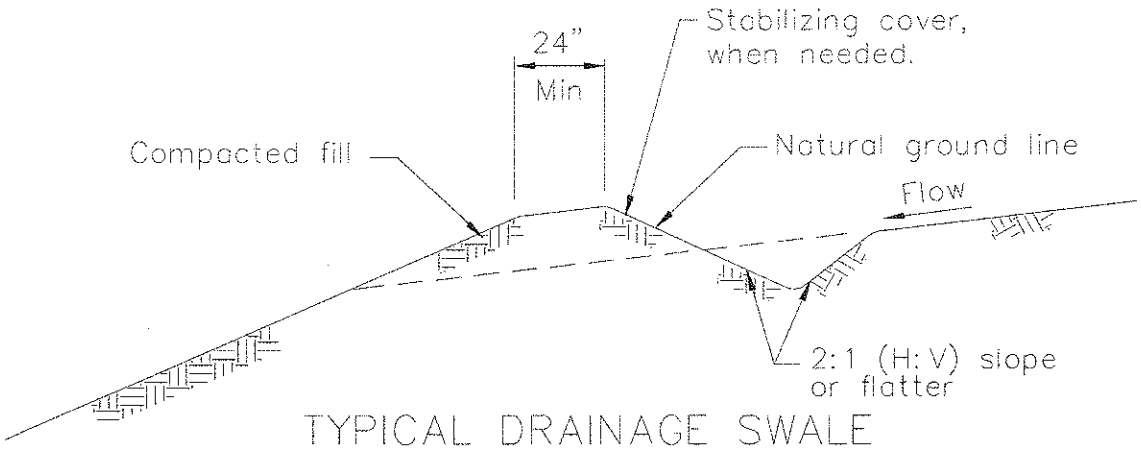
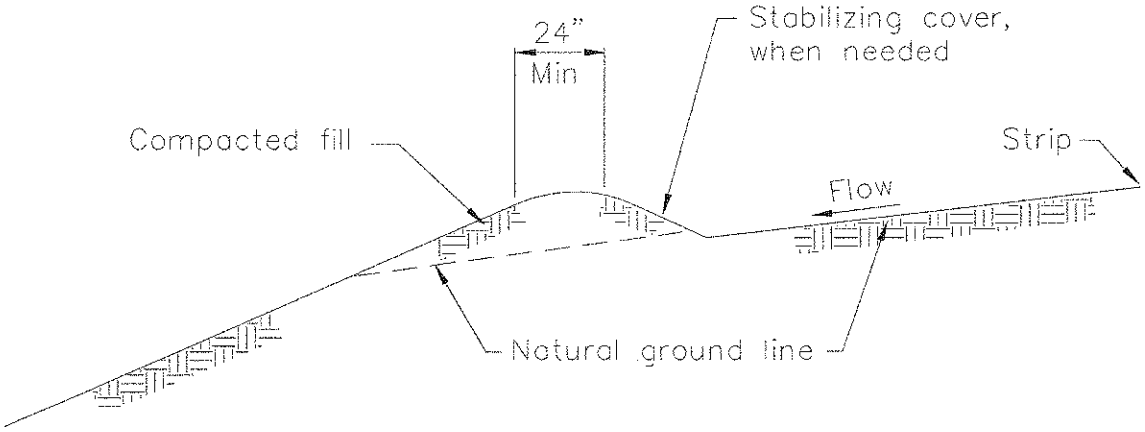


TYPICAL DRAINAGE SWALE
NOT TO SCALE

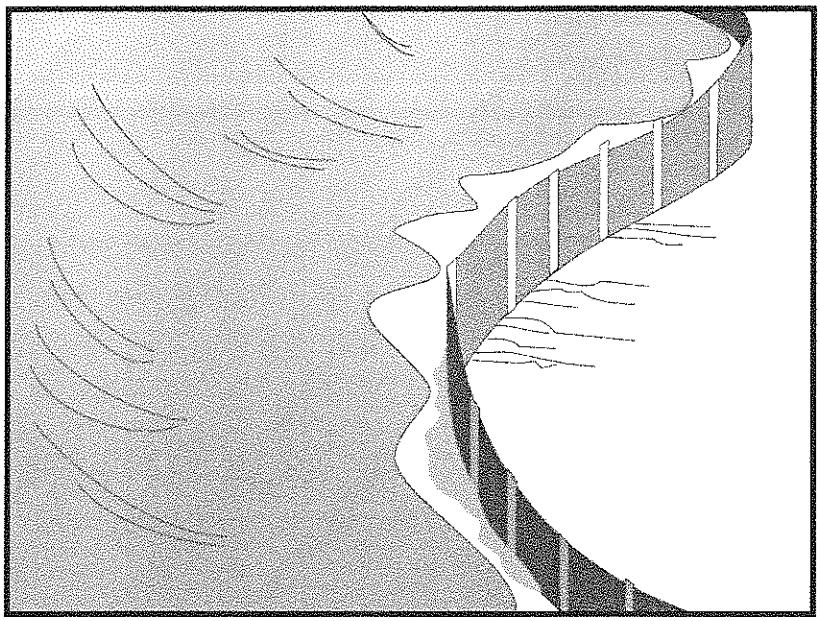
NOTES:

1. Stabilize inlet, outlets and slopes.
2. Properly compact the subgrade.



TYPICAL EARTH DIKE
NOT TO SCALE

Silt Fence SE-1



Categories

EC	Erosion Control	
SE	Sediment Control	☑
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WE	Wind Erosion Control	
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WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-10 Storm Drain Inlet Protection

SE-14 Biofilter Bags

Description and Purpose

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains sediment-laden water, promoting sedimentation behind the fence.

Suitable Applications

Silt fences are suitable for perimeter control, placed below areas where sheet flows discharge from the site. They could also be used as interior controls below disturbed areas where runoff may occur in the form of sheet and rill erosion and around inlets within disturbed areas (SE-10). Silt fences are generally ineffective in locations where the flow is concentrated and are only applicable for sheet or overland flows. Silt fences are most effective when used in combination with erosion controls. Suitable applications include:

- Along the perimeter of a project.
- Below the toe or down slope of exposed and erodible slopes.
- Along streams and channels.
- Around temporary spoil areas and stockpiles.
- Around inlets.
- Below other small cleared areas.

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Limitations

- Do not use in streams, channels, drain inlets, or anywhere flow is concentrated.
- Do not use in locations where ponded water may cause a flooding hazard. Runoff typically ponds temporarily on the upstream side of silt fence.
- Do not use silt fence to divert water flows or place across any contour line. Fences not constructed on a level contour, or fences used to divert flow will concentrate flows resulting in additional erosion and possibly overtopping or failure of the silt fence.
- Improperly installed fences are subject to failure from undercutting, overtopping, or collapsing.
- Not effective unless trenched and keyed in.
- Not intended for use as mid-slope protection on slopes greater than 4:1 (H:V).
- Do not use on slopes subject to creeping, slumping, or landslides.

Implementation

General

A silt fence is a temporary sediment barrier consisting of woven geotextile stretched across and attached to supporting posts, trenched-in, and, depending upon the strength of fabric used, supported with plastic or wire mesh fence. Silt fences trap sediment by intercepting and detaining small amounts of sediment-laden runoff from disturbed areas in order to promote sedimentation behind the fence.

The following layout and installation guidance can improve performance and should be followed:

- Use principally in areas where sheet flow occurs.
- Install along a level contour, so water does not pond more than 1.5 ft at any point along the silt fence.
- The maximum length of slope draining to any point along the silt fence should be 200 ft or less.
- The maximum slope perpendicular to the fence line should be 1:1.
- Provide sufficient room for runoff to pond behind the fence and to allow sediment removal equipment to pass between the silt fence and toes of slopes or other obstructions. About 1200 ft^2 of ponding area should be provided for every acre draining to the fence.
- Turn the ends of the filter fence uphill to prevent stormwater from flowing around the fence.
- Leave an undisturbed or stabilized area immediately down slope from the fence where feasible.

- Silt fences should remain in place until the disturbed area is permanently stabilized, after which, the silt fence should be removed and properly disposed.
- Silt fence should be used in combination with erosion source controls up slope in order to provide the most effective sediment control.
- Be aware of local regulations regarding the type and installation requirements of silt fence, which may differ from those presented in this fact sheet.

Design and Layout

The fence should be supported by a plastic or wire mesh if the fabric selected does not have sufficient strength and bursting strength characteristics for the planned application (as recommended by the fabric manufacturer). Woven geotextile material should contain ultraviolet inhibitors and stabilizers to provide a minimum of six months of expected usable construction life at a temperature range of 0 °F to 120 °F.

- Layout in accordance with attached figures.
- For slopes steeper than 2:1 (H:V) and that contain a high number of rocks or large dirt clods that tend to dislodge, it may be necessary to install additional protection immediately adjacent to the bottom of the slope, prior to installing silt fence. Additional protection may be a chain link fence or a cable fence.
- For slopes adjacent to sensitive receiving waters or Environmentally Sensitive Areas (ESAs), silt fence should be used in conjunction with erosion control BMPs.

Standard vs. Heavy Duty Silt Fence

Standard Silt Fence

- Generally applicable in cases where the slope of area draining to the silt fence is 4:1 (H:V) or less.
- Used for shorter durations, typically 5 months or less
- Area draining to fence produces moderate sediment loads.

Heavy Duty Silt Fence

- Use is generally limited to 8 months or less.
- Area draining to fence produces moderate sediment loads.
- Heavy duty silt fence usually has 1 or more of the following characteristics, not possessed by standard silt fence.
  - Fence fabric has higher tensile strength.
  - Fabric is reinforced with wire backing or additional support.
  - Posts are spaced closer than pre-manufactured, standard silt fence products.
  - Posts are metal (steel or aluminum)

Materials

Standard Silt Fence

- Silt fence material should be woven geotextile with a minimum width of 36 in. and a minimum tensile strength of 100 lb force. The fabric should conform to the requirements in ASTM designation D4632 and should have an integral reinforcement layer. The

reinforcement layer should be a polypropylene, or equivalent, net provided by the manufacturer. The permittivity of the fabric should be between 0.1 sec^{-1} and 0.15 sec^{-1} in conformance with the requirements in ASTM designation D4491.

- Wood stakes should be commercial quality lumber of the size and shape shown on the plans. Each stake should be free from decay, splits or cracks longer than the thickness of the stake or other defects that would weaken the stakes and cause the stakes to be structurally unsuitable.

- Staples used to fasten the fence fabric to the stakes should be not less than 1.75 in. long and should be fabricated from 15 gauge or heavier wire. The wire used to fasten the tops of the stakes together when joining two sections of fence should be 9 gauge or heavier wire. Galvanizing of the fastening wire will not be required.

Heavy-Duty Silt Fence

- Some silt fence has a wire backing to provide additional support, and there are products that may use prefabricated plastic holders for the silt fence and use metal posts or bar reinforcement instead of wood stakes. If bar reinforcement is used in lieu of wood stakes, use number four or greater bar. Provide end protection for any exposed bar reinforcement for health and safety purposes.

Installation Guidelines – Traditional Method

Silt fences are to be constructed on a level contour. Sufficient area should exist behind the fence for ponding to occur without flooding or overtopping the fence.

- A trench should be excavated approximately 6 in. wide and 6 in. deep along the line of the proposed silt fence (trenches should not be excavated wider or deeper than necessary for proper silt fence installation).

- Bottom of the silt fence should be keyed-in a minimum of 12 in.

- Posts should be spaced a maximum of 6 ft apart and driven securely into the ground a minimum of 18 in. or 12 in. below the bottom of the trench.

- When standard strength geotextile is used, a plastic or wire mesh support fence should be fastened securely to the upslope side of posts using heavy–duty wire staples at least 1 in. long. The mesh should extend into the trench.

- When extra-strength geotextile and closer post spacing are used, the mesh support fence may be eliminated.

- Woven geotextile should be purchased in a long roll, then cut to the length of the barrier. When joints are necessary, geotextile should be spliced together only at a support post, with a minimum 6 in. overlap and both ends securely fastened to the post.

- The trench should be backfilled with native material and compacted.

- Construct silt fences with a setback of at least 3 ft from the toe of a slope. Where, due to specific site conditions, a 3 ft setback is not available, the silt fence may be constructed at the

toe of the slope, but should be constructed as far from the toe of the slope as practicable. Silt fences close to the toe of the slope will be less effective and more difficult to maintain.

- Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the barrier; in no case should the reach exceed 500 ft.
- Cross barriers should be a minimum of $^1/_3$ and a maximum of ½ the height of the linear barrier.
- See typical installation details at the end of this fact sheet.

Installation Guidelines - Static Slicing Method

- Static Slicing is defined as insertion of a narrow blade pulled behind a tractor, similar to a plow blade, at least 10 inches into the soil while at the same time pulling silt geotextile fabric into the ground through the opening created by the blade to the depth of the blade. Once the gerotextile is installed, the soil is compacted using tractor tires.
- This method will not work with pre-fabricated, wire backed silt fence.
- Benefits:
    - Ease of installation (most often done with a 2 person crew). In addition, installation using static slicing has been found to be more efficient on slopes, in rocky soils, and in saturated soils.
    - Minimal soil disturbance.
    - Greater level of compaction along fence, leading to higher performance (i.e. greater sediment retention).
    - Uniform installation.
    - Less susceptible to undercutting/undermining.

Costs

- It should be noted that costs vary greatly across regions due to available supplies and labor costs.
- Average annual cost for installation using the traditional silt fence installation method (assumes 6 month useful life) is $7 per linear foot based on vendor research. Range of cost is $3.50 - $9.10 per linear foot.
- In tests, the slicing method required 0.33 man hours per 100 linear feet, while the trenched based systems required as much as 1.01 man hours per linear foot.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Repair undercut silt fences.

- Repair or replace split, torn, slumping, or weathered fabric. The lifespan of silt fence fabric is generally 5 to 8 months.
- Silt fences that are damaged and become unsuitable for the intended purpose should be removed from the site of work, disposed, and replaced with new silt fence barriers.
- Sediment that accumulates in the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Silt fences should be left in place until the upstream area is permanently stabilized. Until then, the silt fence should be inspected and maintained regularly.
- Remove silt fence when upgradient areas are stabilized. Fill and compact post holes and anchor trench, remove sediment accumulation, grade fence alignment to blend with adjacent ground, and stabilize disturbed area.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, United States Environmental Protection Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group-Working Paper, USEPA, April 1992.

Sedimentation and Erosion Control Practices, and Inventory of Current Practices (Draft), UESPA, 1990.

Southeastern Wisconsin Regional Planning Commission (SWRPC). Costs of Urban Nonpoint Source Water Pollution Control Measures. Technical Report No. 31. Southeastern Wisconsin Regional Planning Commission, Waukesha, WI. 1991

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.

U.S. Environmental Protection Agency (USEPA). Stormwater Management for Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices. U.S. Environmental Protection Agency, Office of Water, Washington, DC, 1992.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.Soil Stabilization BMP Research for Erosion and Sediment Controls: Cost Survey Technical Memorandum, State of California Department of Transportation (Caltrans), July 2007.

Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.

Silt Fence

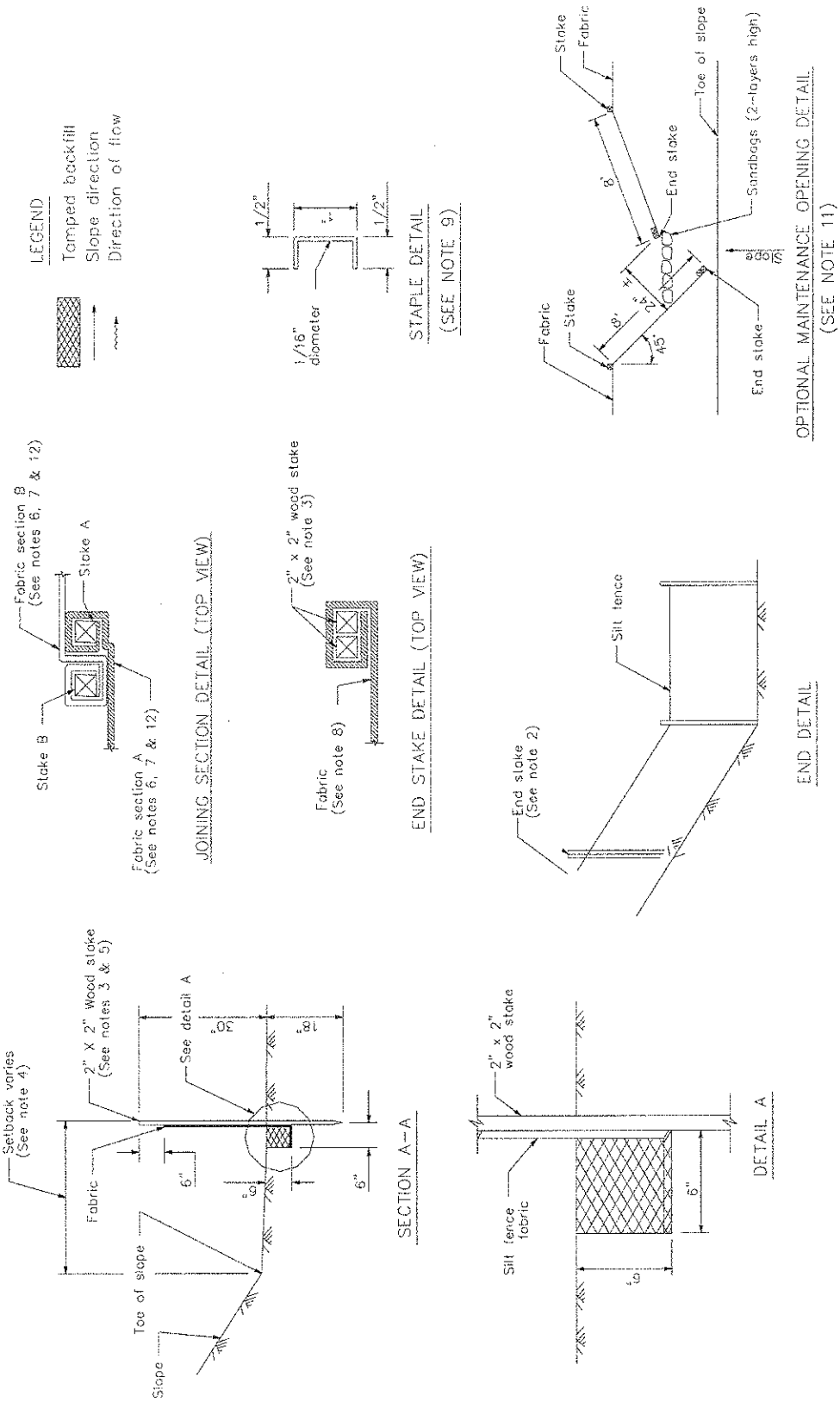
SE-1

NOTES

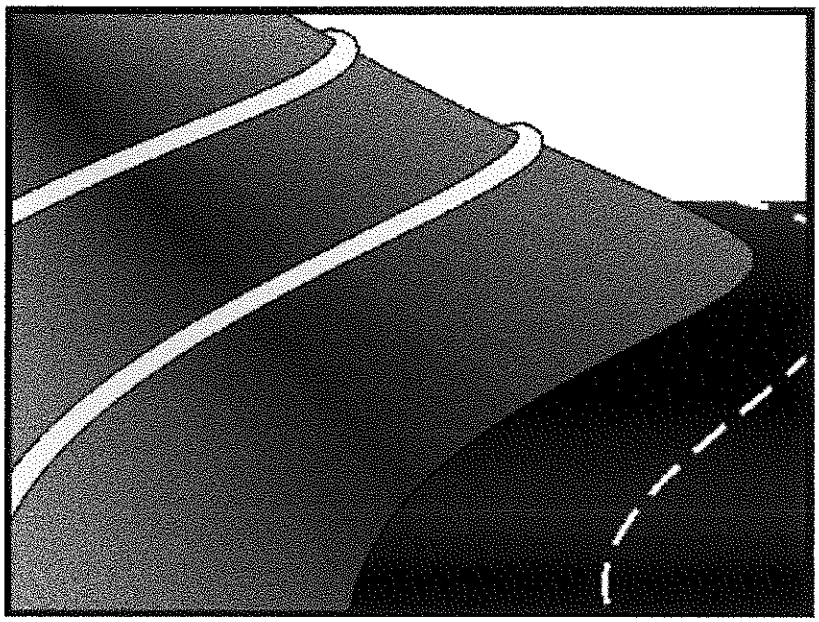
1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/3 the height of the linear barrier, in no case shall the reach length exceed 500'.
2. The last 8'–0" of fence shall be turned up slope.
3. Stake dimensions are nominal.
4. Dimension may vary to fit field condition.
5. Stakes shall be spaced at 8'–0" maximum and shall be positioned on downstream side of fence.
6. Stakes to overlap and fence fabric to fold around each stake one full turn. Secure fabric to stake with 4 staples.
7. Stakes shall be driven tightly together to prevent potential flow–through of sediment at joint. The tops of the stakes shall be secured with wire.
8. For end stake, fence fabric shall be folded around two stakes one full turn and secured with 4 staples.
9. Minimum 4 staples per stake. Dimensions shown are typical.
10. Cross barriers shall be a minimum of 1/3 and a maximum of 1/2 the height of the linear barrier.
11. Maintenance openings shall be constructed in a manner to ensure sediment remains behind silt fence.
12. Joining sections shall not be placed at sump locations.
13. Sandbag rows and layers shall be offset to eliminate gaps.
14. Add 3–4 bags to cross barrier on downgradient side of silt fence as needed to prevent bypass or undermining and as allowable based on site limits of disturbance.

CROSS BARRIER DETAIL

SECTION C–C


LEGEND
Tamped backfill
Slope direction
Direction of flow
1/2"
1/16" diameter
1/2"
STAPLE DETAIL
(SEE NOTE 9)
Stake
Fabric
8'
End stake
Toe of slope
Sandbags (2-layers high)
Fabric
Stake
8'
4'
2'
4'
45°
End stake
OPTIONAL MAINTENANCE OPENING DETAIL
(SEE NOTE 11)
Fabric section B
(See notes 6, 7 & 12)
Stake A
Stake B
Fabric section A
(See notes 6, 7 & 12)
JOINING SECTION DETAIL (TOP VIEW)
2" x 2" wood stake
(See note 3)
Fabric
(See note 8)
END STAKE DETAIL (TOP VIEW)
Silt fence
End stake
(See note 2)
END DETAIL
Setback varies
(See note 4)
2" X 2" Wood stake
(See notes 3 & 5)
See detail A
8"
8"
Fabric
6"
6"
Toe of slope
Slope
SECTION A-A
2" x 2"
wood stake
Silt fence
fabric
6"
DETAIL A

Fiber Rolls SE-5



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

A fiber roll consists of straw, flax, or other similar materials bound into a tight tubular roll. When fiber rolls are placed at the toe and on the face of slopes, they intercept runoff, reduce its flow velocity, release the runoff as sheet flow, and provide removal of sediment from the runoff. By interrupting the length of a slope, fiber rolls can also reduce erosion.

Suitable Applications

Fiber rolls may be suitable:

- Along the toe, top, face, and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the end of a downward slope where it transitions to a steeper slope
- Along the perimeter of a project
- As check dams in unlined ditches
- Down-slope of exposed soil areas
- Around temporary stockpiles

Limitations

- Fiber rolls are not effective unless trenched

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- Fiber rolls at the toe of slopes greater than 5:1 (H:V) should be a minimum of 20 in. diameter or installations achieving the same protection (i.e. stacked smaller diameter fiber rolls, etc.).
- Difficult to move once saturated.
- If not properly staked and trenched in, fiber rolls could be transported by high flows.
- Fiber rolls have a very limited sediment capture zone.
- Fiber rolls should not be used on slopes subject to creep, slumping, or landslide.

Implementation

Fiber Roll Materials

- Fiber rolls should be either prefabricated rolls or rolled tubes of erosion control blanket.

Assembly of Field Rolled Fiber Roll

- Roll length of erosion control blanket into a tube of minimum 8 in. diameter.
- Bind roll at each end and every 4 ft along length of roll with jute-type twine.

Installation

- Locate fiber rolls on level contours spaced as follows:
  - Slope inclination of 4:1 (H:V) or flatter: Fiber rolls should be placed at a maximum interval of 20 ft.
  - Slope inclination between 4:1 and 2:1 (H:V): Fiber Rolls should be placed at a maximum interval of 15 ft. (a closer spacing is more effective).
  - Slope inclination 2:1 (H:V) or greater: Fiber Rolls should be placed at a maximum interval of 10 ft. (a closer spacing is more effective).
- Turn the ends of the fiber roll up slope to prevent runoff from going around the roll.
- Stake fiber rolls into a 2 to 4 in. deep trench with a width equal to the diameter of the fiber roll.
  - Drive stakes at the end of each fiber roll and spaced 4 ft maximum on center.
  - Use wood stakes with a nominal classification of 0.75 by 0.75 in. and minimum length of 24 in.
- If more than one fiber roll is placed in a row, the rolls should be overlapped, not abutted.

Removal

- Fiber rolls are typically left in place.

- If fiber rolls are removed, collect and dispose of sediment accumulation, and fill and compact holes, trenches, depressions or any other ground disturbance to blend with adjacent ground.

Costs

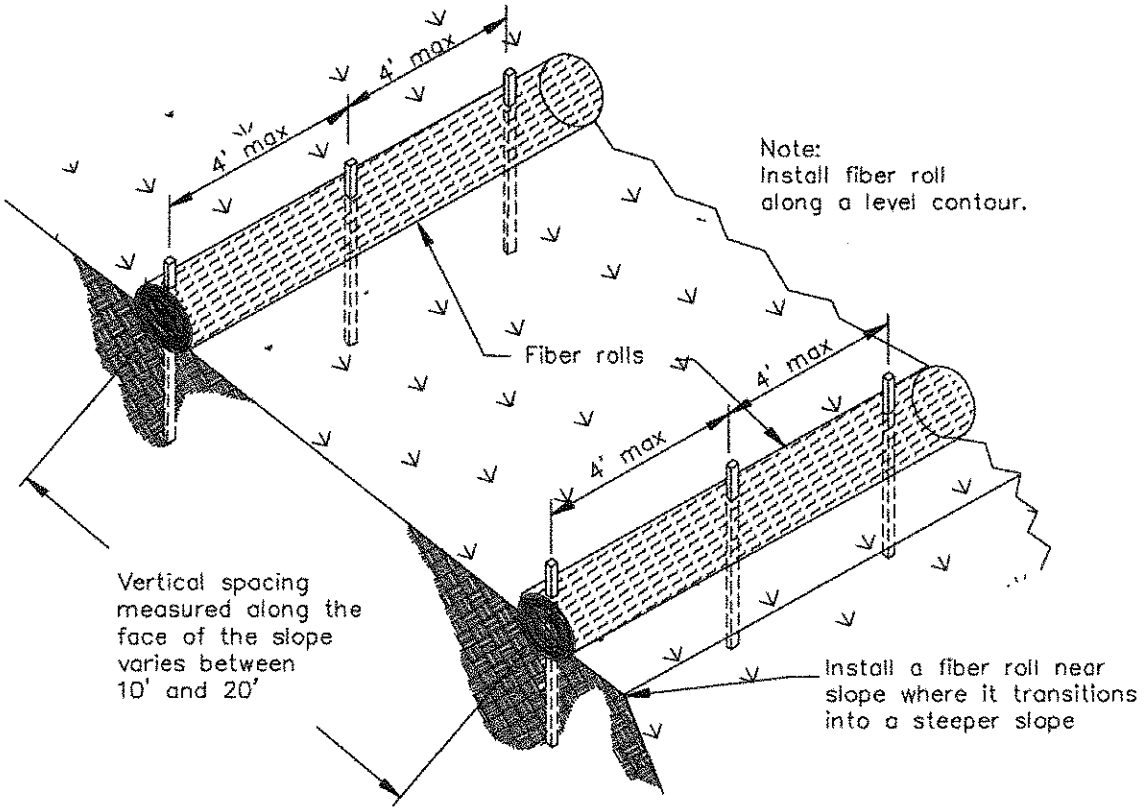
Material costs for fiber rolls range from $20 - $30 per 25 ft roll.

Inspection and Maintenance

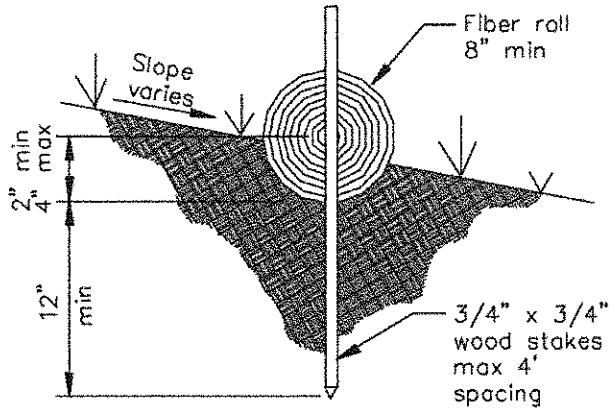
- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Repair or replace split, torn, unraveling, or slumping fiber rolls.
- If the fiber roll is used as a sediment capture device, or as an erosion control device to maintain sheet flows, sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage depth, usually one-half the distance between the top of the fiber roll and the adjacent ground surface. Sediment removed during maintenance may be incorporated into earthwork on the site of disposed at an appropriate location.
- If fiber rolls are used for erosion control, such as in a mini check dam, sediment removal should not be required as long as the system continues to control the grade. Sediment control BMPs will likely be required in conjunction with this type of application.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

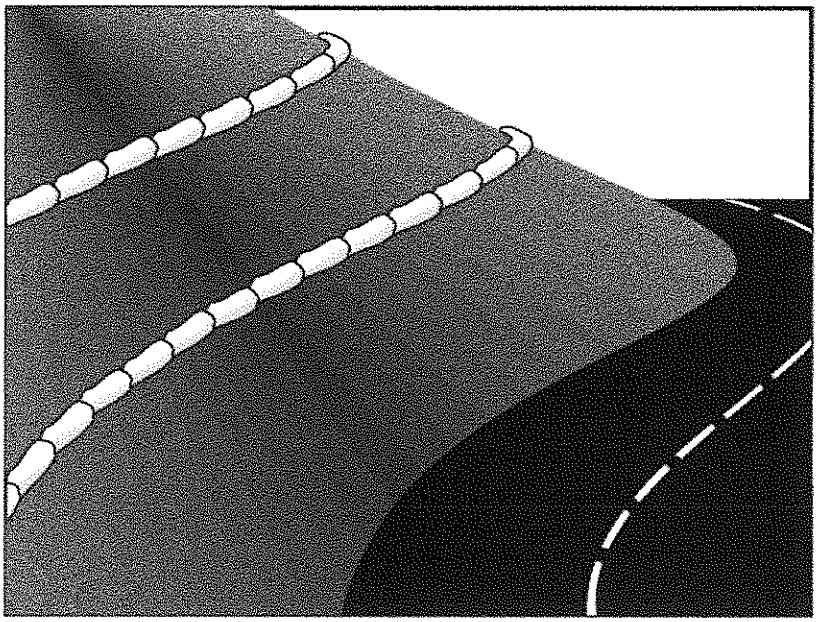


TYPICAL FIBER ROLL INSTALLATION
N.T.S.



ENTRENCHMENT DETAIL
N.T.S.

Gravel Bag Berm SE-6



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Roll

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flows, preventing erosion.

Suitable Applications

Gravel bag berms may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes
  - As sediment traps at culvert/pipe outlets
  - Below other small cleared areas
  - Along the perimeter of a site
  - Down slope of exposed soil areas
  - Around temporary stockpiles and spoil areas
  - Parallel to a roadway to keep sediment off paved areas
  - Along streams and channels
- As linear erosion control measure:

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- Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow
- At the top of slopes to divert runoff away from disturbed slopes
- As check dams across mildly sloped construction roads

Limitations

- Gravel berms may be difficult to remove.
- Removal problems limit their usefulness in landscaped areas.
- Gravel bag berm may not be appropriate for drainage areas greater than 5 acres.
- Runoff will pond upstream of the filter, possibly causing flooding if sufficient space does not exist.
- Degraded gravel bags may rupture when removed, spilling contents.
- Installation can be labor intensive.
- Berms may have limited durability for long-term projects.
- When used to detain concentrated flows, maintenance requirements increase.

Implementation

General

A gravel bag berm consists of a row of open graded gravel–filled bags placed on a level contour. When appropriately placed, a gravel bag berm intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding provides quiescent conditions allowing sediment to settle. The open graded gravel in the bags is porous, which allows the ponded runoff to flow slowly through the bags, releasing the runoff as sheet flows. Gravel bag berms also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets, which erode rills, and ultimately gullies, into disturbed, sloped soils. Gravel bag berms are similar to sand bag barriers, but are more porous.

Design and Layout

- Locate gravel bag berms on level contours.
  - Slopes between 20:1 and 2:1 (H:V): Gravel bags should be placed at a maximum interval of 50 ft (a closer spacing is more effective), with the first row near the slope toe.
  - Slopes 2:1 (H:V) or steeper: Gravel bags should be placed at a maximum interval of 25 ft (a closer spacing is more effective), with the first row placed the slope toe.
- Turn the ends of the gravel bag barriers up slope to prevent runoff from going around the berm.
- Allow sufficient space up slope from the gravel bag berm to allow ponding, and to provide room for sediment storage.

- For installation near the toe of the slope, consider moving the gravel bag barriers away from the slope toe to facilitate cleaning. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- In Non-Traffic Areas:
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Top width = 12 in. minimum for one or two layer construction
  - Side slopes = 2:1 or flatter
- In Construction Traffic Areas:
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Top width = 12 in. minimum for one or two layer construction.
  - Side slopes = 2:1 or flatter.
- Butt ends of bags tightly
- On multiple row, or multiple layer construction, overlapp butt joints of adjacent row and row beneath.
- Use a pyramid approach when stacking bags.

Materials

- ***Bag Material:*** Bags should be woven polypropylene, polyethylene or polyamide fabric or burlap, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355.
- ***Bag Size:*** Each gravel-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.
- ***Fill Material:*** Fill material should be 0.5 to 1 in. Class 2 aggregate base, clean and free from clay, organic matter, and other deleterious material, or other suitable open graded, non-cohesive, porous gravel.

Costs

Gravel filter: Expensive, since off-site materials, hand construction, and demolition/removal are usually required. Material costs for gravel bags are average of $2.50 per empty gravel bag. Gravel costs range from $20-$35 per yd^3.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.
- Gravel bags exposed to sunlight will need to be replaced every two to three months due to degrading of the bags.
- Reshape or replace gravel bags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site or disposed at an appropriate location.
- Remove gravel bag berms when no longer needed. Remove sediment accumulation and clean, re-grade, and stabilize the area. Removed sediment should be incorporated in the project or disposed of.

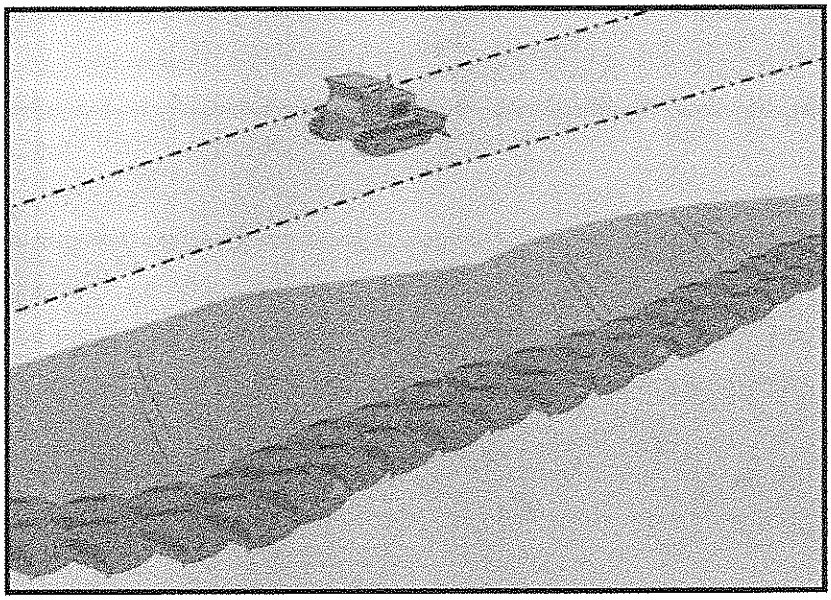
References

Handbook of Steel Drainage and Highway Construction, American Iron and Steel Institute, 1983.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Pollution Plan Handbook, First Edition, State of California, Department of Transportation Division of New Technology, Materials and Research, October 1992.

Sandbag Barrier SE-8



Categories

EC	Erosion Control	☒
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:
☑ **Primary Category**
☒ **Secondary Category**

Description and Purpose

A sandbag barrier is a series of sand-filled bags placed on a level contour to intercept or to divert sheet flows. Sandbag barriers placed on a level contour pond sheet flow runoff, allowing sediment to settle out.

Suitable Applications

Sandbag barriers may be suitable:

- As a linear sediment control measure:
  - Below the toe of slopes and erodible slopes.
  - As sediment traps at culvert/pipe outlets.
  - Below other small cleared areas.
  - Along the perimeter of a site.
  - Down slope of exposed soil areas.
  - Around temporary stockpiles and spoil areas.
  - Parallel to a roadway to keep sediment off paved areas.
  - Along streams and channels.
- As linear erosion control measure:
  - Along the face and at grade breaks of exposed and erodible slopes to shorten slope length and spread runoff as sheet flow.

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-14 Biofilter Bags

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- At the top of slopes to divert runoff away from disturbed slopes.
- As check dams across mildly sloped construction roads.

Limitations

- It is necessary to limit the drainage area upstream of the barrier to 5 acres.
- Sandbags are not intended to be used as filtration devices.
- Easily damaged by construction equipment.
- Degraded sandbags may rupture when removed, spilling sand.
- Sand is easily transported by runoff if bag is damaged or ruptured.
- Installation can be labor intensive.
- Durability of sandbags is somewhat limited and bags may need to be replaced when installation is required for longer than 6 months. When used to detain concentrated flows, maintenance requirements increase.
- Burlap should not be used for sandbags.

Implementation

General

A sandbag barrier consists of a row of sand-filled bags placed on a level contour. When appropriately placed, a sandbag barrier intercepts and slows sheet flow runoff, causing temporary ponding. The temporary ponding allows sediment to settle. Sand-filled bags have limited porosity, which is further limited as the fine sand tends to quickly plug with sediment, limiting or completely blocking the rate of flow through the barrier. If a porous barrier is desired, consider SE-1, Silt Fence, SE-5, Fiber Rolls, SE-6, Gravel Bag Berms or SE-14, Biofilter Bags. Sandbag barriers also interrupt the slope length and thereby reduce erosion by reducing the tendency of sheet flows to concentrate into rivulets which erode rills, and ultimately gullies, into disturbed, sloped soils. Sandbag barriers are similar to gravel bag berms, but less porous. Generally, sandbag barriers should be used in conjunction with temporary soil stabilization controls up slope to provide effective erosion and sediment control.

Design and Layout

- Locate sandbag barriers on a level contour.
- When used for slope interruption, the following slope/sheet flow length combinations apply:
  - Slope inclination of 4:1 (H:V) or flatter: Sandbags should be placed at a maximum interval of 20 ft, with the first row near the slope toe.
  - Slope inclination between 4:1 and 2:1 (H:V): Sandbags should be placed at a maximum interval of 15 ft. (a closer spacing is more effective), with the first row near the slope toe.

    Slope inclination 2:1 (H:V) or greater: Sandbags should be placed at a maximum interval of 10 ft. (a closer spacing is more effective), with the first row near the slope toe.

- Turn the ends of the sandbag barrier up slope to prevent runoff from going around the barrier.
- Allow sufficient space up slope from the barrier to allow ponding, and to provide room for sediment storage.
- For installation near the toe of the slope, sand bag barriers should be set back from the slope toe to facilitate cleaning. Where specific site conditions do not allow for a set-back, the sand bag barrier may be constructed on the toe of the slope. To prevent flows behind the barrier, bags can be placed perpendicular to a berm to serve as cross barriers.
- Drainage area should not exceed 5 acres.
- Stack sandbags at least three bags high.
- Butt ends of bags tightly.
- Overlap butt joints of row beneath with each successive row.
- Use a pyramid approach when stacking bags.
- In non-traffic areas
  - Height = 18 in. maximum
  - Top width = 24 in. minimum for three or more layer construction
  - Side slope = 2:1 (H:V) or flatter
- In construction traffic areas
  - Height = 12 in. maximum
  - Top width = 24 in. minimum for three or more layer construction.
  - Side slopes = 2:1 (H:V) or flatter.
- See typical sandbag barrier installation details at the end of this fact sheet.

Materials

- ***Sandbag Material:*** Sandbag should be woven polypropylene, polyethylene or polyamide fabric, minimum unit weight of 4 ounces/yd^2, Mullen burst strength exceeding 300 lb/in^2 in conformance with the requirements in ASTM designation D3786, and ultraviolet stability exceeding 70% in conformance with the requirements in ASTM designation D4355. Use of burlap is not an acceptable substitute, as sand can more easily mobilize out of burlap.
- ***Sandbag Size:*** Each sand-filled bag should have a length of 18 in., width of 12 in., thickness of 3 in., and mass of approximately 33 lbs. Bag dimensions are nominal, and may vary based on locally available materials.

- ***Fill Material:*** All sandbag fill material should be non-cohesive, Class 3 (Caltrans Standard Specification, Section 25) permeable material free from clay and deleterious material, such as recycled concrete or asphalt..

Costs

Empty sandbags cost $0.25 - $0.75. Average cost of fill material is $8 per yd^3. Additional labor is required to fill the bags. Pre-filled sandbags are more expensive at $1.50 - $2.00 per bag. These costs are based upon vendor research.

Inspection and Maintenance

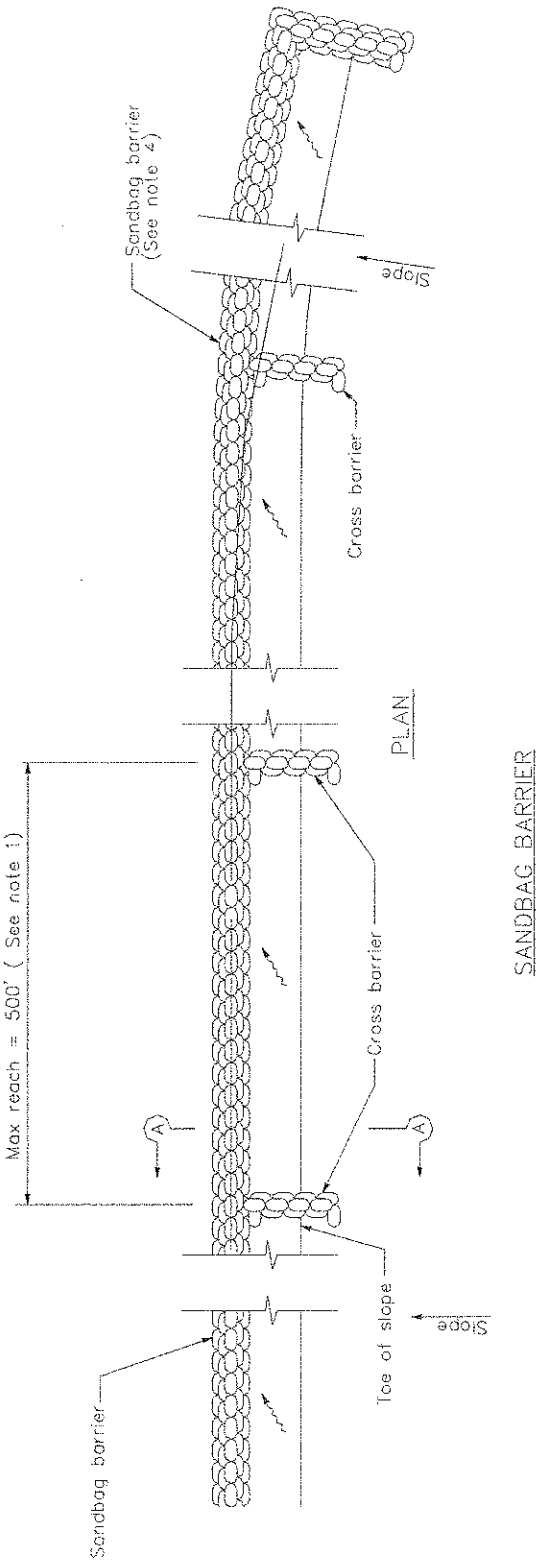
- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Sandbags exposed to sunlight will need to be replaced every two to three months due to degradation of the bags.
- Reshape or replace sandbags as needed.
- Repair washouts or other damage as needed.
- Sediment that accumulates behind the BMP should be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height.
- Remove sandbags when no longer needed and recycle sand fill whenever possible and properly dispose of bag material. Remove sediment accumulation, and clean, re-grade, and stabilize the area.

References

Standard Specifications for Construction of Local Streets and Roads, California Department of Transportation (Caltrans), July 2002.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), March 2003.

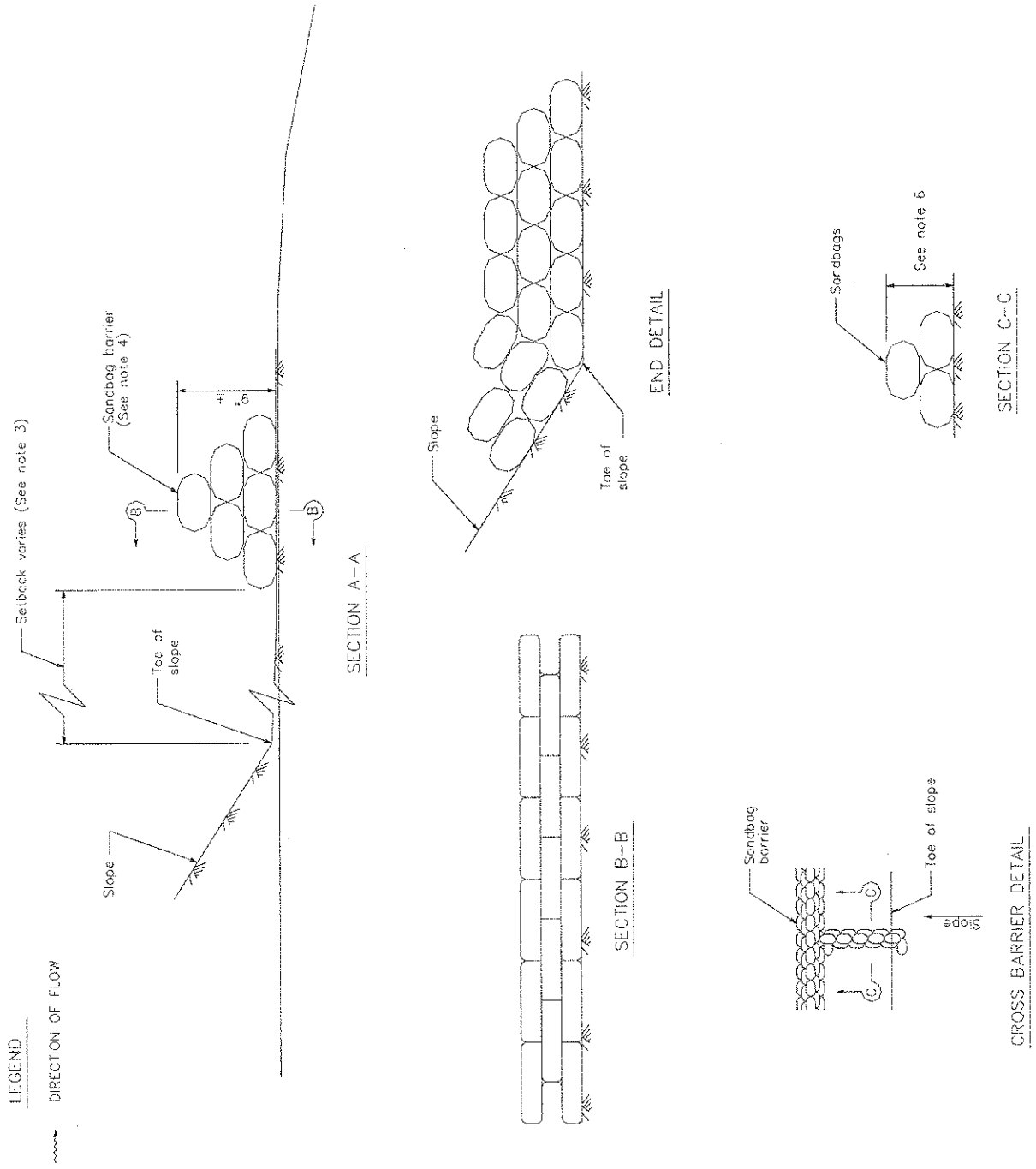
Erosion and Sediment Control Manual, Oregon Department of Environmental Quality, February 2005.



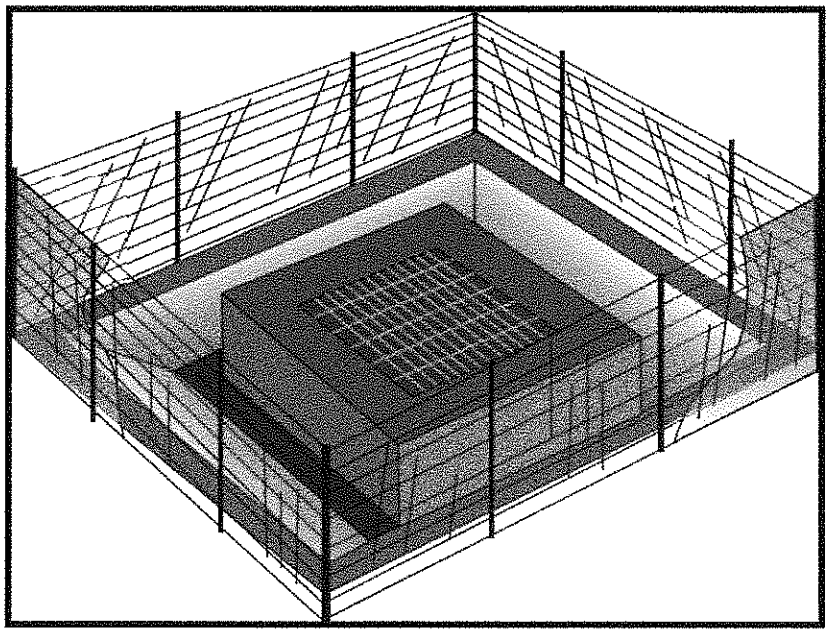
SANDBAG BARRIER

NOTES

1. Construct the length of each reach so that the change in base elevation along the reach does not exceed 1/2 the height of the linear barrier. In no case shall the reach length exceed 500'.
2. Place sandbags tightly.
3. Dimension may vary to fit field condition.
4. Sandbag barrier shall be a minimum of 3 bags high.
5. The end of the barrier shall be turned up slope.
6. Cross barriers shall be a min of 1/2 and a max of 2/3 the height of the linear barrier.
7. Sandbag rows and layers shall be staggered to eliminate gaps.


LEGEND
DIRECTION OF FLOW
Setback varies (See note 3)
Sandbag barrier (See note 4)
Toe of slope
Slope
SECTION A-A
SECTION B-B
Slope
Toe of slope
END DETAIL
Sandbags
See note 6
SECTION C-C
Sandbag barrier
Toe of slope
CROSS BARRIER DETAIL

Storm Drain Inlet Protection SE-10



Objectives

EC	Erosion Control	
SE	Sediment Control	☑
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-1 Silt Fence

SE-5 Fiber Rolls

SE-6 Gravel Bag Berm

SE-8 Sandbag Barrier

SE-9 Straw Bale Barrier

Description and Purpose

Storm drain inlet protection consists of a sediment filter or an impounding area around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction.

Suitable Applications

Every storm drain inlet receiving sediment-laden runoff should be protected.

Limitations

- Drainage area should not exceed 1 acre.
- Straw bales, while potentially effective, have not produced in practice satisfactory results, primarily due to improper installation.
- Requires an adequate area for water to pond without encroaching into portions of the roadway subject to traffic.
- Inlet protection usually requires other methods of temporary protection to prevent sediment-laden stormwater and non-stormwater discharges from entering the storm drain system.
- Sediment removal may be difficult in high flow conditions or if runoff is heavily sediment laden. If high flow conditions are

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expected, use other onsite sediment trapping techniques in conjunction with inlet protection.

- Frequent maintenance is required.
- For drainage areas larger than 1 acre, runoff should be routed to a sediment-trapping device designed for larger flows. See BMPs SE-2, Sediment Basin, and SE-3, Sediment Traps.
- Excavated drop inlet sediment traps are appropriate where relatively heavy flows are expected, and overflow capability is needed.

Implementation

General

Large amounts of sediment may enter the storm drain system when storm drains are installed before the upslope drainage area is stabilized, or where construction is adjacent to an existing storm drain. In cases of extreme sediment loading, the storm drain itself may clog and lose a major portion of its capacity. To avoid these problems, it is necessary to prevent sediment from entering the system at the inlets.

Inlet control measures presented in this handbook should not be used for inlets draining more than one acre. Runoff from larger disturbed areas should be first routed through SE-2, Sediment Basin or SE-3, Sediment Trap. Different types of inlet protection are appropriate for different applications depending on site conditions and the type of inlet. Inlet protection methods not presented in this handbook should be approved by the local stormwater management agency.

Design and Layout

Identify existing and planned storm drain inlets that have the potential to receive sediment-laden surface runoff. Determine if storm drain inlet protection is needed and which method to use.

- Limit upstream drainage area to 1 acre maximum. For larger drainage areas, use SE-2, Sediment Basin, or SE-3, Sediment Trap, upstream of the inlet protection device.
- The key to successful and safe use of storm drain inlet protection devices is to know where runoff will pond or be diverted.
  - Determine the acceptable location and extent of ponding in the vicinity of the drain inlet. The acceptable location and extent of ponding will influence the type and design of the storm drain inlet protection device.
  - Determine the extent of potential runoff diversion caused by the storm drain inlet protection device. Runoff ponded by inlet protection devices may flow around the device and towards the next downstream inlet. In some cases, this is acceptable; in other cases, serious erosion or downstream property damage can be caused by these diversions. The possibility of runoff diversions will influence whether or not storm drain inlet protection is suitable; and, if suitable, the type and design of the device.
- The location and extent of ponding, and the extent of diversion, can usually be controlled through appropriate placement of the inlet protection device. In some cases, moving the

inlet protection device a short distance upstream of the actual inlet can provide more efficient sediment control, limit ponding to desired areas, and prevent or control diversions.

- Four types of inlet protection are presented below. However, it is recognized that other effective methods and proprietary devices exist and may be selected.
  - Filter Fabric Fence: Appropriate for drainage basins with less than a 5% slope, sheet flows, and flows under 0.5 cfs.
  - Excavated Drop Inlet Sediment Trap: An excavated area around the inlet to trap sediment (SE-3).
  - Gravel bag barrier: Used to create a small sediment trap upstream of inlets on sloped, paved streets. Appropriate for sheet flow or when concentrated flow may exceed 0.5 cfs, and where overtopping is required to prevent flooding.
  - Block and Gravel Filter: Appropriate for flows greater than 0.5 cfs.
- Select the appropriate type of inlet protection and design as referred to or as described in this fact sheet.
- Provide area around the inlet for water to pond without flooding structures and property.
- Grates and spaces around all inlets should be sealed to prevent seepage of sediment-laden water.
- Excavate sediment sumps (where needed) 1 to 2 ft with 2:1 side slopes around the inlet.

Installation

- ***DI Protection Type 1 - Filter Fabric Fence*** - The filter fabric fence (Type 1) protection is shown in the attached figure. Similar to constructing a silt fence; see BMP SE-1, Silt Fence. Do not place filter fabric underneath the inlet grate since the collected sediment may fall into the drain inlet when the fabric is removed or replaced.
  1. Excavate a trench approximately 6 in. wide and 6 in. deep along the line of the silt fence inlet protection device.
  2. Place 2 in. by 2 in. wooden stakes around the perimeter of the inlet a maximum of 3 ft apart and drive them at least 18 in. into the ground or 12 in. below the bottom of the trench. The stakes must be at least 48 in.
  3. Lay fabric along bottom of trench, up side of trench, and then up stakes. See SE-1, Silt Fence, for details. The maximum silt fence height around the inlet is 24 in.
  4. Staple the filter fabric (for materials and specifications, see SE-1, Silt Fence) to wooden stakes. Use heavy-duty wire staples at least 1 in. in length.
  5. Backfill the trench with gravel or compacted earth all the way around.
- ***DI Protection Type 2 - Excavated Drop Inlet Sediment Trap*** - The excavated drop inlet sediment trap (Type 2) is shown in the attached figures. Install filter fabric fence in

accordance with DI Protection Type 1. Size excavated trap to provide a minimum storage capacity calculated at the rate 67 yd^3/acre of drainage area.

- ***DI Protection Type 3 - Gravel bag*** - The gravel bag barrier (Type 3) is shown in the figures. Flow from a severe storm should not overtop the curb. In areas of high clay and silts, use filter fabric and gravel as additional filter media. Construct gravel bags in accordance with SE-6, Gravel Bag Berm. Gravel bags should be used due to their high permeability.

  1. Use sand bag made of geotextile fabric (not burlap) and fill with 0.75 in. rock or 0.25 in. pea gravel.
  2. Construct on gently sloping street.
  3. Leave room upstream of barrier for water to pond and sediment to settle.
  4. Place several layers of sand bags – overlapping the bags and packing them tightly together.
  5. Leave gap of one bag on the top row to serve as a spillway. Flow from a severe storm (e.g., 10 year storm) should not overtop the curb.

- ***DI Protection Type 4 – Block and Gravel Filter*** - The block and gravel filter (Type 4) is shown in the figures. Block and gravel filters are suitable for curb inlets commonly used in residential, commercial, and industrial construction.

  1. Place hardware cloth or comparable wire mesh with 0.5 in. openings over the drop inlet so that the wire extends a minimum of 1 ft beyond each side of the inlet structure. If more than one strip is necessary, overlap the strips. Place filter fabric over the wire mesh.
  2. Place concrete blocks lengthwise on their sides in a single row around the perimeter of the inlet, so that the open ends face outward, not upward. The ends of adjacent blocks should abut. The height of the barrier can be varied, depending on design needs, by stacking combinations of blocks that are 4 in., 8 in., and 12 in. wide. The row of blocks should be at least 12 in. but no greater than 24 in. high.
  3. Place wire mesh over the outside vertical face (open end) of the concrete blocks to prevent stone from being washed through the blocks. Use hardware cloth or comparable wire mesh with 0.5 in. opening.
  4. Pile washed stone against the wire mesh to the top of the blocks. Use 0.75 to 3 in.

Costs

- Average annual cost for installation and maintenance (one year useful life) is $200 per inlet.

Inspection and Maintenance

- Inspect BMPs prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

- Filter Fabric Fences. If the fabric becomes clogged, torn, or degrades, it should be replaced. Make sure the stakes are securely driven in the ground and are in good shape (i.e., not bent, cracked, or splintered, and are reasonably perpendicular to the ground). Replace damaged stakes.

- Gravel Filters. If the gravel becomes clogged with sediment, it must be carefully removed from the inlet and either cleaned or replaced. Since cleaning gravel at a construction site may be difficult, consider using the sediment-laden stone as fill material and put fresh stone around the inlet. Inspect bags for holes, gashes, and snags, and replace bags as needed. Check gravel bags for proper arrangement and displacement.

- Sediment that accumulates in the BMP must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when the sediment accumulation reaches one-third of the barrier height. Sediment removed during maintenance may be incorporated into earthwork on the site ore disposed at an appropriate location.

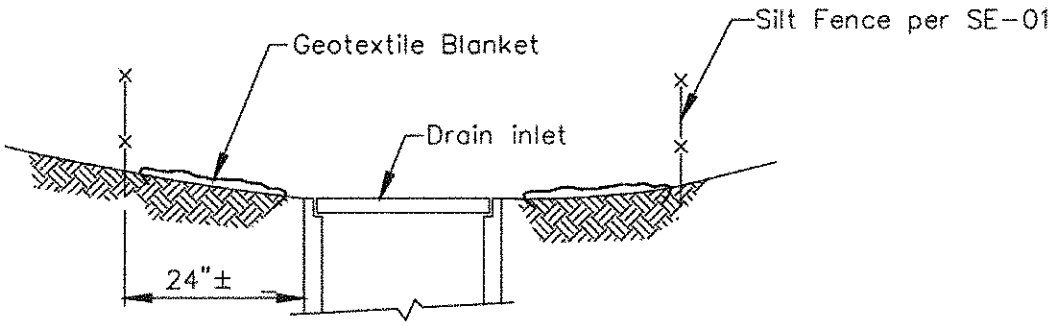
- Remove storm drain inlet protection once the drainage area is stabilized.

  - Clean and regrade area around the inlet and clean the inside of the storm drain inlet as it must be free of sediment and debris at the time of final inspection.

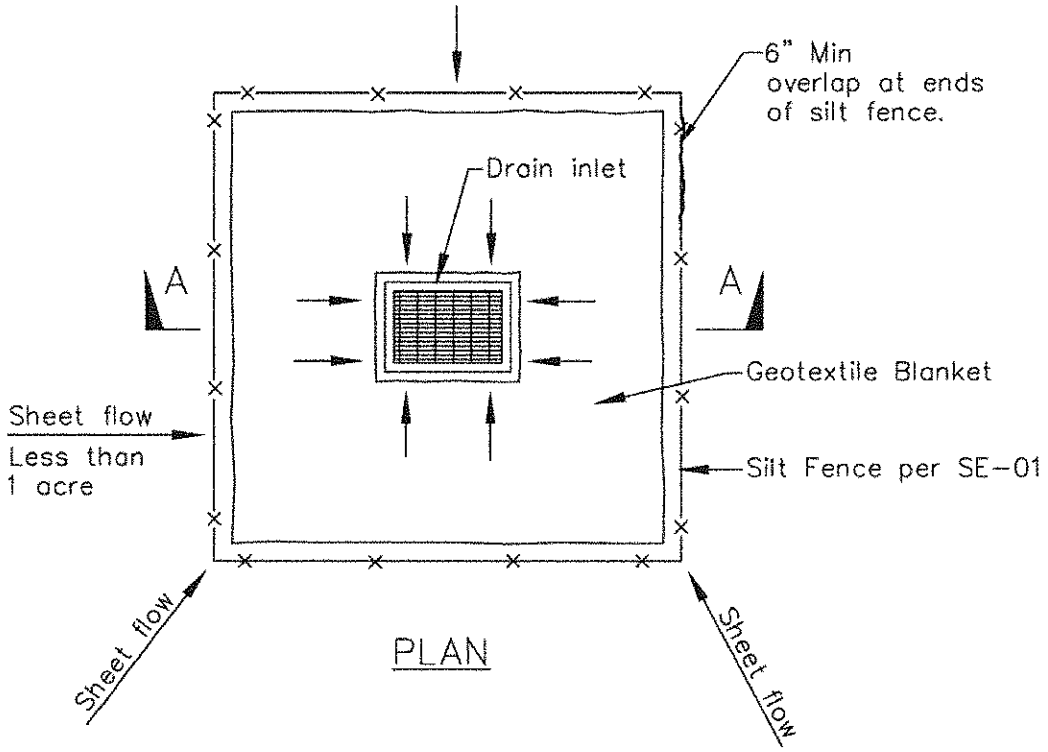
References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management Manual for The Puget Sound Basin, Washington State Department of Ecology, Public Review Draft, 1991.



SECTION A–A

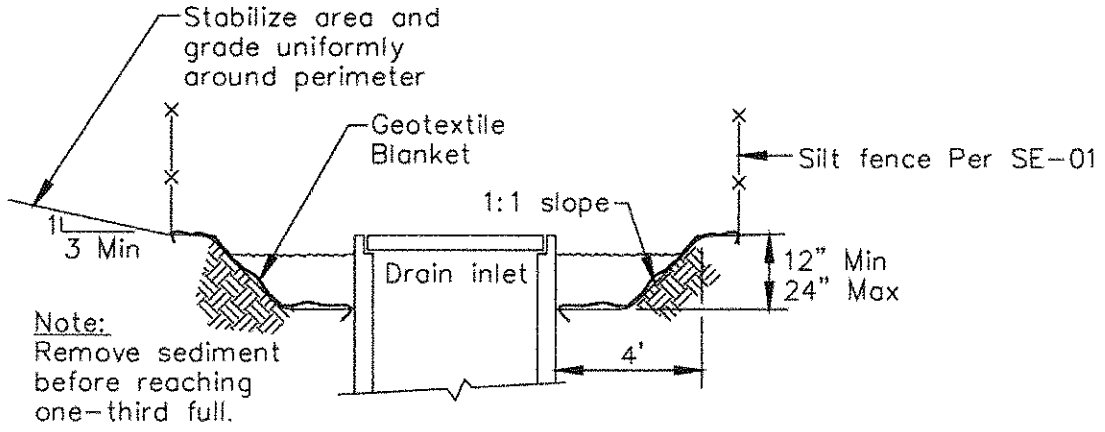


PLAN

DI PROTECTION TYPE 1
NOT TO SCALE

NOTES:

1. For use in areas where grading has been completed and final soil stabilization and seeding are pending.
2. Not applicable in paved areas.
3. Not applicable with concentrated flows.



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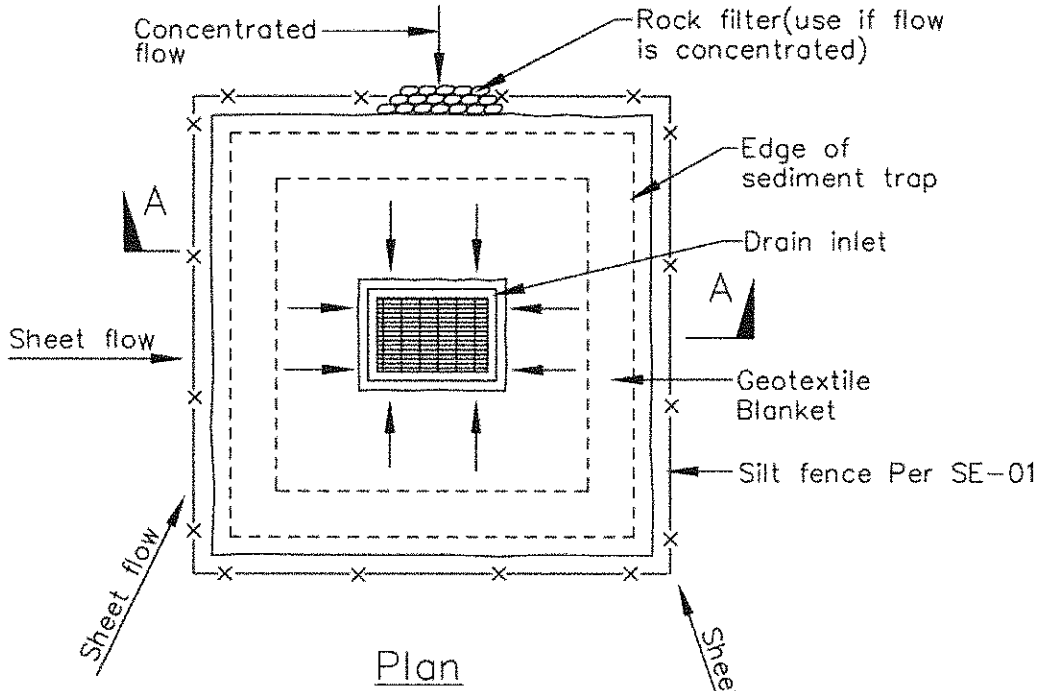
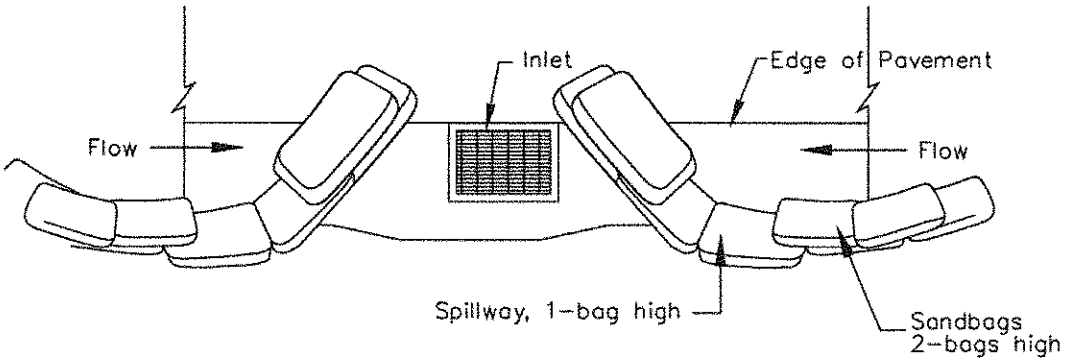


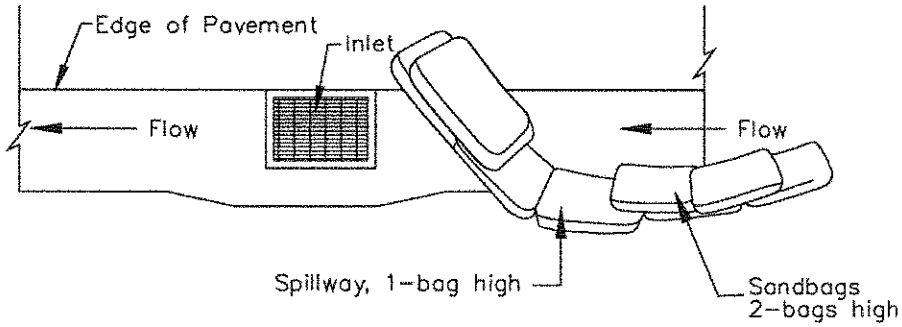
Plan

DI PROTECTION TYPE 2
NOT TO SCALE

Notes
1. For use in cleared and grubbed and in graded areas.
2. Shape basin so that longest inflow area faces longest length of trap.
3. For concentrated flows, shape basin in 2:1 ratio with length oriented towards direction of flow.



TYPICAL PROTECTION FOR INLET ON SUMP

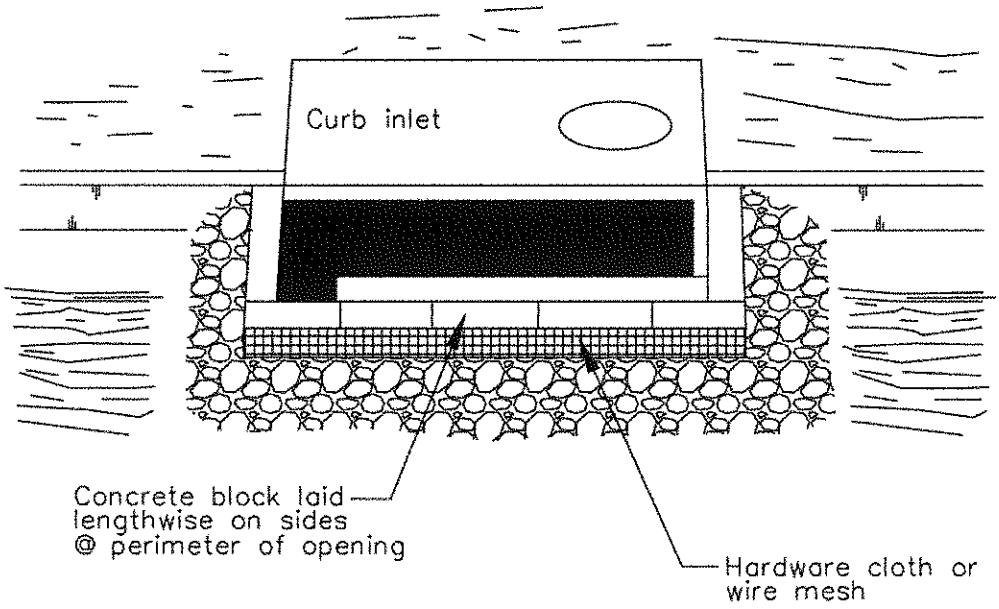


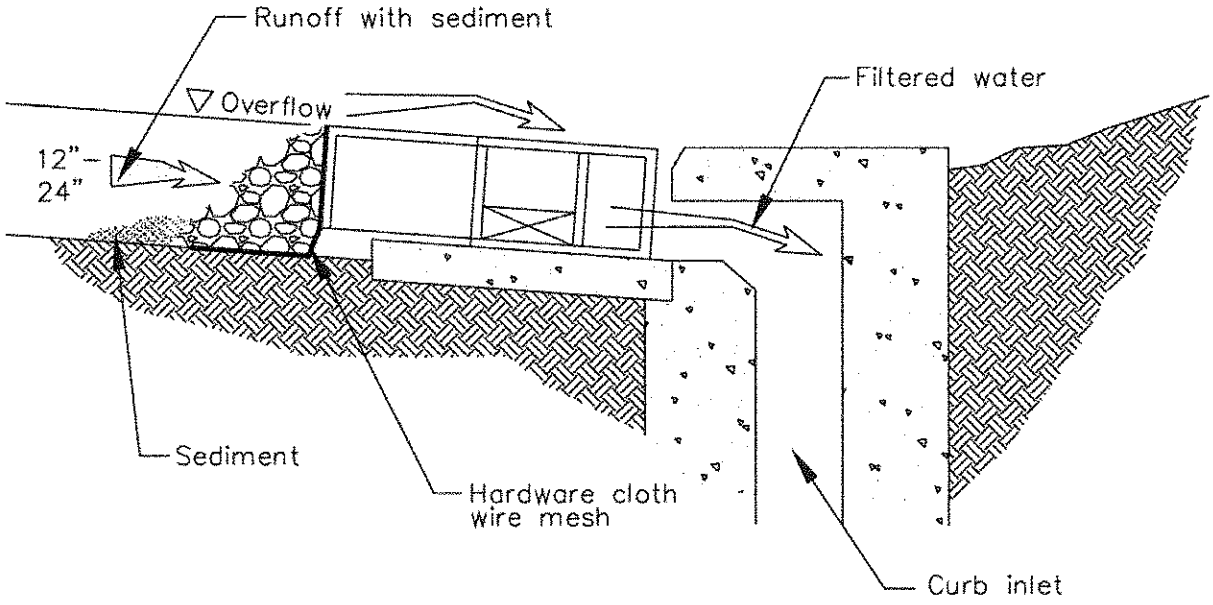
TYPICAL PROTECTION FOR INLET ON GRADE

NOTES:

1. Intended for short-term use.
2. Use to inhibit non-storm water flow.
3. Allow for proper maintenance and cleanup.
4. Bags must be removed after adjacent operation is completed
5. Not applicable in areas with high silts and clays without filter fabric.

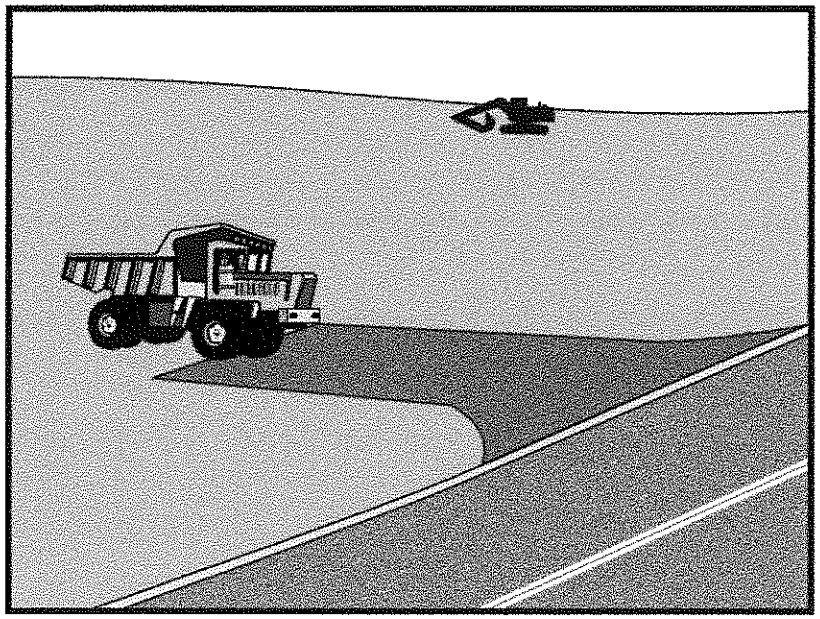
DI PROTECTION TYPE 3
NOT TO SCALE





DI PROTECTION – TYPE 4
NOT TO SCALE

Stabilized Construction Entrance/Exit TC-1



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

A stabilized construction access is defined by a point of entrance/exit to a construction site that is stabilized to reduce the tracking of mud and dirt onto public roads by construction vehicles.

Suitable Applications

Use at construction sites:

- Where dirt or mud can be tracked onto public roads.
- Adjacent to water bodies.
- Where poor soils are encountered.
- Where dust is a problem during dry weather conditions.

Limitations

- Entrances and exits require periodic top dressing with additional stones.
- This BMP should be used in conjunction with street sweeping on adjacent public right of way.
- Entrances and exits should be constructed on level ground only.
- Stabilized construction entrances are rather expensive to construct and when a wash rack is included, a sediment trap of some kind must also be provided to collect wash water runoff.

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Stabilized Construction Entrance/Exit TC-1

Implementation

General

A stabilized construction entrance is a pad of aggregate underlain with filter cloth located at any point where traffic will be entering or leaving a construction site to or from a public right of way, street, alley, sidewalk, or parking area. The purpose of a stabilized construction entrance is to reduce or eliminate the tracking of sediment onto public rights of way or streets. Reducing tracking of sediments and other pollutants onto paved roads helps prevent deposition of sediments into local storm drains and production of airborne dust.

Where traffic will be entering or leaving the construction site, a stabilized construction entrance should be used. NPDES permits require that appropriate measures be implemented to prevent tracking of sediments onto paved roadways, where a significant source of sediments is derived from mud and dirt carried out from unpaved roads and construction sites.

Stabilized construction entrances are moderately effective in removing sediment from equipment leaving a construction site. The entrance should be built on level ground. Advantages of the Stabilized Construction Entrance/Exit is that it does remove some sediment from equipment and serves to channel construction traffic in and out of the site at specified locations. Efficiency is greatly increased when a washing rack is included as part of a stabilized construction entrance/exit.

Design and Layout

- Construct on level ground where possible.
- Select 3 to 6 in. diameter stones.
- Use minimum depth of stones of 12 in. or as recommended by soils engineer.
- Construct length of 50 ft minimum, and 30 ft minimum width.
- Rumble racks constructed of steel panels with ridges and installed in the stabilized entrance/exit will help remove additional sediment and to keep adjacent streets clean.
- Provide ample turning radii as part of the entrance.
- Limit the points of entrance/exit to the construction site.
- Limit speed of vehicles to control dust.
- Properly grade each construction entrance/exit to prevent runoff from leaving the construction site.
- Route runoff from stabilized entrances/exits through a sediment trapping device before discharge.
- Design stabilized entrance/exit to support heaviest vehicles and equipment that will use it.
- Select construction access stabilization (aggregate, asphaltic concrete, concrete) based on longevity, required performance, and site conditions. Do not use asphalt concrete (AC) grindings for stabilized construction access/roadway.

- If aggregate is selected, place crushed aggregate over geotextile fabric to at least 12 in. depth, or place aggregate to a depth recommended by a geotechnical engineer. A crushed aggregate greater than 3 in. but smaller than 6 in. should be used.
- Designate combination or single purpose entrances and exits to the construction site.
- Require that all employees, subcontractors, and suppliers utilize the stabilized construction access.
- Implement SE-7, Street Sweeping and Vacuuming, as needed.
- All exit locations intended to be used for more than a two-week period should have stabilized construction entrance/exit BMPs.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMPs are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect local roads adjacent to the site daily. Sweep or vacuum to remove visible accumulated sediment.
- Remove aggregate, separate and dispose of sediment if construction entrance/exit is clogged with sediment.
- Keep all temporary roadway ditches clear.
- Check for damage and repair as needed.
- Replace gravel material when surface voids are visible.
- Remove all sediment deposited on paved roadways within 24 hours.
- Remove gravel and filter fabric at completion of construction

Costs

Average annual cost for installation and maintenance may vary from $1,200 to $4,800 each, averaging $2,400 per entrance. Costs will increase with addition of washing rack, and sediment trap. With wash rack, costs range from $1,200 - $6,000 each, averaging $3,600 per entrance.

References

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

National Management Measures to Control Nonpoint Source Pollution from Urban Areas, USEPA Agency, 2002.

Proposed Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters, Work Group Working Paper, USEPA, April 1992.

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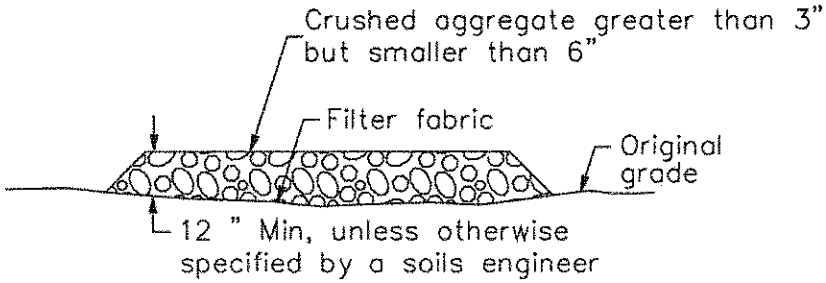
Stormwater Management of the Puget Sound Basin, Technical Manual, Publication #91-75, Washington State Department of Ecology, February 1992.

Virginia Erosion and Sedimentation Control Handbook, Virginia Department of Conservation and Recreation, Division of Soil and Water Conservation, 1991.

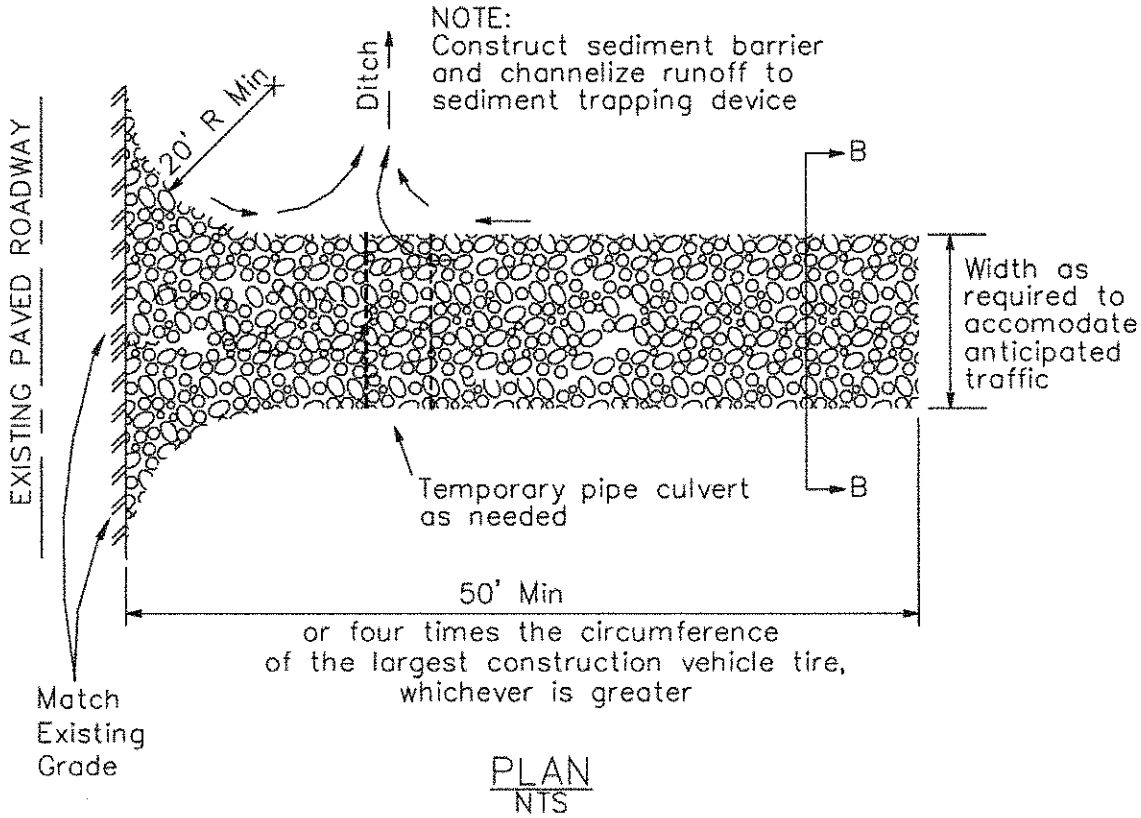
Guidance Specifying Management Measures for Nonpoint Pollution in Coastal Waters, EPA 840-B-9-002, USEPA, Office of Water, Washington, DC, 1993.

Water Quality Management Plan for the Lake Tahoe Region, Volume II, Handbook of Management Practices, Tahoe Regional Planning Agency, November 1988.

Stabilized Construction Entrance/Exit TC-1

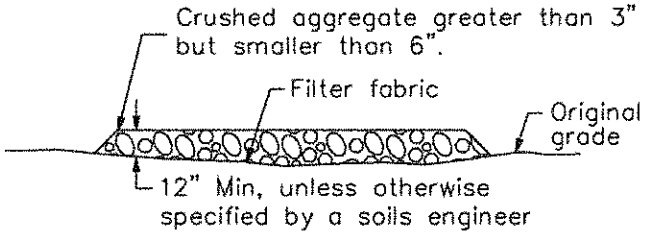


SECTION B–B
NTS



PLAN
NTS

Stabilized Construction Entrance/Exit TC-1



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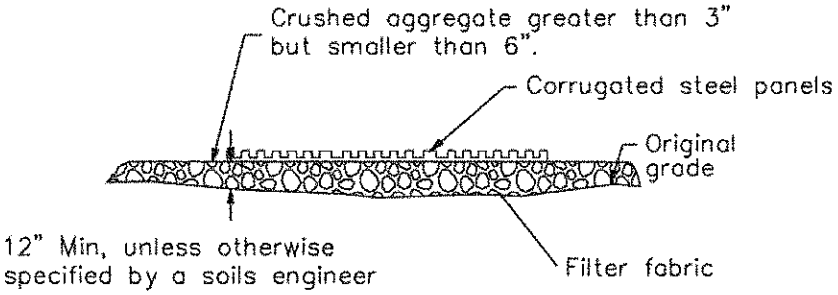

SECTION A–A
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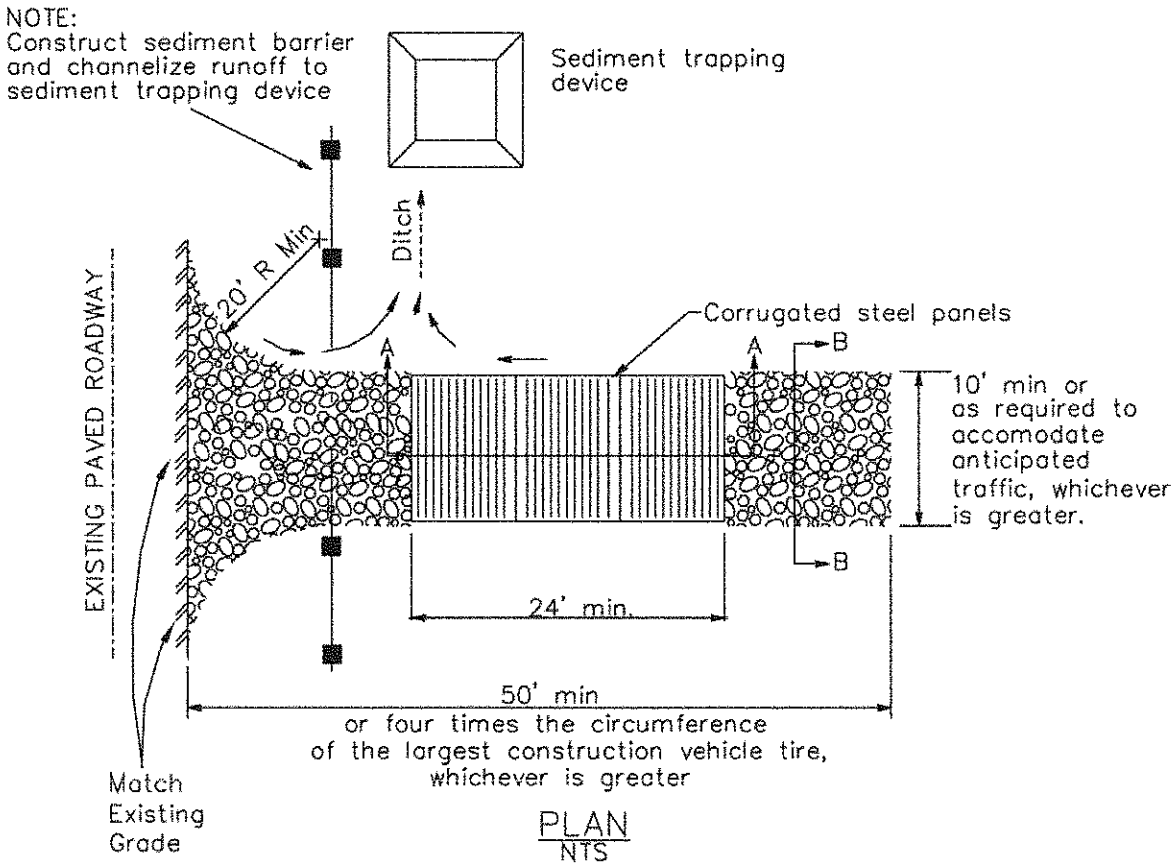

PLAN
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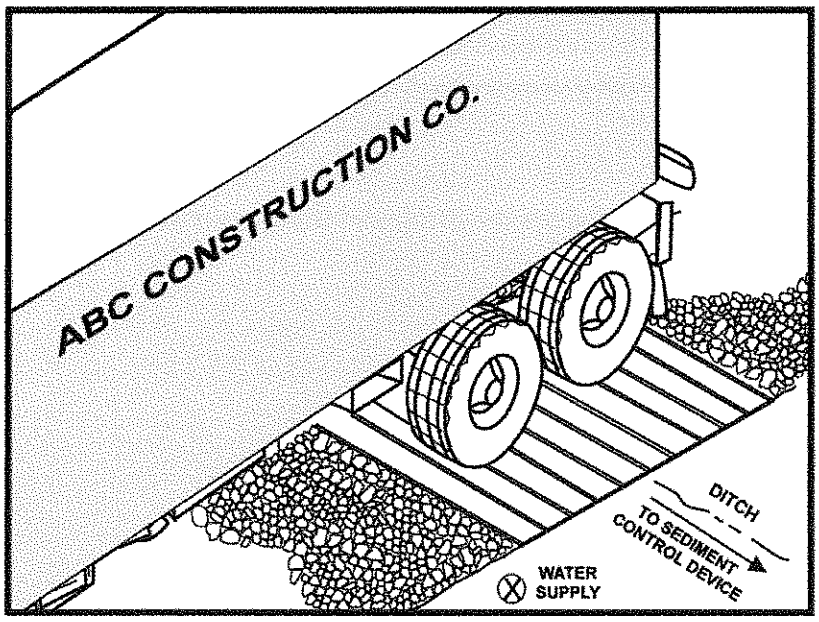
Entrance/Outlet Tire Wash TC-3



Objectives

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	☑
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

TC-1 Stabilized Construction Entrance/Exit

Description and Purpose

A tire wash is an area located at stabilized construction access points to remove sediment from tires and under carriages and to prevent sediment from being transported onto public roadways.

Suitable Applications

Tire washes may be used on construction sites where dirt and mud tracking onto public roads by construction vehicles may occur.

Limitations

- The tire wash requires a supply of wash water.
- A turnout or doublewide exit is required to avoid having entering vehicles drive through the wash area.
- Do not use where wet tire trucks leaving the site leave the road dangerously slick.

Implementation

- Incorporate with a stabilized construction entrance/exit. See TC-1, Stabilized Construction Entrance/Exit.
- Construct on level ground when possible, on a pad of coarse aggregate greater than 3 in. but smaller than 6 in. A geotextile fabric should be placed below the aggregate.
- Wash rack should be designed and constructed/manufactured for anticipated traffic loads.

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- Provide a drainage ditch that will convey the runoff from the wash area to a sediment trapping device. The drainage ditch should be of sufficient grade, width, and depth to carry the wash runoff.
- Use hoses with automatic shutoff nozzles to prevent hoses from being left on.
- Require that all employees, subcontractors, and others that leave the site with mud caked tires and undercarriages to use the wash facility.
- Implement SC-7, Street Sweeping and Vacuuming, as needed.

Costs

Costs are low for installation of wash rack.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.
- Remove accumulated sediment in wash rack and/or sediment trap to maintain system performance.
- Inspect routinely for damage and repair as needed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

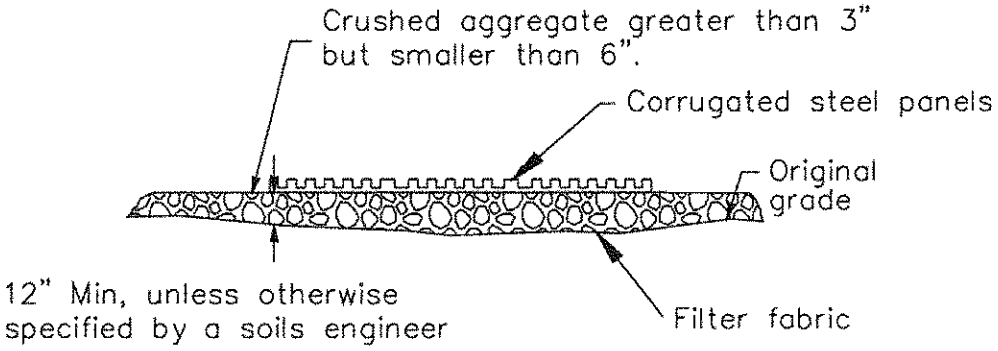
Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Manual of Standards of Erosion and Sediment Control Measures, Association of Bay Area Governments, May 1995.

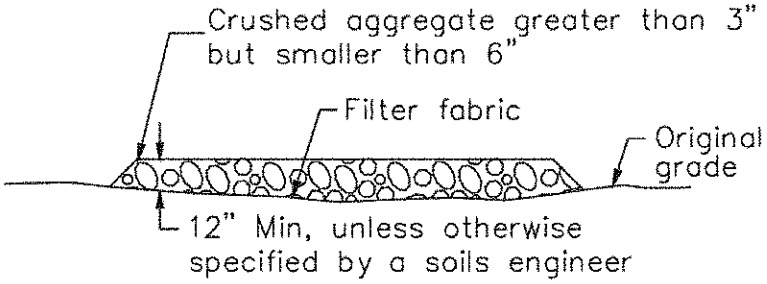
Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

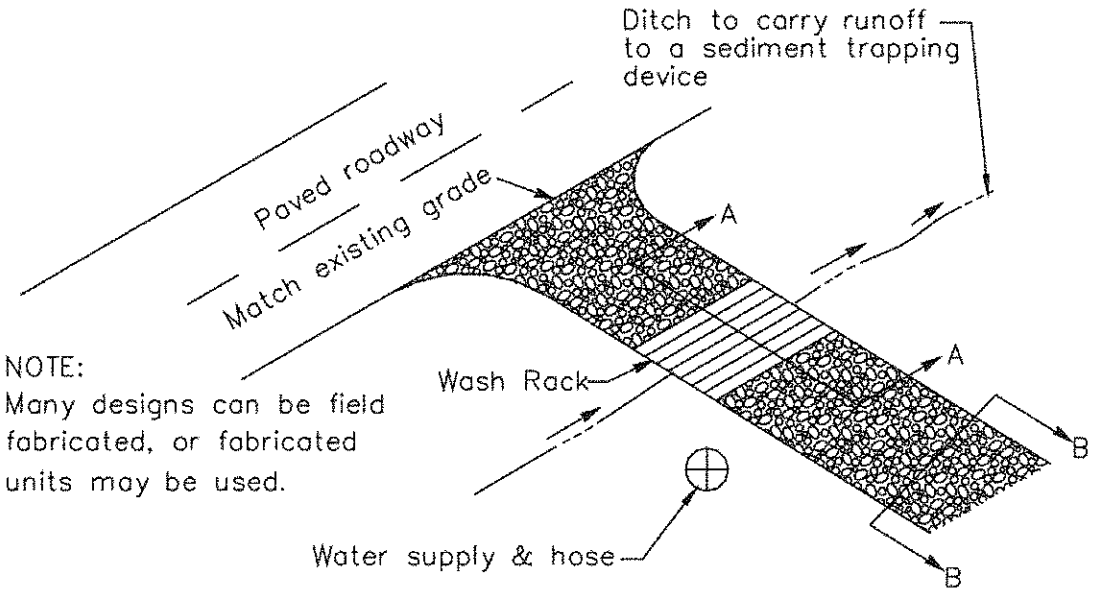
Entrance/Outlet Tire Wash TC-3



SECTION A–A
NOT TO SCALE

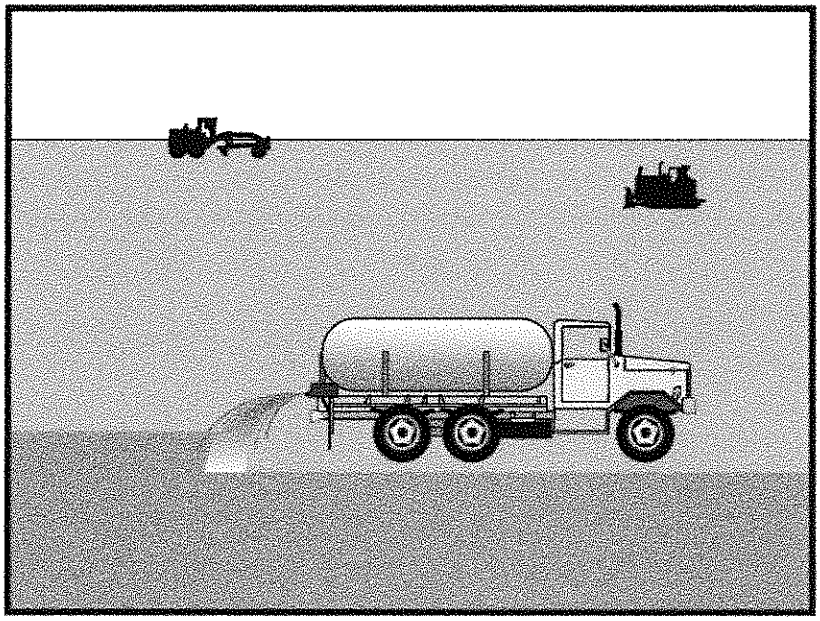


SECTION B–B
NTS



TYPICAL TIRE WASH
NOT TO SCALE

Wind Erosion Control WE-1



Objectives

EC	Erosion Control	
SE	Sediment Control	☒
TC	Tracking Control	
WE	Wind Erosion Control	☑
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Wind erosion or dust control consists of applying water or other dust palliatives as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Suitable Applications

Wind erosion control BMPs are suitable during the following construction activities:

- Construction vehicle traffic on unpaved roads
- Drilling and blasting activities
- Sediment tracking onto paved roads
- Soils and debris storage piles
- Batch drop from front-end loaders
- Areas with unstabilized soil
- Final grading/site stabilization

Limitations

- Watering prevents dust only for a short period and should be applied daily (or more often) to be effective.
- Over watering may cause erosion.

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- Oil or oil-treated subgrade should not be used for dust control because the oil may migrate into drainageways and/or seep into the soil.
- Effectiveness depends on soil, temperature, humidity, and wind velocity.
- Chemically treated sub grades may make the soil water repellant, interfering with long-term infiltration and the vegetation/re-vegetation of the site. Some chemical dust suppressants may be subject to freezing and may contain solvents and should be handled properly.
- Asphalt, as a mulch tack or chemical mulch, requires a 24-hour curing time to avoid adherence to equipment, worker shoes, etc. Application should be limited because asphalt surfacing may eventually migrate into the drainage system.
- In compacted areas, watering and other liquid dust control measures may wash sediment or other constituents into the drainage system.

Implementation

General

California's Mediterranean climate, with short wet seasons and long hot dry seasons, allows the soils to thoroughly dry out. During these dry seasons, construction activities are at their peak, and disturbed and exposed areas are increasingly subject to wind erosion, sediment tracking and dust generated by construction equipment.

Dust control, as a BMP, is a practice that is already in place for many construction activities. Los Angeles, the North Coast, and Sacramento, among others, have enacted dust control ordinances for construction activities that cause dust to be transported beyond the construction project property line.

Recently, the State Air Resources Control Board has, under the authority of the Clean Air Act, started to address air quality in relation to inhalable particulate matter less than 10 microns (PM-10). Approximately 90 percent of these small particles are considered to be dust. Existing dust control regulations by local agencies, municipal departments, public works department, and public health departments are in place in some regions within California.

Many local agencies require dust control in order to comply with local nuisance laws, opacity laws (visibility impairment) and the requirements of the Clean Air Act. The following are measures that local agencies may have already implemented as requirements for dust control from contractors:

- Construction and Grading Permits: Require provisions for dust control plans.
- Opacity Emission Limits: Enforce compliance with California air pollution control laws.
- Increase Overall Enforcement Activities: Priority given to cases involving citizen complaints.
- Maintain Field Application Records: Require records of dust control measures from contractor;
- Stormwater Pollution Prevention Plan: (SWPPP): Integrate dust control measures into SWPPP.

Dust Control Practices

Dust control BMPs generally stabilize exposed surfaces and minimize activities that suspend or track dust particles. The following table shows dust control practices that can be applied to site conditions that cause dust. For heavily traveled and disturbed areas, wet suppression (watering), chemical dust suppression, gravel asphalt surfacing, temporary gravel construction entrances, equipment wash-out areas, and haul truck covers can be employed as dust control applications. Permanent or temporary vegetation and mulching can be employed for areas of occasional or no construction traffic. Preventive measures would include minimizing surface areas to be disturbed, limiting onsite vehicle traffic to 15 mph, and controlling the number and activity of vehicles on a site at any given time.

SITE CONDITION	DUST CONTROL PRACTICES								
	Permanent Vegetation	Mulching	Wet Suppression (Watering)	Chemical Dust Suppression	Gravel or Asphalt	Silt Fences	Temporary Gravel Construction Entrances/Equipment Wash Down	Haul Truck Covers	Minimize Extent of Disturbed Area
Disturbed Areas not Subject to Traffic	X	X	X	X	X				X
Disturbed Areas Subject to Traffic			X	X	X		X		X
Material Stock Pile Stabilization			X	X		X			X
Demolition			X				X	X	
Clearing/ Excavation			X	X		X			X
Truck Traffic on Unpaved Roads			X	X	X		X	X	
Mud/Dirt Carry Out					X		X		

Additional preventive measures include:

- Schedule construction activities to minimize exposed area (EC-1, Scheduling).
- Quickly stabilize exposed soils using vegetation, mulching, spray-on adhesives, calcium chloride, sprinkling, and stone/gravel layering.
- Identify and stabilize key access points prior to commencement of construction.
- Minimize the impact of dust by anticipating the direction of prevailing winds.
- Direct most construction traffic to stabilized roadways within the project site.
- Water should be applied by means of pressure-type distributors or pipelines equipped with a spray system or hoses and nozzles that will ensure even distribution.
- All distribution equipment should be equipped with a positive means of shutoff.
- Unless water is applied by means of pipelines, at least one mobile unit should be available at all times to apply water or dust palliative to the project.

- If reclaimed waste water is used, the sources and discharge must meet California Department of Health Services water reclamation criteria and the Regional Water Quality Control Board requirements. Non-potable water should not be conveyed in tanks or drain pipes that will be used to convey potable water and there should be no connection between potable and non-potable supplies. Non-potable tanks, pipes, and other conveyances should be marked, "NON-POTABLE WATER - DO NOT DRINK."
- Materials applied as temporary soil stabilizers and soil binders also generally provide wind erosion control benefits.
- Pave or chemically stabilize access points where unpaved traffic surfaces adjoin paved roads.
- Provide covers for haul trucks transporting materials that contribute to dust.
- Provide for wet suppression or chemical stabilization of exposed soils.
- Provide for rapid clean up of sediments deposited on paved roads. Furnish stabilized construction road entrances and vehicle wash down areas.
- Stabilize inactive construction sites using vegetation or chemical stabilization methods.
- Limit the amount of areas disturbed by clearing and earth moving operations by scheduling these activities in phases.

For chemical stabilization, there are many products available for chemically stabilizing gravel roadways and stockpiles. If chemical stabilization is used, the chemicals should not create any adverse effects on stormwater, plant life, or groundwater.

Costs

Installation costs for water and chemical dust suppression are low, but annual costs may be quite high since these measures are effective for only a few hours to a few days.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Check areas protected to ensure coverage.
- Most dust control measures require frequent, often daily, or multiple times per day attention.

References

Best Management Practices and Erosion Control Manual for Construction Sites, Flood Control District of Maricopa County, Arizona, September 1992.

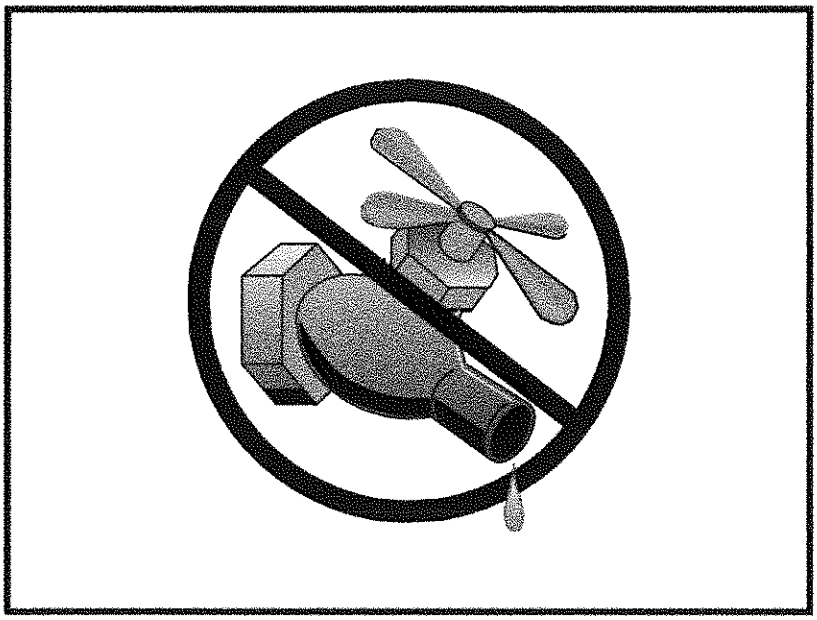
California Air Pollution Control Laws, California Air Resources Board, 1992.

Caltrans, Standard Specifications, Sections 10, "Dust Control"; Section 17, "Watering"; and Section 18, "Dust Palliative".

Prospects for Attaining the State Ambient Air Quality Standards for Suspended Particulate Matter (PM10), Visibility Reducing Particles, Sulfates, Lead, and Hydrogen Sulfide, California Air Resources Board, April 1991.

Stormwater Quality Handbooks Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Water Conservation Practices NS-1



Objectives

EC	Erosion Control	☒
SE	Sediment Control	☒
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ Primary Objective

☒ Secondary Objective

Targeted Constituents

Sediment	☑
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

None

Description and Purpose

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Suitable Applications

Water conservation practices are suitable for all construction sites where water is used, including piped water, metered water, trucked water, and water from a reservoir.

Limitations

- None identified.

Implementation

- Keep water equipment in good working condition.
- Stabilize water truck filling area.
- Repair water leaks promptly.
- Washing of vehicles and equipment on the construction site is discouraged.
- Avoid using water to clean construction areas. If water must be used for cleaning or surface preparation, surface should be swept and vacuumed first to remove dirt. This will minimize amount of water required.

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- Direct construction water runoff to areas where it can soak into the ground or be collected and reused.
- Authorized non-stormwater discharges to the storm drain system, channels, or receiving waters are acceptable with the implementation of appropriate BMPs.
- Lock water tank valves to prevent unauthorized use.

Costs

The cost is small to none compared to the benefits of conserving water.

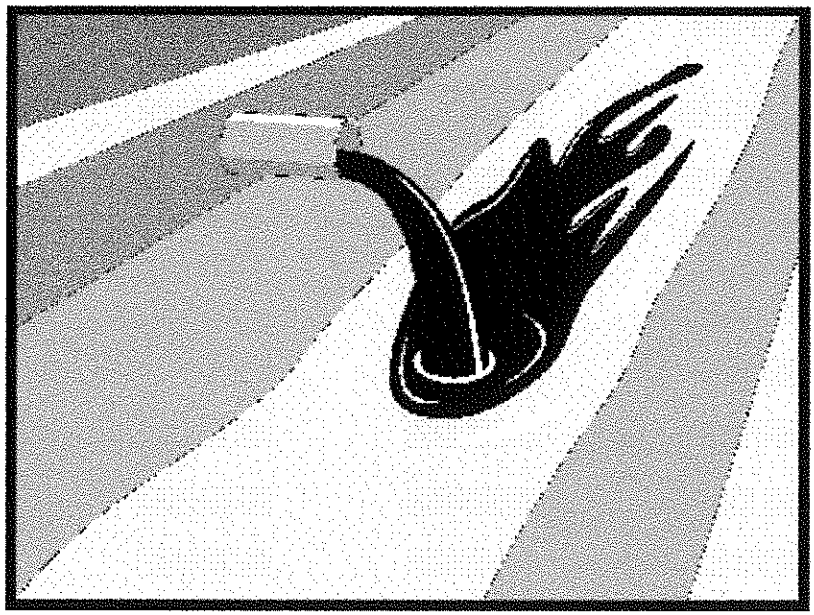
Inspection and Maintenance

- Inspect and verify that activity based BMPs are in place prior to the commencement of authorized non-stormwater discharges.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges are occuring.
- Repair water equipment as needed to prevent unintended discharges.
  - Water trucks
  - Water reservoirs (water buffalos)
  - Irrigation systems
  - Hydrant connections

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Illicit Connection/Discharge NS-6



Description and Purpose

Procedures and practices designed for construction contractors to recognize illicit connections or illegally dumped or discharged materials on a construction site and report incidents.

Suitable Applications

This best management practice (BMP) applies to all construction projects. Illicit connection/discharge and reporting is applicable anytime an illicit connection or discharge is discovered or illegally dumped material is found on the construction site.

Limitations

Illicit connections and illegal discharges or dumping, for the purposes of this BMP, refer to discharges and dumping caused by parties other than the contractor. If pre-existing hazardous materials or wastes are known to exist onsite, they should be identified in the SWPPP and handled as set forth in the SWPPP.

Implementation

Planning

- Review the SWPPP. Pre-existing areas of contamination should be identified and documented in the SWPPP.
- Inspect site before beginning the job for evidence of illicit connections, illegal dumping or discharges. Document any pre-existing conditions and notify the owner.

Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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- Inspect site regularly during project execution for evidence of illicit connections, illegal dumping or discharges.
- Observe site perimeter for evidence for potential of illicitly discharged or illegally dumped material, which may enter the job site.

Identification of Illicit Connections and Illegal Dumping or Discharges

- **General** – unlabeled and unidentifiable material should be treated as hazardous.
- **Solids** - Look for debris, or rubbish piles. Solid waste dumping often occurs on roadways with light traffic loads or in areas not easily visible from the traveled way.
- **Liquids** - signs of illegal liquid dumping or discharge can include:
  - Visible signs of staining or unusual colors to the pavement or surrounding adjacent soils
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Abnormal water flow during the dry weather season
- **Urban Areas** - Evidence of illicit connections or illegal discharges is typically detected at storm drain outfall locations or at manholes. Signs of an illicit connection or illegal discharge can include:
  - Abnormal water flow during the dry weather season
  - Unusual flows in sub drain systems used for dewatering
  - Pungent odors coming from the drainage systems
  - Discoloration or oily substances in the water or stains and residues detained within ditches, channels or drain boxes
  - Excessive sediment deposits, particularly adjacent to or near active offsite construction projects
- **Rural Areas** - Illicit connections or illegal discharges involving irrigation drainage ditches are detected by visual inspections. Signs of an illicit discharge can include:
  - Abnormal water flow during the non-irrigation season
  - Non-standard junction structures
  - Broken concrete or other disturbances at or near junction structures

Reporting

Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery. For illicit connections or discharges to the storm drain system, notify the local stormwater management agency. For illegal dumping, notify the local law enforcement agency.

Cleanup and Removal

The responsibility for cleanup and removal of illicit or illegal dumping or discharges will vary by location. Contact the local stormwater management agency for further information.

Costs

Costs to look for and report illicit connections and illegal discharges and dumping are low. The best way to avoid costs associated with illicit connections and illegal discharges and dumping is to keep the project perimeters secure to prevent access to the site, to observe the site for vehicles that should not be there, and to document any waste or hazardous materials that exist onsite before taking possession of the site.

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect the site regularly to check for any illegal dumping or discharge.
- Prohibit employees and subcontractors from disposing of non-job related debris or materials at the construction site.
- Notify the owner of any illicit connections and illegal dumping or discharge incidents at the time of discovery.

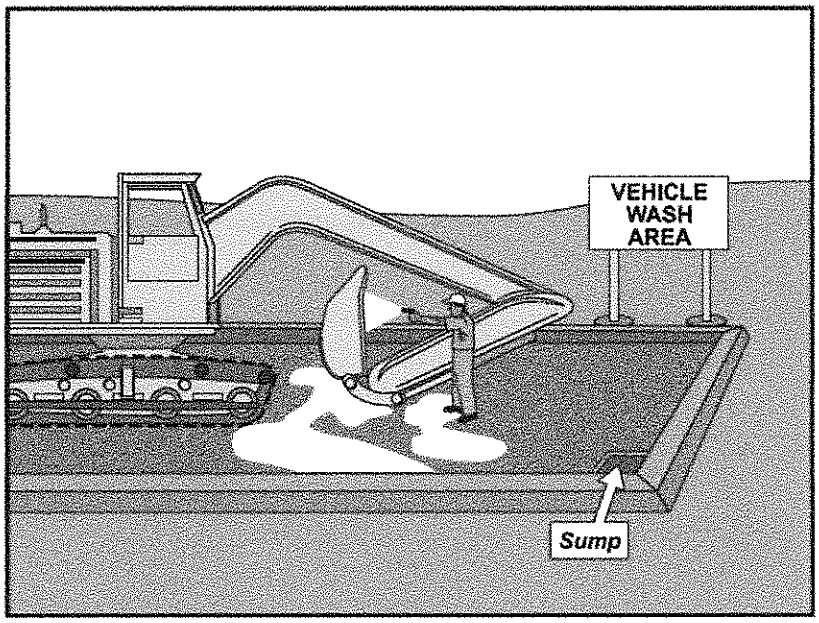
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle and Equipment Cleaning NS-8



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment cleaning is performed.

Limitations

Even phosphate-free, biodegradable soaps have been shown to be toxic to fish before the soap degrades. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Implementation

Other options to washing equipment onsite include contracting with either an offsite or mobile commercial washing business. These businesses may be better equipped to handle and dispose of the wash waters properly. Performing this work offsite can also be economical by eliminating the need for a separate washing operation onsite.

If washing operations are to take place onsite, then:

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- Use phosphate-free, biodegradable soaps.
- Educate employees and subcontractors on pollution prevention measures.
- Do not permit steam cleaning onsite. Steam cleaning can generate significant pollutant concentrates.
- Cleaning of vehicles and equipment with soap, solvents or steam should not occur on the project site unless resulting wastes are fully contained and disposed of. Resulting wastes should not be discharged or buried, and must be captured and recycled or disposed according to the requirements of WM-10, Liquid Waste Management or WM-6, Hazardous Waste Management, depending on the waste characteristics. Minimize use of solvents. Use of diesel for vehicle and equipment cleaning is prohibited.
- All vehicles and equipment that regularly enter and leave the construction site must be cleaned offsite.
- When vehicle and equipment washing and cleaning must occur onsite, and the operation cannot be located within a structure or building equipped with appropriate disposal facilities, the outside cleaning area should have the following characteristics:
  - Located away from storm drain inlets, drainage facilities, or watercourses
  - Paved with concrete or asphalt and bermed to contain wash waters and to prevent runon and runoff
  - Configured with a sump to allow collection and disposal of wash water
  - No discharge of wash waters to storm drains or watercourses
  - Used only when necessary
- When cleaning vehicles and equipment with water:
  - Use as little water as possible. High-pressure sprayers may use less water than a hose and should be considered
  - Use positive shutoff valve to minimize water usage
  - Facility wash racks should discharge to a sanitary sewer, recycle system or other approved discharge system and must not discharge to the storm drainage system, watercourses, or to groundwater

Costs

Cleaning vehicles and equipment at an offsite facility may reduce overall costs for vehicle and equipment cleaning by eliminating the need to provide similar services onsite. When onsite cleaning is needed, the cost to establish appropriate facilities is relatively low on larger, long-duration projects, and moderate to high on small, short-duration projects.

Inspection and Maintenance

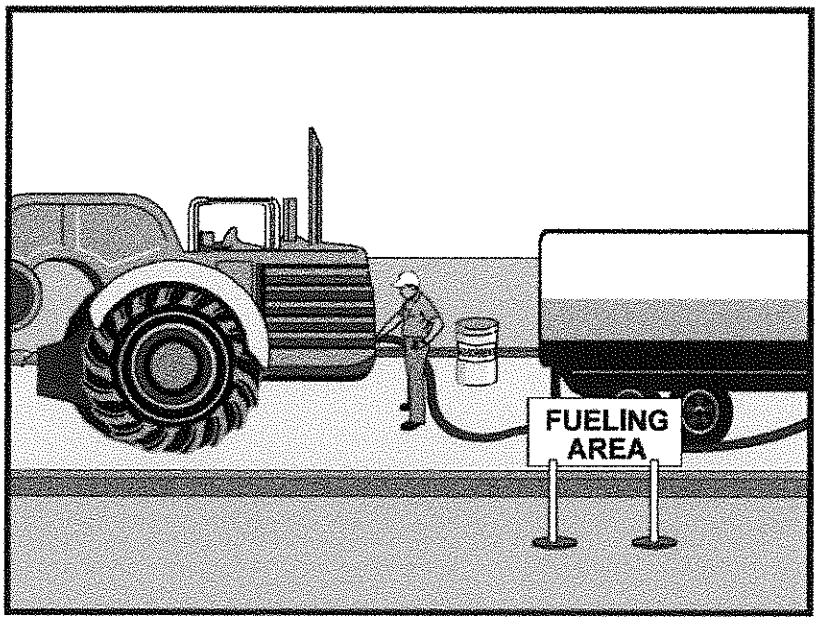
- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Inspection and maintenance is minimal, although some berm repair may be necessary.
- Monitor employees and subcontractors throughout the duration of the construction project to ensure appropriate practices are being implemented.
- Inspect sump regularly and remove liquids and sediment as needed.
- Prohibit employees and subcontractors from washing personal vehicles and equipment on the construction site.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Swisher, R.D. Surfactant Biodegradation, Marcel Decker Corporation, 1987.

Vehicle and Equipment Fueling NS-9



Objectives

EC	Erosion Control	
SE	Sediment Control	
TR	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	
Trash	
Metals	
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks, and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Suitable Applications

These procedures are suitable on all construction sites where vehicle and equipment fueling takes place.

Limitations

Onsite vehicle and equipment fueling should only be used where it is impractical to send vehicles and equipment offsite for fueling. Sending vehicles and equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/ Exit.

Implementation

- Use offsite fueling stations as much as possible. These businesses are better equipped to handle fuel and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate fueling area at a site.
- Discourage "topping-off" of fuel tanks.

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- Absorbent spill cleanup materials and spill kits should be available in fueling areas and on fueling trucks, and should be disposed of properly after use.
- Drip pans or absorbent pads should be used during vehicle and equipment fueling, unless the fueling is performed over an impermeable surface in a dedicated fueling area.
- Use absorbent materials on small spills. Do not hose down or bury the spill. Remove the adsorbent materials promptly and dispose of properly.
- Avoid mobile fueling of mobile construction equipment around the site; rather, transport the equipment to designated fueling areas. With the exception of tracked equipment such as bulldozers and large excavators, most vehicles should be able to travel to a designated area with little lost time.
- Train employees and subcontractors in proper fueling and cleanup procedures.
- When fueling must take place onsite, designate an area away from drainage courses to be used. Fueling areas should be identified in the SWPPP.
- Dedicated fueling areas should be protected from stormwater runon and runoff, and should be located at least 50 ft away from downstream drainage facilities and watercourses. Fueling must be performed on level-grade areas.
- Protect fueling areas with berms and dikes to prevent runon, runoff, and to contain spills.
- Nozzles used in vehicle and equipment fueling should be equipped with an automatic shutoff to control drips. Fueling operations should not be left unattended.
- Use vapor recovery nozzles to help control drips as well as air pollution where required by Air Quality Management Districts (AQMD).
- Federal, state, and local requirements should be observed for any stationary above ground storage tanks.

Costs

- All of the above measures are low cost except for the capital costs of above ground tanks that meet all local environmental, zoning, and fire codes.

Inspection and Maintenance

- Vehicles and equipment should be inspected each day of use for leaks. Leaks should be repaired immediately or problem vehicles or equipment should be removed from the project site.
- Keep ample supplies of spill cleanup materials onsite.
- Immediately clean up spills and properly dispose of contaminated soil and cleanup materials.

References

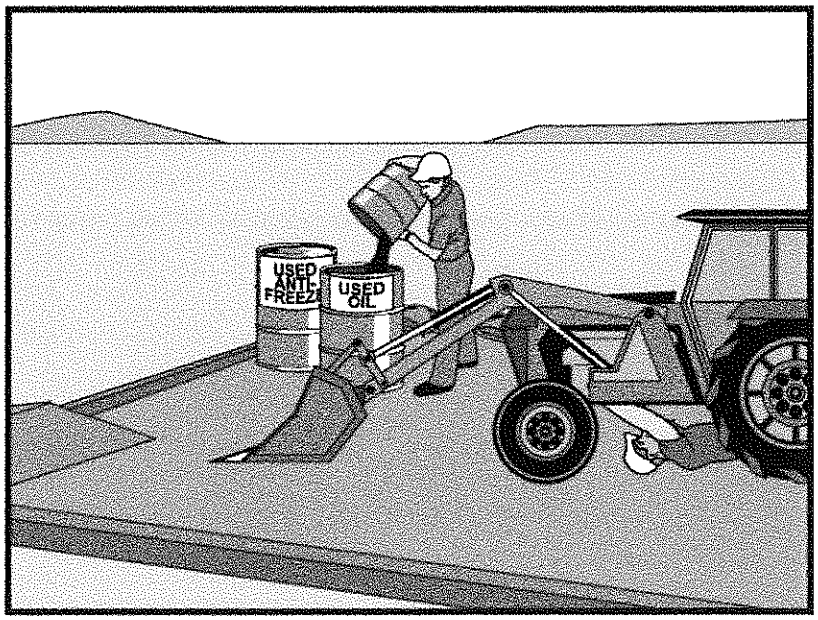
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Vehicle & Equipment Maintenance NS-10



Objectives

EC	Erosion Control	
SE	Sediment Control	
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Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Suitable Applications

These procedures are suitable on all construction projects where an onsite yard area is necessary for storage and maintenance of heavy equipment and vehicles.

Limitations

Onsite vehicle and equipment maintenance should only be used where it is impractical to send vehicles and equipment offsite for maintenance and repair. Sending vehicles/equipment offsite should be done in conjunction with TR-1, Stabilized Construction Entrance/Exit.

Outdoor vehicle or equipment maintenance is a potentially significant source of stormwater pollution. Activities that can contaminate stormwater include engine repair and service, changing or replacement of fluids, and outdoor equipment storage and parking (engine fluid leaks). For further information on vehicle or equipment servicing, see NS-8, Vehicle and Equipment Cleaning, and NS-9, Vehicle and Equipment Fueling.

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NS-10 Vehicle & Equipment Maintenance

Implementation

- Use offsite repair shops as much as possible. These businesses are better equipped to handle vehicle fluids and spills properly. Performing this work offsite can also be economical by eliminating the need for a separate maintenance area.
- If maintenance must occur onsite, use designated areas, located away from drainage courses. Dedicated maintenance areas should be protected from stormwater runon and runoff, and should be located at least 50 ft from downstream drainage facilities and watercourses.
- Drip pans or absorbent pads should be used during vehicle and equipment maintenance work that involves fluids, unless the maintenance work is performed over an impermeable surface in a dedicated maintenance area.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- All fueling trucks and fueling areas are required to have spill kits and/or use other spill protection devices.
- Use adsorbent materials on small spills. Remove the absorbent materials promptly and dispose of properly.
- Inspect onsite vehicles and equipment daily at startup for leaks, and repair immediately.
- Keep vehicles and equipment clean; do not allow excessive build-up of oil and grease.
- Segregate and recycle wastes, such as greases, used oil or oil filters, antifreeze, cleaning solutions, automotive batteries, hydraulic and transmission fluids. Provide secondary containment and covers for these materials if stored onsite.
- Train employees and subcontractors in proper maintenance and spill cleanup procedures.
- Drip pans or plastic sheeting should be placed under all vehicles and equipment placed on docks, barges, or other structures over water bodies when the vehicle or equipment is planned to be idle for more than 1 hour.
- For long-term projects, consider using portable tents or covers over maintenance areas if maintenance cannot be performed offsite.
- Consider use of new, alternative greases and lubricants, such as adhesive greases, for chassis lubrication and fifth-wheel lubrication.
- Properly dispose of used oils, fluids, lubricants, and spill cleanup materials.
- Do not place used oil in a dumpster or pour into a storm drain or watercourse.
- Properly dispose of or recycle used batteries.
- Do not bury used tires.
- Repair leaks of fluids and oil immediately.

Vehicle & Equipment Maintenance NS-10

Listed below is further information if you must perform vehicle or equipment maintenance onsite.

Safer Alternative Products

- Consider products that are less toxic or hazardous than regular products. These products are often sold under an "environmentally friendly" label.
- Consider use of grease substitutes for lubrication of truck fifth-wheels. Follow manufacturers label for details on specific uses.
- Consider use of plastic friction plates on truck fifth-wheels in lieu of grease. Follow manufacturers label for details on specific uses.

Waste Reduction

Parts are often cleaned using solvents such as trichloroethylene, trichloroethane, or methylene chloride. Many of these cleaners are listed in California Toxic Rule as priority pollutants. These materials are harmful and must not contaminate stormwater. They must be disposed of as a hazardous waste. Reducing the number of solvents makes recycling easier and reduces hazardous waste management costs. Often, one solvent can perform a job as well as two different solvents. Also, if possible, eliminate or reduce the amount of hazardous materials and waste by substituting non-hazardous or less hazardous materials. For example, replace chlorinated organic solvents with non-chlorinated solvents. Non-chlorinated solvents like kerosene or mineral spirits are less toxic and less expensive to dispose of properly. Check the list of active ingredients to see whether it contains chlorinated solvents. The "chlor" term indicates that the solvent is chlorinated. Also, try substituting a wire brush for solvents to clean parts.

Recycling and Disposal

Separating wastes allows for easier recycling and may reduce disposal costs. Keep hazardous wastes separate, do not mix used oil solvents, and keep chlorinated solvents (like,-trichloroethane) separate from non-chlorinated solvents (like kerosene and mineral spirits). Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around. Provide cover and secondary containment until these materials can be removed from the site.

Oil filters can be recycled. Ask your oil supplier or recycler about recycling oil filters.

Do not dispose of extra paints and coatings by dumping liquid onto the ground or throwing it into dumpsters. Allow coatings to dry or harden before disposal into covered dumpsters.

Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries, even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Costs

All of the above are low cost measures. Higher costs are incurred to setup and maintain onsite maintenance areas.

NS-10 Vehicle & Equipment Maintenance

Inspection and Maintenance

- Inspect and verify that activity-based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharges daily while non-stormwater discharges occur.
- Keep ample supplies of spill cleanup materials onsite.
- Maintain waste fluid containers in leak proof condition.
- Vehicles and equipment should be inspected on each day of use. Leaks should be repaired immediately or the problem vehicle(s) or equipment should be removed from the project site.
- Inspect equipment for damaged hoses and leaky gaskets routinely. Repair or replace as needed.

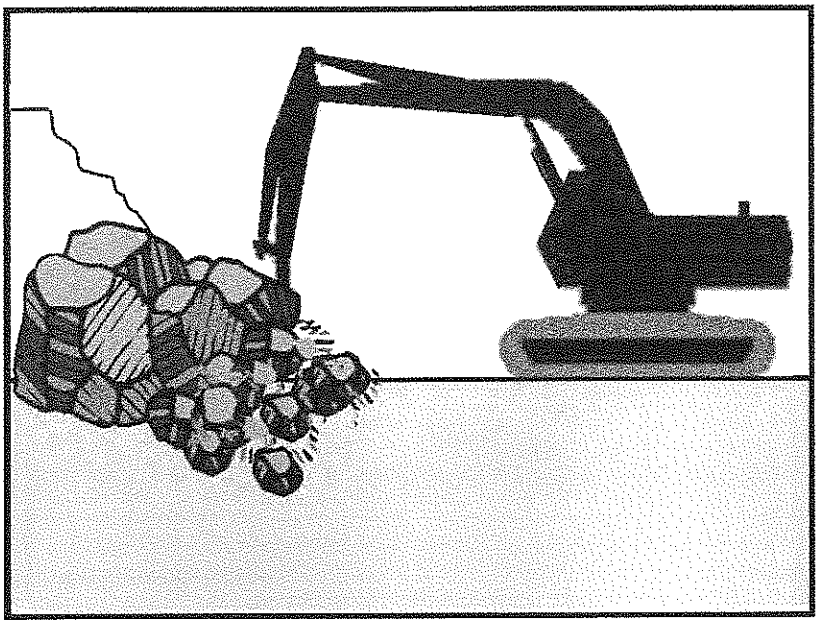
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program; Program Development and Approval Guidance, Working Group, Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Demolition Adjacent to Water NS-15



Categories

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	☑
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Procedures to protect water bodies from debris and wastes associated with structure demolition or removal over or adjacent to watercourses.

Suitable Applications

Full bridge demolition and removal, partial bridge removal (barrier rail, edge of deck) associated with bridge widening projects, concrete channel removal, or any other structure removal that could potentially affect water quality.

Limitations

None identified.

Implementation

- Refer to NS-5, Clear Water Diversion, to direct water away from work areas.
- Use attachments on construction equipment such as backhoes to catch debris from small demolition operations.
- Use covers or platforms to collect debris.
- Platforms and covers are to be approved by the owner.
- Stockpile accumulated debris and waste generated during demolition away from watercourses and in accordance with WM-3, Stockpile Management.
- Ensure safe passage of wildlife, as necessary.

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- Discharges to waterways shall be reported to the Regional Water Quality Control Board immediately upon discovery. A written discharge notification must follow within 7 days. Follow the spill reporting procedures in the SWPPP.

- For structures containing hazardous materials, i.e., lead paint or asbestos, refer to BMP WM-6, Hazardous Waste Management. For demolition work involving soil excavation around lead-painted structures, refer to WM-7, Contaminated Soil Management.

Costs

Cost may vary according to the combination of practices implemented.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect BMPs in accordance with General Permit requirements for the associated project type and risk level. It is recommended that at a minimum, BMPs be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

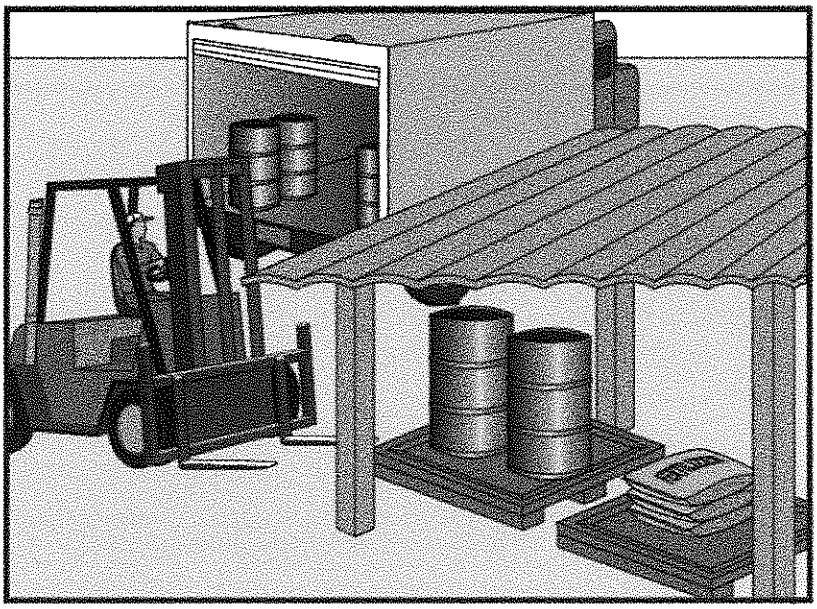
- Any debris-catching devices shall be emptied regularly. Collected debris shall be removed and stored away from the watercourse and protected from runon and runoff.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities, Developing Pollution Prevention Plans and Best Management Practices, EPA 832-R-92005; USEPA, April 1992.

Material Delivery and Storage WM-1



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent, reduce, or eliminate the discharge of pollutants from material delivery and storage to the stormwater system or watercourses by minimizing the storage of hazardous materials onsite, storing materials in a designated area, installing secondary containment, conducting regular inspections, and training employees and subcontractors.

This best management practice covers only material delivery and storage. For other information on materials, see WM-2, Material Use, or WM-4, Spill Prevention and Control. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

These procedures are suitable for use at all construction sites with delivery and storage of the following materials:

- Soil stabilizers and binders
- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and concrete components

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- Hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

Limitations

- Space limitation may preclude indoor storage.
- Storage sheds often must meet building and fire code requirements.

Implementation

The following steps should be taken to minimize risk:

- Temporary storage area should be located away from vehicular traffic.
- Material Safety Data Sheets (MSDS) should be supplied for all materials stored.
- Construction site areas should be designated for material delivery and storage.
- Material delivery and storage areas should be located near the construction entrances, away from waterways, if possible.
  - Avoid transport near drainage paths or waterways.
  - Surround with earth berms. See EC-9, Earth Dikes and Drainage Swales.
  - Place in an area which will be paved.
- Storage of reactive, ignitable, or flammable liquids must comply with the fire codes of your area. Contact the local Fire Marshal to review site materials, quantities, and proposed storage area to determine specific requirements. See the Flammable and Combustible Liquid Code, NFPA30.
- An up to date inventory of materials delivered and stored onsite should be kept.
- Hazardous materials storage onsite should be minimized.
- Hazardous materials should be handled as infrequently as possible.
- During the rainy season, consider storing materials in a covered area. Store materials in secondary containments such as earthen dike, horse trough, or even a children's wading pool for non-reactive materials such as detergents, oil, grease, and paints. Small amounts of material may be secondarily contained in "bus boy" trays or concrete mixing trays.
- Do not store chemicals, drums, or bagged materials directly on the ground. Place these items on a pallet and, when possible, in secondary containment.

- If drums must be kept uncovered, store them at a slight angle to reduce ponding of rainwater on the lids to reduce corrosion. Domed plastic covers are inexpensive and snap to the top of drums, preventing water from collecting.
- Chemicals should be kept in their original labeled containers.
- Employees and subcontractors should be trained on the proper material delivery and storage practices.
- Employees trained in emergency spill cleanup procedures must be present when dangerous materials or liquid chemicals are unloaded.
- If significant residual materials remain on the ground after construction is complete, properly remove materials and any contaminated soil. See WM-7, Contaminated Soil Management. If the area is to be paved, pave as soon as materials are removed to stabilize the soil.

Material Storage Areas and Practices

- Liquids, petroleum products, and substances listed in 40 CFR Parts 110, 117, or 302 should be stored in approved containers and drums and should not be overfilled. Containers and drums should be placed in temporary containment facilities for storage.
- A temporary containment facility should provide for a spill containment volume able to contain precipitation from a 25 year storm event, plus the greater of 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater.
- A temporary containment facility should be impervious to the materials stored therein for a minimum contact time of 72 hours.
- A temporary containment facility should be maintained free of accumulated rainwater and spills. In the event of spills or leaks, accumulated rainwater and spills should be collected and placed into drums. These liquids should be handled as a hazardous waste unless testing determines them to be non-hazardous. All collected liquids or non-hazardous liquids should be sent to an approved disposal site.
- Sufficient separation should be provided between stored containers to allow for spill cleanup and emergency response access.
- Incompatible materials, such as chlorine and ammonia, should not be stored in the same temporary containment facility.
- Throughout the rainy season, each temporary containment facility should be covered during non-working days, prior to, and during rain events.
- Materials should be stored in their original containers and the original product labels should be maintained in place in a legible condition. Damaged or otherwise illegible labels should be replaced immediately.

- Bagged and boxed materials should be stored on pallets and should not be allowed to accumulate on the ground. To provide protection from wind and rain throughout the rainy season, bagged and boxed materials should be covered during non-working days and prior to and during rain events.
- Stockpiles should be protected in accordance with WM-3, Stockpile Management.
- Materials should be stored indoors within existing structures or sheds when available.
- Proper storage instructions should be posted at all times in an open and conspicuous location.
- An ample supply of appropriate spill clean up material should be kept near storage areas.
- Also see WM-6, Hazardous Waste Management, for storing of hazardous materials.

Material Delivery Practices

- Keep an accurate, up-to-date inventory of material delivered and stored onsite.
- Arrange for employees trained in emergency spill cleanup procedures to be present when dangerous materials or liquid chemicals are unloaded.

Spill Cleanup

- Contain and clean up any spill immediately.
- Properly remove and dispose of any hazardous materials or contaminated soil if significant residual materials remain on the ground after construction is complete. See WM-7, Contaminated Soil Management.
- See WM-4, Spill Prevention and Control, for spills of chemicals and/or hazardous materials.

Cost

- The largest cost of implementation may be in the construction of a materials storage area that is covered and provides secondary containment.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Keep an ample supply of spill cleanup materials near the storage area.
- Keep storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored.
- Repair or replace perimeter controls, containment structures, covers, and liners as needed to maintain proper function.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

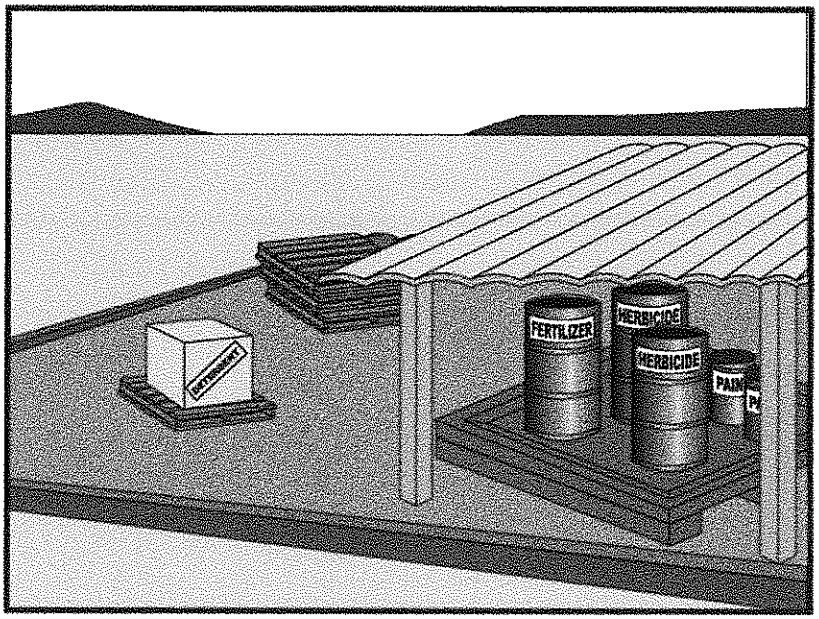
Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Material Use

WM-2



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to the storm drain system or watercourses from material use by using alternative products, minimizing hazardous material use onsite, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for use at all construction projects. These procedures apply when the following materials are used or prepared onsite:

- Pesticides and herbicides
- Fertilizers
- Detergents
- Plaster
- Petroleum products such as fuel, oil, and grease
- Asphalt and other concrete components
- Other hazardous chemicals such as acids, lime, glues, adhesives, paints, solvents, and curing compounds
- Concrete compounds
- Other materials that may be detrimental if released to the environment

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Limitations

Safer alternative building and construction products may not be available or suitable in every instance.

Implementation

The following steps should be taken to minimize risk:

- Minimize use of hazardous materials onsite.
- Follow manufacturer instructions regarding uses, protective equipment, ventilation, flammability, and mixing of chemicals.
- Train personnel who use pesticides. The California Department of Pesticide Regulation and county agricultural commissioners license pesticide dealers, certify pesticide applicators, and conduct onsite inspections.
- Do not over-apply fertilizers, herbicides, and pesticides. Prepare only the amount needed. Follow the recommended usage instructions. Over-application is expensive and environmentally harmful. Unless on steep slopes, till fertilizers into the soil rather than hydro seeding. Apply surface dressings in several smaller applications, as opposed to one large application, to allow time for infiltration and to avoid excess material being carried offsite by runoff. Do not apply these chemicals just before it rains.
- Train employees and subcontractors in proper material use.
- Supply Material Safety Data Sheets (MSDS) for all materials.
- Dispose of latex paint and paint cans, used brushes, rags, absorbent materials, and drop cloths, when thoroughly dry and are no longer hazardous, with other construction debris.
- Do not remove the original product label; it contains important safety and disposal information. Use the entire product before disposing of the container.
- Mix paint indoors or in a containment area. Never clean paintbrushes or rinse paint containers into a street, gutter, storm drain, or watercourse. Dispose of any paint thinners, residue, and sludge(s) that cannot be recycled, as hazardous waste.
- For water-based paint, clean brushes to the extent practicable, and rinse to a drain leading to a sanitary sewer where permitted, or into a concrete washout pit or temporary sediment trap. For oil-based paints, clean brushes to the extent practicable, and filter and reuse thinners and solvents.
- Use recycled and less hazardous products when practical. Recycle residual paints, solvents, non-treated lumber, and other materials.
- Use materials only where and when needed to complete the construction activity. Use safer alternative materials as much as possible. Reduce or eliminate use of hazardous materials onsite when practical.

- Require contractors to complete the "Report of Chemical Spray Forms" when spraying herbicides and pesticides.
- Keep an ample supply of spill clean up material near use areas. Train employees in spill clean up procedures.
- Avoid exposing applied materials to rainfall and runoff unless sufficient time has been allowed for them to dry.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and at two–week intervals in the non-rainy season to verify continued BMP implementation.
- Maintenance of this best management practice is minimal.
- Spot check employees and subcontractors throughout the job to ensure appropriate practices are being employed.

References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance, Working Group Working Paper; USEPA, April 1992.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Stockpile Management WM-3

Objectives		
EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:
☑ **Primary Objective**
☒ **Secondary Objective**

Targeted Constituents	
Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Stockpile Management procedures and practices are designed to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, asphalt minder (so called "cold mix" asphalt), and pressure treated wood.

Suitable Applications

Implement in all projects that stockpile soil and other materials.

Limitations

None identified.

Implementation

Protection of stockpiles is a year-round requirement. To properly manage stockpiles:

- Locate stockpiles a minimum of 50 ft away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect all stockpiles from stormwater runon using a temporary perimeter sediment barrier such as berms, dikes, fiber rolls, silt fences, sandbag, gravel bags, or straw bale barriers.

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- Implement wind erosion control practices as appropriate on all stockpiled material. For specific information, see WE-1, Wind Erosion Control.
- Manage stockpiles of contaminated soil in accordance with WM-7, Contaminated Soil Management.
- Place bagged materials on pallets and under cover.

Protection of Non-Active Stockpiles

Non-active stockpiles of the identified materials should be protected further as follows:

Soil stockpiles

- During the rainy season, soil stockpiles should be covered or protected with soil stabilization measures and a temporary perimeter sediment barrier at all times.
- During the non-rainy season, soil stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of Portland cement concrete rubble, asphalt concrete, asphalt concrete rubble, aggregate base, or aggregate sub base

- During the rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier at all times.
- During the non-rainy season, the stockpiles should be covered or protected with a temporary perimeter sediment barrier prior to the onset of precipitation.

Stockpiles of "cold mix"

- During the rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material at all times.
- During the non-rainy season, cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Stockpiles/Storage of pressure treated wood with copper, chromium, and arsenic or ammonical, copper, zinc, and arsenate

- During the rainy season, treated wood should be covered with plastic or comparable material at all times.
- During the non-rainy season, treated wood should be covered with plastic or comparable material at all times and cold mix stockpiles should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Protection of Active Stockpiles

Active stockpiles of the identified materials should be protected further as follows:

- All stockpiles should be protected with a temporary linear sediment barrier prior to the onset of precipitation.
- Stockpiles of "cold mix" should be placed on and covered with plastic or comparable material prior to the onset of precipitation.

Costs

All of the above are low cost measures.

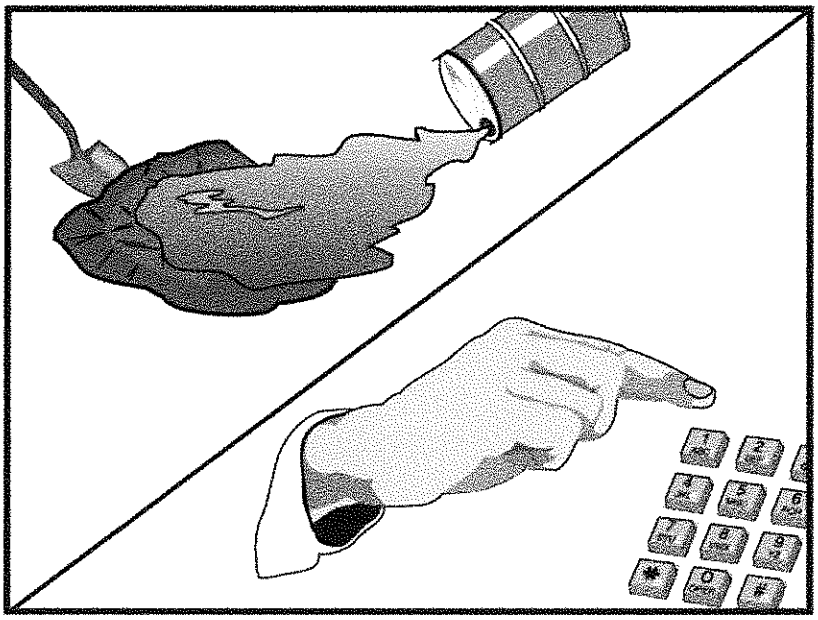
Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation
- Repair and/or replace perimeter controls and covers as needed to keep them functioning properly.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Spill Prevention and Control WM-4



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

This best management practice covers only spill prevention and control. However, WM-1, Materials Delivery and Storage, and WM-2, Material Use, also contain useful information, particularly on spill prevention. For information on wastes, see the waste management BMPs in this section.

Suitable Applications

This BMP is suitable for all construction projects. Spill control procedures are implemented anytime chemicals or hazardous substances are stored on the construction site, including the following materials:

- Soil stabilizers/binders
- Dust palliatives
- Herbicides
- Growth inhibitors
- Fertilizers
- Deicing/anti-icing chemicals

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- Fuels
- Lubricants
- Other petroleum distillates

Limitations

- In some cases it may be necessary to use a private spill cleanup company.
- This BMP applies to spills caused by the contractor and subcontractors.
- Procedures and practices presented in this BMP are general. Contractor should identify appropriate practices for the specific materials used or stored onsite

Implementation

The following steps will help reduce the stormwater impacts of leaks and spills:

Education

- Be aware that different materials pollute in different amounts. Make sure that each employee knows what a "significant spill" is for each material they use, and what is the appropriate response for "significant" and "insignificant" spills.
- Educate employees and subcontractors on potential dangers to humans and the environment from spills and leaks.
- Hold regular meetings to discuss and reinforce appropriate disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.
- Have contractor's superintendent or representative oversee and enforce proper spill prevention and control measures.

General Measures

- To the extent that the work can be accomplished safely, spills of oil, petroleum products, substances listed under 40 CFR parts 110,117, and 302, and sanitary and septic wastes should be contained and cleaned up immediately.
- Store hazardous materials and wastes in covered containers and protect from vandalism.
- Place a stockpile of spill cleanup materials where it will be readily accessible.
- Train employees in spill prevention and cleanup.
- Designate responsible individuals to oversee and enforce control measures.
- Spills should be covered and protected from stormwater runon during rainfall to the extent that it doesn't compromise clean up activities.
- Do not bury or wash spills with water.

- Store and dispose of used clean up materials, contaminated materials, and recovered spill material that is no longer suitable for the intended purpose in conformance with the provisions in applicable BMPs.
- Do not allow water used for cleaning and decontamination to enter storm drains or watercourses. Collect and dispose of contaminated water in accordance with WM-10, Liquid Waste Management.
- Contain water overflow or minor water spillage and do not allow it to discharge into drainage facilities or watercourses.
- Place proper storage, cleanup, and spill reporting instructions for hazardous materials stored or used on the project site in an open, conspicuous, and accessible location.
- Keep waste storage areas clean, well organized, and equipped with ample cleanup supplies as appropriate for the materials being stored. Perimeter controls, containment structures, covers, and liners should be repaired or replaced as needed to maintain proper function.

Cleanup

- Clean up leaks and spills immediately.
- Use a rag for small spills on paved surfaces, a damp mop for general cleanup, and absorbent material for larger spills. If the spilled material is hazardous, then the used cleanup materials are also hazardous and must be sent to either a certified laundry (rags) or disposed of as hazardous waste.
- Never hose down or bury dry material spills. Clean up as much of the material as possible and dispose of properly. See the waste management BMPs in this section for specific information.

Minor Spills

- Minor spills typically involve small quantities of oil, gasoline, paint, etc. which can be controlled by the first responder at the discovery of the spill.
- Use absorbent materials on small spills rather than hosing down or burying the spill.
- Absorbent materials should be promptly removed and disposed of properly.
- Follow the practice below for a minor spill:
  - Contain the spread of the spill.
  - Recover spilled materials.
  - Clean the contaminated area and properly dispose of contaminated materials.

Semi-Significant Spills

- Semi-significant spills still can be controlled by the first responder along with the aid of other personnel such as laborers and the foreman, etc. This response may require the cessation of all other activities.

- Spills should be cleaned up immediately:
  - Contain spread of the spill.
  - Notify the project foreman immediately.
  - If the spill occurs on paved or impermeable surfaces, clean up using "dry" methods (absorbent materials, cat litter and/or rags). Contain the spill by encircling with absorbent materials and do not let the spill spread widely.
  - If the spill occurs in dirt areas, immediately contain the spill by constructing an earthen dike. Dig up and properly dispose of contaminated soil.
  - If the spill occurs during rain, cover spill with tarps or other material to prevent contaminating runoff.

Significant/Hazardous Spills

- For significant or hazardous spills that cannot be controlled by personnel in the immediate vicinity, the following steps should be taken:
  - Notify the local emergency response by dialing 911. In addition to 911, the contractor will notify the proper county officials. It is the contractor's responsibility to have all emergency phone numbers at the construction site.
  - Notify the Governor's Office of Emergency Services Warning Center, (916) 845-8911.
  - For spills of federal reportable quantities, in conformance with the requirements in 40 CFR parts 110,119, and 302, the contractor should notify the National Response Center at (800) 424-8802.
  - Notification should first be made by telephone and followed up with a written report.
  - The services of a spills contractor or a Haz-Mat team should be obtained immediately. Construction personnel should not attempt to clean up until the appropriate and qualified staffs have arrived at the job site.
  - Other agencies which may need to be consulted include, but are not limited to, the Fire Department, the Public Works Department, the Coast Guard, the Highway Patrol, the City/County Police Department, Department of Toxic Substances, California Division of Oil and Gas, Cal/OSHA, etc.

Reporting

- Report significant spills to local agencies, such as the Fire Department; they can assist in cleanup.
- Federal regulations require that any significant oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center (NRC) at 800-424-8802 (24 hours).

Use the following measures related to specific activities:

Vehicle and Equipment Maintenance

- If maintenance must occur onsite, use a designated area and a secondary containment, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Regularly inspect onsite vehicles and equipment for leaks and repair immediately
- Check incoming vehicles and equipment (including delivery trucks, and employee and subcontractor vehicles) for leaking oil and fluids. Do not allow leaking vehicles or equipment onsite.
- Always use secondary containment, such as a drain pan or drop cloth, to catch spills or leaks when removing or changing fluids.
- Place drip pans or absorbent materials under paving equipment when not in use.
- Use absorbent materials on small spills rather than hosing down or burying the spill. Remove the absorbent materials promptly and dispose of properly.
- Promptly transfer used fluids to the proper waste or recycling drums. Don't leave full drip pans or other open containers lying around
- Oil filters disposed of in trashcans or dumpsters can leak oil and pollute stormwater. Place the oil filter in a funnel over a waste oil-recycling drum to drain excess oil before disposal. Oil filters can also be recycled. Ask the oil supplier or recycler about recycling oil filters.
- Store cracked batteries in a non-leaking secondary container. Do this with all cracked batteries even if you think all the acid has drained out. If you drop a battery, treat it as if it is cracked. Put it into the containment area until you are sure it is not leaking.

Vehicle and Equipment Fueling

- If fueling must occur onsite, use designate areas, located away from drainage courses, to prevent the runon of stormwater and the runoff of spills.
- Discourage "topping off" of fuel tanks.
- Always use secondary containment, such as a drain pan, when fueling to catch spills/ leaks.

Costs

Prevention of leaks and spills is inexpensive. Treatment and/ or disposal of contaminated soil or water can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Keep ample supplies of spill control and cleanup materials onsite, near storage, unloading, and maintenance areas.
- Update your spill prevention and control plan and stock cleanup materials as changes occur in the types of chemicals onsite.

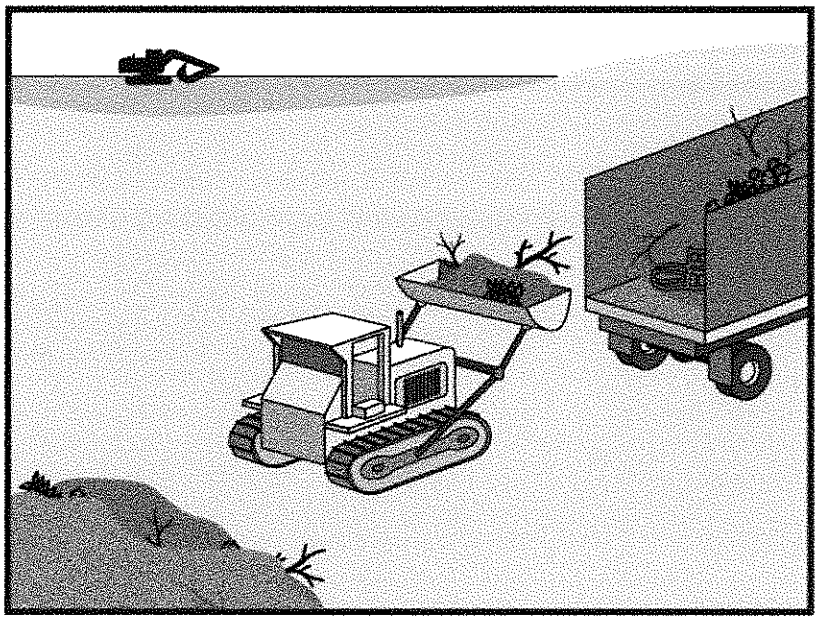
References

Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Solid Waste Management WM-5



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

Description and Purpose

Solid waste management procedures and practices are designed to prevent or reduce the discharge of pollutants to stormwater from solid or construction waste by providing designated waste collection areas and containers, arranging for regular disposal, and training employees and subcontractors.

Suitable Applications

This BMP is suitable for construction sites where the following wastes are generated or stored:

- Solid waste generated from trees and shrubs removed during land clearing, demolition of existing structures (rubble), and building construction
- Packaging materials including wood, paper, and plastic
- Scrap or surplus building materials including scrap metals, rubber, plastic, glass pieces and masonry products
- Domestic wastes including food containers such as beverage cans, coffee cups, paper bags, plastic wrappers, and cigarettes
- Construction wastes including brick, mortar, timber, steel and metal scraps, pipe and electrical cuttings, non-hazardous equipment parts, styrofoam and other materials used to transport and package construction materials

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- Highway planting wastes, including vegetative material, plant containers, and packaging materials

Limitations

Temporary stockpiling of certain construction wastes may not necessitate stringent drainage related controls during the non-rainy season or in desert areas with low rainfall.

Implementation

The following steps will help keep a clean site and reduce stormwater pollution:

- Select designated waste collection areas onsite.
- Inform trash-hauling contractors that you will accept only watertight dumpsters for onsite use. Inspect dumpsters for leaks and repair any dumpster that is not watertight.
- Locate containers in a covered area or in a secondary containment.
- Provide an adequate number of containers with lids or covers that can be placed over the container to keep rain out or to prevent loss of wastes when it is windy.
- Plan for additional containers and more frequent pickup during the demolition phase of construction.
- Collect site trash daily, especially during rainy and windy conditions.
- Remove this solid waste promptly since erosion and sediment control devices tend to collect litter.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.
- Do not hose out dumpsters on the construction site. Leave dumpster cleaning to the trash hauling contractor.
- Arrange for regular waste collection before containers overflow.
- Clean up immediately if a container does spill.
- Make sure that construction waste is collected, removed, and disposed of only at authorized disposal areas.

Education

- Have the contractor's superintendent or representative oversee and enforce proper solid waste management procedures and practices.
- Instruct employees and subcontractors on identification of solid waste and hazardous waste.
- Educate employees and subcontractors on solid waste storage and disposal procedures.

- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Require that employees and subcontractors follow solid waste handling and storage procedures.
- Prohibit littering by employees, subcontractors, and visitors.
- Minimize production of solid waste materials wherever possible.

Collection, Storage, and Disposal

- Littering on the project site should be prohibited.
- To prevent clogging of the storm drainage system, litter and debris removal from drainage grates, trash racks, and ditch lines should be a priority.
- Trash receptacles should be provided in the contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods.
- Litter from work areas within the construction limits of the project site should be collected and placed in watertight dumpsters at least weekly, regardless of whether the litter was generated by the contractor, the public, or others. Collected litter and debris should not be placed in or next to drain inlets, stormwater drainage systems, or watercourses.
- Dumpsters of sufficient size and number should be provided to contain the solid waste generated by the project.
- Full dumpsters should be removed from the project site and the contents should be disposed of by the trash hauling contractor.
- Construction debris and waste should be removed from the site biweekly or more frequently as needed.
- Construction material visible to the public should be stored or stacked in an orderly manner.
- Stormwater runon should be prevented from contacting stored solid waste through the use of berms, dikes, or other temporary diversion structures or through the use of measures to elevate waste from site surfaces.
- Solid waste storage areas should be located at least 50 ft from drainage facilities and watercourses and should not be located in areas prone to flooding or ponding.
- Except during fair weather, construction and highway planting waste not stored in watertight dumpsters should be securely covered from wind and rain by covering the waste with tarps or plastic.
- Segregate potentially hazardous waste from non-hazardous construction site waste.
- Make sure that toxic liquid wastes (used oils, solvents, and paints) and chemicals (acids, pesticides, additives, curing compounds) are not disposed of in dumpsters designated for construction debris.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management. Have hazardous waste hauled to an appropriate disposal and/or recycling facility.
- Salvage or recycle useful vegetation debris, packaging and surplus building materials when practical. For example, trees and shrubs from land clearing can be used as a brush barrier, or converted into wood chips, then used as mulch on graded areas. Wood pallets, cardboard boxes, and construction scraps can also be recycled.

Costs

All of the above are low cost measures.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur
- Inspect construction waste area regularly.
- Arrange for regular waste collection.

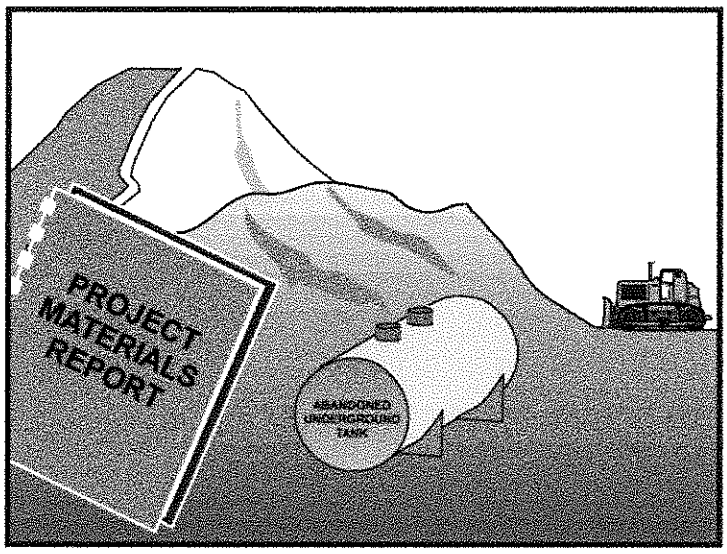
References

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Contaminated Soil Management WM-7



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Description and Purpose

Prevent or reduce the discharge of pollutants to stormwater from contaminated soil and highly acidic or alkaline soils by conducting pre-construction surveys, inspecting excavations regularly, and remediating contaminated soil promptly.

Suitable Applications

Contaminated soil management is implemented on construction projects in highly urbanized or industrial areas where soil contamination may have occurred due to spills, illicit discharges, aerial deposition, past use and leaks from underground storage tanks.

Limitations

Contaminated soils that cannot be treated onsite must be disposed of offsite by a licensed hazardous waste hauler. The presence of contaminated soil may indicate contaminated water as well. See NS-2, Dewatering Operations, for more information.

The procedures and practices presented in this BMP are general. The contractor should identify appropriate practices and procedures for the specific contaminants known to exist or discovered onsite.

Implementation

Most owners and developers conduct pre-construction environmental assessments as a matter of routine. Contaminated soils are often identified during project planning and development with known locations identified in the plans, specifications and in the SWPPP. The contractor should review applicable reports and investigate appropriate call-outs in the plans, specifications, and

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	☑
Oil and Grease	☑
Organics	☑

Potential Alternatives

None

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SWPPP. Recent court rulings holding contractors liable for cleanup costs when they unknowingly move contaminated soil highlight the need for contractors to confirm a site assessment is completed before earth moving begins.

The following steps will help reduce stormwater pollution from contaminated soil:

- Conduct thorough, pre-construction inspections of the site and review documents related to the site. If inspection or reviews indicated presence of contaminated soils, develop a plan before starting work.
- Look for contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
- Prevent leaks and spills. Contaminated soil can be expensive to treat and dispose of properly. However, addressing the problem before construction is much less expensive than after the structures are in place.
- The contractor may further identify contaminated soils by investigating:
  - Past site uses and activities
  - Detected or undetected spills and leaks
  - Acid or alkaline solutions from exposed soil or rock formations high in acid or alkaline forming elements
  - Contaminated soil as evidenced by discoloration, odors, differences in soil properties, abandoned underground tanks or pipes, or buried debris.
  - Suspected soils should be tested at a certified laboratory.

Education

- Have employees and subcontractors complete a safety training program which meets 29 CFR 1910.120 and 8 CCR 5192 covering the potential hazards as identified, prior to performing any excavation work at the locations containing material classified as hazardous.
- Educate employees and subcontractors in identification of contaminated soil and on contaminated soil handling and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).

Handling Procedures for Material with Aerially Deposited Lead (ADL)

- Materials from areas designated as containing (ADL) may, if allowed by the contract special provisions, be excavated, transported, and used in the construction of embankments and/or backfill.
- Excavation, transportation, and placement operations should result in no visible dust.
- Caution should be exercised to prevent spillage of lead containing material during transport.

- Quality should be monitored during excavation of soils contaminated with lead.

Handling Procedures for Contaminated Soils

- Minimize onsite storage. Contaminated soil should be disposed of properly in accordance with all applicable regulations. All hazardous waste storage will comply with the requirements in Title 22, CCR, Sections 66265.250 to 66265.260.
- Test suspected soils at an approved certified laboratory.
- Work with the local regulatory agencies to develop options for treatment or disposal if the soil is contaminated.
- Avoid temporary stockpiling of contaminated soils or hazardous material.
- Take the following precautions if temporary stockpiling is necessary:
  - Cover the stockpile with plastic sheeting or tarps.
  - Install a berm around the stockpile to prevent runoff from leaving the area.
  - Do not stockpile in or near storm drains or watercourses.
- Remove contaminated material and hazardous material on exteriors of transport vehicles and place either into the current transport vehicle or into the excavation prior to the vehicle leaving the exclusion zone.
- Monitor the air quality continuously during excavation operations at all locations containing hazardous material.
- Procure all permits and licenses, pay all charges and fees, and give all notices necessary and incident to the due and lawful prosecution of the work, including registration for transporting vehicles carrying the contaminated material and the hazardous material.
- Collect water from decontamination procedures and treat or dispose of it at an appropriate disposal site.
- Collect non-reusable protective equipment, once used by any personnel, and dispose of at an appropriate disposal site.
- Install temporary security fence to surround and secure the exclusion zone. Remove fencing when no longer needed.
- Excavate, transport, and dispose of contaminated material and hazardous material in accordance with the rules and regulations of the following agencies (the specifications of these agencies supersede the procedures outlined in this BMP):
  - United States Department of Transportation (USDOT)
  - United States Environmental Protection Agency (USEPA)
  - California Environmental Protection Agency (CAL-EPA)

- California Division of Occupation Safety and Health Administration (CAL-OSHA)
- Local regulatory agencies

Procedures for Underground Storage Tank Removals

- Prior to commencing tank removal operations, obtain the required underground storage tank removal permits and approval from the federal, state, and local agencies that have jurisdiction over such work.
- To determine if it contains hazardous substances, arrange to have tested, any liquid or sludge found in the underground tank prior to its removal.
- Following the tank removal, take soil samples beneath the excavated tank and perform analysis as required by the local agency representative(s).
- The underground storage tank, any liquid or sludge found within the tank, and all contaminated substances and hazardous substances removed during the tank removal and transported to disposal facilities permitted to accept such waste.

Water Control

- All necessary precautions and preventive measures should be taken to prevent the flow of water, including ground water, from mixing with hazardous substances or underground storage tank excavations. Such preventative measures may consist of, but are not limited to, berms, cofferdams, grout curtains, freeze walls, and seal course concrete or any combination thereof.
- If water does enter an excavation and becomes contaminated, such water, when necessary to proceed with the work, should be discharged to clean, closed top, watertight transportable holding tanks, treated, and disposed of in accordance with federal, state, and local laws.

Costs

Prevention of leaks and spills is inexpensive. Treatment or disposal of contaminated soil can be quite expensive.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for contractor's Water Pollution Control Manager, foreman, and/or construction supervisor to monitor onsite contaminated soil storage and disposal procedures.
- Monitor air quality continuously during excavation operations at all locations containing hazardous material.
- Coordinate contaminated soils and hazardous substances/waste management with the appropriate federal, state, and local agencies.

- Implement WM-4, Spill Prevention and Control, to prevent leaks and spills as much as possible.

References

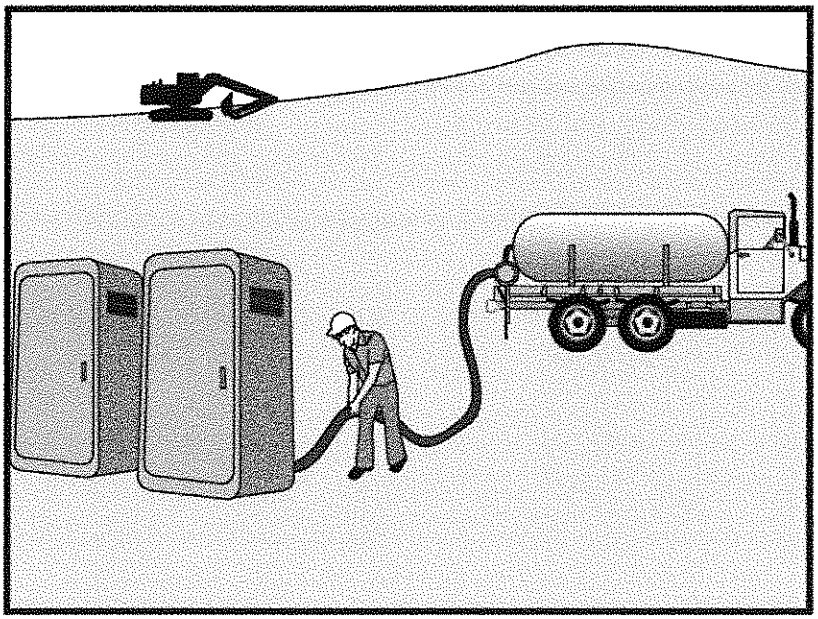
Blueprint for a Clean Bay: Best Management Practices to Prevent Stormwater Pollution from Construction Related Activities; Santa Clara Valley Nonpoint Source Pollution Control Program, 1995.

Processes, Procedures and Methods to Control Pollution Resulting from All Construction Activity, 430/9-73-007, USEPA, 1973.

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Sanitary/Septic Waste Management WM-9



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	
Nutrients	☑
Trash	☑
Metals	
Bacteria	☑
Oil and Grease	
Organics	☑

Potential Alternatives

None

Description and Purpose

Proper sanitary and septic waste management prevent the discharge of pollutants to stormwater from sanitary and septic waste by providing convenient, well-maintained facilities, and arranging for regular service and disposal.

Suitable Applications

Sanitary septic waste management practices are suitable for use at all construction sites that use temporary or portable sanitary and septic waste systems.

Limitations

None identified.

Implementation

Sanitary or septic wastes should be treated or disposed of in accordance with state and local requirements. In many cases, one contract with a local facility supplier will be all that it takes to make sure sanitary wastes are properly disposed.

Storage and Disposal Procedures

- Temporary sanitary facilities should be located away from drainage facilities, watercourses, and from traffic circulation. When subjected to high winds or risk of high winds, temporary sanitary facilities should be secured to prevent overturning.
- Wastewater should not be discharged or buried within the project site.

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WM-9 Sanitary/Septic Waste Management

- Sanitary and septic systems that discharge directly into sanitary sewer systems, where permissible, should comply with the local health agency, city, county, and sewer district requirements.
- Only reputable, licensed sanitary and septic waste haulers should be used.
- Sanitary facilities should be located in a convenient location.
- Untreated raw wastewater should never be discharged or buried.
- Temporary septic systems should treat wastes to appropriate levels before discharging.
- If using an onsite disposal system (OSDS), such as a septic system, local health agency requirements must be followed.
- Temporary sanitary facilities that discharge to the sanitary sewer system should be properly connected to avoid illicit discharges.
- Sanitary and septic facilities should be maintained in good working order by a licensed service.
- Regular waste collection by a licensed hauler should be arranged before facilities overflow.

Education

- Educate employees, subcontractors, and suppliers on sanitary and septic waste storage and disposal procedures.
- Educate employees, subcontractors, and suppliers of potential dangers to humans and the environment from sanitary and septic wastes.
- Instruct employees, subcontractors, and suppliers in identification of sanitary and septic waste.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Establish a continuing education program to indoctrinate new employees.

Costs

All of the above are low cost measures.

Inspection and Maintenance

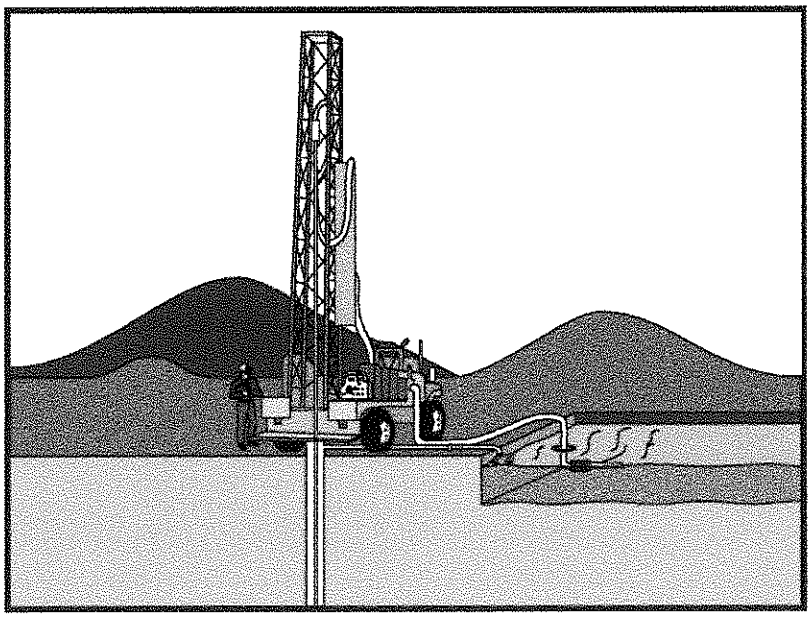
- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.
- Arrange for regular waste collection.
- If high winds are expected, portable sanitary facilities must be secured with spikes or weighed down to prevent over turning.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Stormwater Management for Construction Activities; Developing Pollution Prevention Plans and Best Management Practice, EPA 832-R-92005; USEPA, April 1992.

Liquid Waste Management WM-10



Objectives

EC	Erosion Control	
SE	Sediment Control	
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	☑

Legend:

☑ **Primary Objective**

☒ **Secondary Objective**

Targeted Constituents

Sediment	☑
Nutrients	☑
Trash	☑
Metals	☑
Bacteria	
Oil and Grease	☑
Organics	

Potential Alternatives

None

Description and Purpose

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

Suitable Applications

Liquid waste management is applicable to construction projects that generate any of the following non-hazardous by-products, residuals, or wastes:

- Drilling slurries and drilling fluids
- Grease-free and oil-free wastewater and rinse water
- Dredgings
- Other non-stormwater liquid discharges not permitted by separate permits

Limitations

- Disposal of some liquid wastes may be subject to specific laws and regulations or to requirements of other permits secured for the construction project (e.g., NPDES permits, Army Corps permits, Coastal Commission permits, etc.).
- Liquid waste management does not apply to dewatering operations (NS-2 Dewatering Operations), solid waste management (WM-5, Solid Waste Management), hazardous

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wastes (WM-6, Hazardous Waste Management), or concrete slurry residue (WM-8, Concrete Waste Management).

- Typical permitted non-stormwater discharges can include: water line flushing; landscape irrigation; diverted stream flows; rising ground waters; uncontaminated pumped ground water; discharges from potable water sources; foundation drains; irrigation water; springs; water from crawl space pumps; footing drains; lawn watering; flows from riparian habitats and wetlands; and discharges or flows from emergency fire fighting activities.

Implementation

General Practices

- Instruct employees and subcontractors how to safely differentiate between non-hazardous liquid waste and potential or known hazardous liquid waste.
- Instruct employees, subcontractors, and suppliers that it is unacceptable for any liquid waste to enter any storm drainage device, waterway, or receiving water.
- Educate employees and subcontractors on liquid waste generating activities and liquid waste storage and disposal procedures.
- Hold regular meetings to discuss and reinforce disposal procedures (incorporate into regular safety meetings).
- Verify which non-stormwater discharges are permitted by the statewide NPDES permit; different regions might have different requirements not outlined in this permit.
- Apply NS-8, Vehicle and Equipment Cleaning for managing wash water and rinse water from vehicle and equipment cleaning operations.

Containing Liquid Wastes

- Drilling residue and drilling fluids should not be allowed to enter storm drains and watercourses and should be disposed of.
- If an appropriate location is available, drilling residue and drilling fluids that are exempt under Title 23, CCR § 2511(g) may be dried by infiltration and evaporation in a containment facility constructed in conformance with the provisions concerning the Temporary Concrete Washout Facilities detailed in WM-8, Concrete Waste Management.
- Liquid wastes generated as part of an operational procedure, such as water-laden dredged material and drilling mud, should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment.
- Liquid wastes should be contained in a controlled area such as a holding pit, sediment basin, roll-off bin, or portable tank.
- Containment devices must be structurally sound and leak free.
- Containment devices must be of sufficient quantity or volume to completely contain the liquid wastes generated.

- Precautions should be taken to avoid spills or accidental releases of contained liquid wastes. Apply the education measures and spill response procedures outlined in WM-4, Spill Prevention and Control.

- Containment areas or devices should not be located where accidental release of the contained liquid can threaten health or safety or discharge to water bodies, channels, or storm drains.

Capturing Liquid Wastes

- Capture all liquid wastes that have the potential to affect the storm drainage system (such as wash water and rinse water from cleaning walls or pavement), before they run off a surface.

- Do not allow liquid wastes to flow or discharge uncontrolled. Use temporary dikes or berms to intercept flows and direct them to a containment area or device for capture.

- Use a sediment trap (SE-3, Sediment Trap) for capturing and treating sediment laden liquid waste or capture in a containment device and allow sediment to settle.

Disposing of Liquid Wastes

- A typical method to handle liquid waste is to dewater the contained liquid waste, using procedures such as described in NS-2, Dewatering Operations, and SE-2, Sediment Basin, and dispose of resulting solids per WM-5, Solid Waste Management.

- Methods of disposal for some liquid wastes may be prescribed in Water Quality Reports, NPDES permits, Environmental Impact Reports, 401 or 404 permits, and local agency discharge permits, etc. Review the SWPPP to see if disposal methods are identified.

- Liquid wastes, such as from dredged material, may require testing and certification whether it is hazardous or not before a disposal method can be determined.

- For disposal of hazardous waste, see WM-6, Hazardous Waste Management.

- If necessary, further treat liquid wastes prior to disposal. Treatment may include, though is not limited to, sedimentation, filtration, and chemical neutralization.

Costs

Prevention costs for liquid waste management are minimal. Costs increase if cleanup or fines are involved.

Inspection and Maintenance

- Inspect and verify that activity–based BMPs are in place prior to the commencement of associated activities. While activities associated with the BMP are under way, inspect weekly during the rainy season and of two-week intervals in the non-rainy season to verify continued BMP implementation.

- Inspect BMPs subject to non-stormwater discharge daily while non-stormwater discharges occur.

- Remove deposited solids in containment areas and capturing devices as needed and at the completion of the task. Dispose of any solids as described in WM-5, Solid Waste Management.
- Inspect containment areas and capturing devices and repair as needed.

References

Stormwater Quality Handbooks - Construction Site Best Management Practices (BMPs) Manual, State of California Department of Transportation (Caltrans), November 2000.

Appendix D: Inspection Forms

BMP INSPECTION REPORT

Date and Time of Inspection:			Date Report Written:	
Inspection Type: (Circle one)	Weekly *Complete Parts I,II,III and VII*	Pre-Storm *Complete Parts I,II,III,IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I,II,III,VI and VII*

Part I. General Information

Site Information

Construction Site Name:			
Construction stage and completed activities:			Approximate area of site that is exposed:
Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather

Estimate storm beginning: (date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (days or hours)	Rain gauge reading and location: (in)

Is a "Qualifying Event" predicted or did one occur (i.e., 0.5" rain with 48-hrs or greater between events)? (Y/N)
If yes, summarize forecast:

Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.

Inspector Information

Inspector Name:	Inspector Title:
Signature:	Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Part II. BMP Observations Continued. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Adequately designed, implemented and effective (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Linear sediment control along toe of slope, face of slope an at grade breaks (Risk Level 2 & 3 Only)			
Limit construction activity to and from site to entrances and exits that employ effective controls to prevent offsite tracking (Risk Level 2 & 3 Only)			

Ensure all storm, drain inlets and perimeter controls, runoff control BMPs and pollutants controls at entrances and exits are maintained and protected from activities the reduce their effectiveness (Risk Level 2 & 3 Only)			
Inspect all immediate access roads daily (Risk Level 2 & 3 Only)			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project CERCLA SWP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies

Deficiency	**Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.**	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).

	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	
Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	

Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if CERCLA SWP change is required.	
Required Actions	**Implementation Date**

Rain Gauge Log Sheet				
Construction Site Name:				
WDID #:				
Date (mm/dd/yy)	Time (24-hr)	Initials	Rainfall Depth (Inches)	Notes:

Risk Level 1, 2, 3 ***Visual Inspection Field Log Sheet***						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name:						
Construction stage and completed activities:				Approximate area of exposed site:		
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: _____ (date and time)		Estimate storm duration:_____ (hours)		Estimate time since last storm: _____ (days or hours)	Rain gauge reading:_ _____ (inches)	
Observations: If yes identify location						
Odors	Yes ☐	No ☐				
Floating material	Yes ☐	No ☐				
Suspended Material	Yes ☐	No ☐				
Sheen	Yes ☐	No ☐				
Discolorations	Yes ☐	No ☐				
Turbidity	Yes ☐	No ☐				
Site Inspections						
Outfalls or BMPs Evaluated			**Deficiencies Noted**			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:			
Corrective Actions Identified (note if CERCLA SWP/REAP change is needed)						

Inspector Information			
Inspector Name:		Inspector Title:	
Signature:			Date:
Risk Level 2 ***Effluent Sampling Field Log Sheets***			
Construction Site Name:	Date:	Time Start:	
Sampler:			
Sampling Event Type:	☐ Stormwater	☐ Non-stormwater	☐ Non-visible pollutant
Field Meter Calibration			
pH Meter ID No./Desc.: Calibration Date/Time:	Turbidity Meter ID No./Desc.: Calibration Date/Time:		

Field pH and Turbidity Measurements			
Discharge Location Description	pH	Turbidity	Time

Grab Samples Collected		
Discharge Location Description	Sample Type	Time

Additional Sampling Notes:
Time End:

NAL or NEL Exceedance Evaluation Summary Report	**Page __ of __**
Project Name	
Project WDID	
Project Location	
Date of Exceedance	
Type of Exceedance	**NAL Daily Average ☐ pH ☐ Turbidity** **NEL Daily Average ☐ pH ☐ Turbidity** **☐ Other (specify) _____**
Measurement or Analytical Method	**☐ Field meter** **(Sensitivity: _____)** **☐ Lab method (specify) _____** **(Reporting Limit: _____)** **(MDL: _____)**
Calculated Daily Average	**☐ pH _ pH units** **☐ Turbidity __ NTU**
Rain Gauge Measurement	**_____ inches**
Compliance Storm Event	**_____ inches (5-year, 24-hour event)**
Visual Observations on Day of Exceedance	

NAL or NEL Exceedance Evaluation Summary Report	**Page __ of __**
Description of BMPs in Place at Time of Event	
Initial Assessment of Cause	
Corrective Actions Taken (deployed after exceedance)	
Additional Corrective Actions Proposed	
Report Completed By	_____ **(Print Name, Title)**
Signature	_____

Appendix E: Rain Event Action Plan

Rain Event Action Plan (REAP)

Date of REAP		**WDID Number:**	
Date Rain Predicted to Occur:		**Predicted % chance of rain:**	

Predicted Rain Event Triggered Actions

Below is a list of suggested actions and items to review for this project. Each active Trade should check all material storage areas, stockpiles, waste management areas, vehicle and equipment storage and maintenance, areas of active soil disturbance, and areas of active work to ensure the proper implementation of BMPs. Project-wide BMPs should be checked and cross-referenced to the BMP progress map.

Trade or Activity	Suggested action(s) to perform / item(s) to review prior to rain event
Information & Scheduling	Inform trade supervisors of predicted rain Check scheduled activities and reschedule as needed Alert erosion/sediment control provider Alert sample collection contractor (if applicable) Schedule staff for extended rain inspections (including weekends & holidays) Check Erosion and Sediment Control (ESC) material stock Review BMP progress map Other:_____ _____ _____
Material storage areas	Material under cover or in sheds (ex: treated woods and metals) Perimeter control around stockpiles Other:_____ _____ _____
Waste management areas	Dumpsters closed Drain holes plugged Recycling bins covered Sanitary stations bermed and protected from tipping Other:_____ _____ _____

Trade operations	Exterior operations shut down for event (e.g., no concrete pours or paving) Soil treatments (e.g.,: fertilizer) ceased within 24 hours of event Materials and equipment (ex: tools) properly stored and covered Waste and debris disposed in covered dumpsters or removed from site Trenches and excavations protected Perimeter controls around disturbed areas Fueling and repair areas covered and bermed Other:_____ _____ _____
Site ESC BMPs	Adequate capacity in sediment basins and traps Site perimeter controls in place Catch basin and drop inlet protection in place and cleaned Temporary erosion controls deployed Temporary perimeter controls deployed around disturbed areas and stockpiles Roads swept; site ingress and egress points stabilized Other:_____ _____ _____
Concrete rinse out area	Adequate capacity for rain Wash-out bins covered Other:_____ _____ _____
Spill and drips	All incident spills and drips, including paint, stucco, fuel, and oil cleaned Drip pans emptied Other:_____ _____ _____

Continued on next page.

Other / Discussion / Diagrams	_____ _____ _____ _____

Attach a printout of the weather forecast from the NOAA website to the REAP.

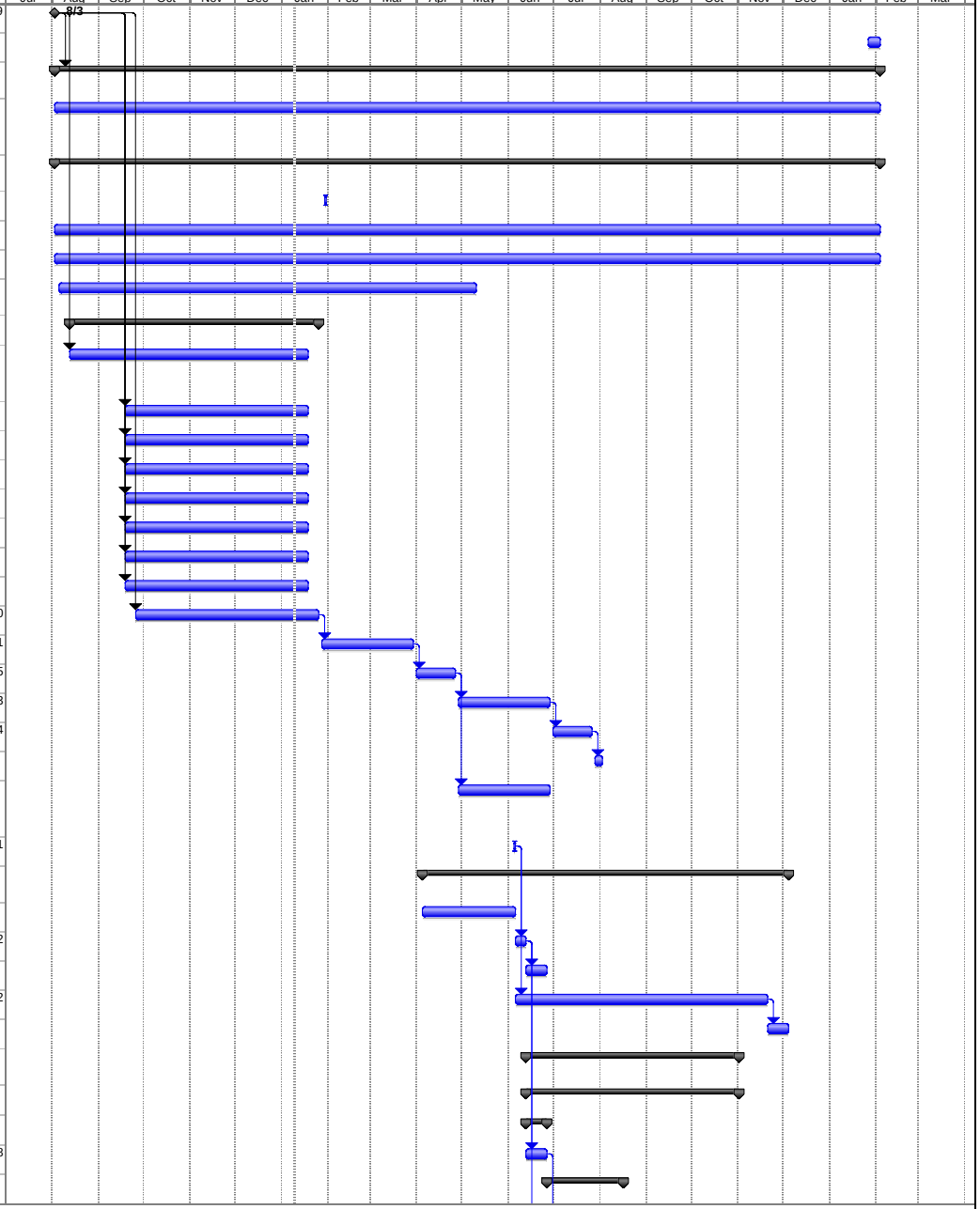
I certify under penalty of law that this Rain Event Action Plan (REAP) will be performed in accordance with the General Permit by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____Date: _____
Qualified SWPPP Practitioner (Use ink please)

Appendix F: Construction Schedule

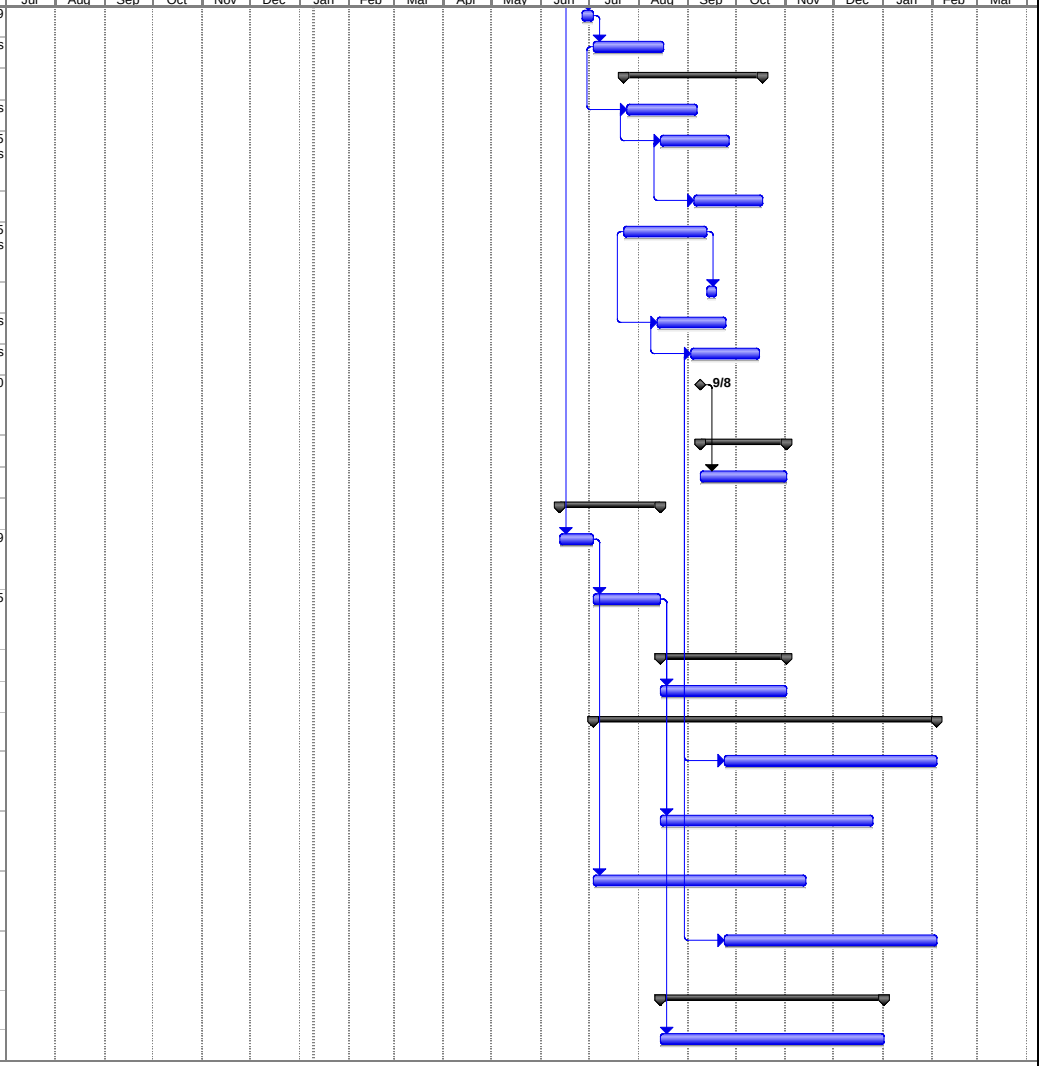
Parcel D-1 Phase II Radiological Remediation and Support
Hunter's Point Naval Shipyard
San Francisco, CA
Contract N62473-09-D-2614 X003

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
1	Project Award	0 days	Fri 8/3/12	Fri 8/3/12		5,16,17,18,19
2	Project Complete/Closeout	6 days	Mon 1/27/14	Mon 2/3/14		
3	**WE1 Project Management Work Element**	**392 days**	**Fri 8/3/12**	**Mon 2/3/14**	**1**	
4	Project Management Activities (scoping, planning, estimation, execution, tracking)	392 days	Fri 8/3/12	Mon 2/3/14		
5	**WE2 Project Meetings**	**392 days**	**Fri 8/3/12**	**Mon 2/3/14**		
6	2.2.1 Kick-off Meeting	1 day	Wed 1/30/13	Wed 1/30/13		
7	2.2.2 BRAC Cleanup Team (BCT) meetings	392 days	Fri 8/3/12	Mon 2/3/14		
8	2.2.3 Contractor Coordination Meetings	392 days	Fri 8/3/12	Mon 2/3/14		
9	**WE4 Planning Documents**	200 days	Mon 8/6/12	Fri 5/10/13		
10	**Internal Draft**	**120 days**	**Mon 8/13/12**	**Fri 1/25/13**		
11	2.4.1 Prepare, review, revise, re-review and approve the Execution Plan 2.4.1	115 days	Mon 8/13/12	Fri 1/18/13	1	
12	2.4.1.1 Basewide Rad Management Plan	88 days	Wed 9/19/12	Fri 1/18/13	1	
13	2.4.1.2 Sampling and Analysis Plan	88 days	Wed 9/19/12	Fri 1/18/13	1	
14	2.4.1.3 Radiological Protection Plan	88 days	Wed 9/19/12	Fri 1/18/13	1	
15	2.4.1.4 QA/QC Plan	88 days	Wed 9/19/12	Fri 1/18/13	1	
16	2.4.1.5 APP/SSHP	88 days	Wed 9/19/12	Fri 1/18/13	1	
17	2.4.1.6 Environmental Protection Plan/2.4.1.6.1 SWPPP	88 days	Wed 9/19/12	Fri 1/18/13	1	
18	2.4.1.6.2 Dust Control Plan	88 days	Wed 9/19/12	Fri 1/18/13	1	
19	2.4.2 Design Plan/TSPs	88 days	Wed 9/26/12	Fri 1/25/13	1	20
20	Navy Review of Internal Draft	45 days	Mon 1/28/13	Fri 3/29/13	19	21
21	Navy RTC and Draft Submittal to Regulators	20 days	Mon 4/1/13	Fri 4/26/13	20	22,25
22	Regulatory Review of Draft Plans	45 days	Mon 4/29/13	Fri 6/28/13	21	23
23	RTCs for Regulatory Comments for Draft	20 days	Mon 7/1/13	Fri 7/26/13	22	24
24	Submit Final to Regulators	5 days	Mon 7/29/13	Fri 8/2/13	23	
25	2.4.3 Prepare, review, revise, re-review and approve the Task Specific Plans for Parcel (NRDL & Ship Berths)	45 days	Mon 4/29/13	Fri 6/28/13	21	
26	NTP for Field Work	1 day	Wed 6/5/13	Wed 6/5/13		29,31
27	**WE3 Project Infrastructure**	**174 days**	**Fri 4/5/13**	**Wed 12/4/13**		
28	2.3.1 Procurement	44 days	Fri 4/5/13	Wed 6/5/13		
29	2.3.2 Mobilization	5 days	Thu 6/6/13	Wed 6/12/13	26	36,30,52
30	2.3.3 Site Cleanup & Demobilization	10 days	Thu 6/13/13	Wed 6/26/13	29	
31	2.3.4 Logistical Support	120 days	Thu 6/6/13	Wed 11/20/13	26	32
32	Logisitical Support affter Field Acitivities	10 days	Thu 11/21/13	Wed 12/4/13	31	
33	**WE5 Removal Actions & Radiological Surveys**	**102 days**	**Thu 6/13/13**	**Fri 11/1/13**		
34	**2.5.1 Sewer and Storm Drain Removal**	**102 days**	**Thu 6/13/13**	**Fri 11/1/13**		
35	**Sewer & Storm Drain System**	**10 days**	**Thu 6/13/13**	**Wed 6/26/13**		
36	2.5.1.1 Prepare Work Area	10 days	Thu 6/13/13	Wed 6/26/13	29	38
37	**2.5.1.2 Excavate & Remove SS/SD System**	**37 days**	**Thu 6/27/13**	**Fri 8/16/13**		



Parcel D-1 Phase II Radiological Remediation and Support
Hunter's Point Naval Shipyard
San Francisco, CA
Contract N62473-09-D-2614 X003

ID	Task Name	Duration	Start	Finish	Predecessors	Successors
38	Excavate & Remove SS/SD under RSY & NRDL	5 days	Thu 6/27/13	Wed 7/3/13	36	39
39	Excavate & Remove SS/SD System 2.5.1.2	32 days	Thu 7/4/13	Fri 8/16/13	38	1SS+15 days
40	**2.5.1.3 Sample, Jsurvey & Remediate**	**63 days**	**Tue 7/23/13**	**Thu 10/17/13**		
41	Survey of Trench SUs	32 days	Thu 7/25/13	Fri 9/6/13	39SS+15 days	2SS+15 days
42	Trench survey sample analysis returned	31 days	Thu 8/15/13	Thu 9/26/13	41SS+15 days	43SS+15 days
43	Trench SUs RASO approval process	31 days	Thu 9/5/13	Thu 10/17/13	42SS+15 days	
44	RSY pads survey, remediate and sample	38 days	Tue 7/23/13	Thu 9/12/13		45,46SS+15 days
45	RSY pads (12 removed)	4 days	Fri 9/13/13	Wed 9/18/13	44	
46	RSY pads sample analysis returned	31 days	Tue 8/13/13	Tue 9/24/13	44SS+15 days	7SS+15 days
47	RSY pads RASO approval process	31 days	Tue 9/3/13	Tue 10/15/13	46SS+15 days	0SS+15 days
48	Sample, survey and remediate complete 2.5.1.3	0 days	Sun 9/8/13	Sun 9/8/13		50
49	**2.5.1.4 Backfill Restore**	**40 days**	**Mon 9/9/13**	**Fri 11/1/13**		
50	2.5.1.4 Backfill Restore	40 days	Mon 9/9/13	Fri 11/1/13	48	
51	**2.5.2 Area Investigation & Remediation, and Final Status S**	**45 days**	**Thu 6/13/13**	**Wed 8/14/13**		
52	Investigate, remediate, survey, and RASO approval NRDL area 2.5.2.1	15 days	Thu 6/13/13	Wed 7/3/13	29	53,59
53	Investigate, remediate, survey, and RASO approval ship berths 2.5.2.2	30 days	Thu 7/4/13	Wed 8/14/13	52	58,62,55
54	**2.5.3 Rail Tie Survey & Disposal**	**57 days**	**Thu 8/15/13**	**Fri 11/1/13**		
55	Survey and dispose of Parcel D1 rail ties 2.5.3	57 days	Thu 8/15/13	Fri 11/1/13	53	
56	**WE6 Completion Reports**	**153 days**	**Thu 7/4/13**	**Mon 2/3/14**		
57	Prepare, review, revise, and approve survey unit ipackage soils completion reports 2.6.2	95 days	Tue 9/24/13	Mon 2/3/14	47SS+15 days	
58	Prepare, review, revise, and approveFSS ship berthds reports 2.6.2 A	95 days	Thu 8/15/13	Wed 12/25/13	53	
59	Prepare, review, revise and appprove FSS NRDL reports 2.6.2 B	95 days	Thu 7/4/13	Wed 11/13/13	52	
60	Prepare, review, revise, and approve survey Removal Action Completion reports 2.6.3	95 days	Tue 9/24/13	Mon 2/3/14	47SS+15 days	
61	**WE7 Site Support Activities**	**100 days**	**Thu 8/15/13**	**Wed 1/1/14**		
62	Waste management activities	100 days	Thu 8/15/13	Wed 1/1/14	53	



Appendix G: Training Reporting Form

Trained Contractor Personnel Log

Stormwater Management Training Log and Documentation

Project Name: Radiological Remediation and Support, Parcel D-1
WDID #: _____

Stormwater Management Topic: (check as appropriate)

☐ Erosion Control ☐ Sediment Control
☐ Wind Erosion Control ☐ Tracking Control
☐ Non-Stormwater Management ☐ Waste Management and Materials Pollution Control
☐ Stormwater Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor:_____ Telephone: _____

Course Length (hours): _____

Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone

As needed, add proof of external training (e.g., course completion certificates, credentials for QSP, QSD).

Appendix H: Construction General Permit

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board
Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

Arnold Schwarzenegger
Governor

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I. BACKGROUND

A. History

In 1972, the Federal Water Pollution Control Act (also referred to as the Clean Water Act [CWA]) was amended to provide that the discharge of pollutants to waters of the United States from any point source is unlawful unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The 1987 amendments to the CWA added Section 402(p), which establishes a framework for regulating municipal and industrial storm water discharges under the NPDES Program. On November 16, 1990, the U.S. Environmental Protection Agency (USEPA) published final regulations that established storm water permit application requirements for specified categories of industries. The regulations provide that discharges of storm water to waters of the United States from construction projects that encompass five or more acres of soil disturbance are effectively prohibited unless the discharge is in compliance with an NPDES Permit. Regulations (Phase II Rule) that became final on December 8, 1999 lowered the permitting threshold from five acres to one acre.

While federal regulations allow two permitting options for storm water discharges (Individual Permits and General Permits), the State Water Board has elected to adopt only one statewide General Permit at this time that will apply to most storm water discharges associated with construction activity.

On August 19, 1999, the State Water Board reissued the General Construction Storm Water Permit (Water Quality Order 99-08-DWQ). On December 8, 1999 the State Water Board amended Order 99-08-DWQ to apply to sites as small as one acre.

The General Permit accompanying this fact sheet regulates storm water runoff from construction sites. Regulating many storm water discharges under one permit will greatly reduce the administrative burden associated with permitting individual storm water discharges. To obtain coverage under this General Permit, dischargers shall electronically file the Permit Registration Documents (PRDs), which includes a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other compliance related documents required by this General Permit and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Quality Control Boards (Regional Water Boards) may issue General Permits or Individual Permits containing more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers.

B. Legal Challenges and Court Decisions

1. Early Court Decisions

Shortly after the passage of the CWA, the USEPA promulgated regulations exempting most storm water discharges from the NPDES permit requirements. (See 40 C.F.R. § 125.4 (1975); see also *Natural Resources Defense Council v. Costle* (D.C. Cir. 1977) 568 F.2d 1369, 1372 (*Costle*); *Defenders of Wildlife v. Browner* (9th Cir. 1999) 191 F.3d 1159, 1163 (*Defenders of Wildlife*).) When environmental groups challenged this exemption in federal court, the District of Columbia Court of Appeals invalidated the regulation, holding that the USEPA "does not have authority to exempt categories of point sources from the permit requirements of [CWA] § 402." (*Costle*, 568 F.2d at 1377.) The *Costle* court rejected the USEPA's argument that effluent-based storm sewer regulation was administratively infeasible because of the variable nature of storm water pollution and the number of affected storm sewers throughout the country. (*Id.* at 1377-82.) Although the court acknowledged the practical problems relating to storm sewer regulation, the court found the USEPA had the flexibility under the CWA to design regulations that would overcome these problems. (*Id.* at 1379-83.) In particular, the court pointed to general permits and permits based on requiring best management practices (BMPs).

During the next 15 years, the USEPA made numerous attempts to reconcile the statutory requirement of point source regulation with the practical problem of regulating possibly millions of diverse point source discharges of storm water. (See *Defenders of Wildlife*, 191 F.3d at 1163; see also Gallagher, Clean Water Act in Environmental Law Handbook (Sullivan, edit., 2003)
p. 300 (Environmental Law Handbook); Eisen, *Toward a Sustainable Urbanism: Lessons from Federal Regulation of Urban Storm Water Runoff* (1995) 48 Wash. U.J. Urb. & Contemp. L.1, 40-41 [Regulation of Urban Storm Water Runoff].)

In 1987, Congress amended the CWA to require NPDES permits for storm water discharges. (See CWA § 402(p), 33 U.S.C. § 1342(p); *Defenders of Wildlife,* 191 F.3d at 1163; *Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1296.) In these amendments, enacted as part of the Water Quality Act of 1987, Congress distinguished between industrial and municipal storm water discharges. With respect to industrial storm water discharges, Congress provided that NPDES permits "shall meet all applicable provisions of this section and section 1311 [requiring the USEPA to establish effluent limitations under specific timetables]." (CWA § 402(p)(3)(A), 33 U.S.C. § 1342(p)(3)(A); see also *Defenders of Wildlife,* 191 F.3d at 1163-64.)

In 1990, USEPA adopted regulations specifying what activities were considered “industrial” and thus required discharges of storm water associated with those activities to obtain coverage under NPDES permits. (55 Fed. Reg. 47,990 (1990); 40 C.F.R. § 122.26(b)(14).) Construction activities, deemed a subset of the industrial activities category, must also be regulated by an NPDES permit. (40 C.F.R. § 122.26(b)(14)(x)). In 1999, USEPA issued regulations for “Phase II” of storm water regulation, which required most small construction sites (1-5 acres) to be regulated under the NPDES program. (64 Fed. Reg. 68,722; 40 C.F.R. § 122.26(b)(15)(i).)

2. Court Decisions on Public Participation

Two recent federal court opinions have vacated USEPA rules that denied meaningful public review of NPDES permit conditions. On January 14, 2003, the Ninth Circuit Court of Appeals held that certain aspects of USEPA’s Phase II regulations governing MS4s were invalid primarily because the general permit did not contain express requirements for public participation. (*Environmental Defense Center v. USEPA* (9th Cir. 2003) 344 F.3d 832.) Specifically, the court determined that applications for general permit coverage (including the Notice of Intent (NOI) and Storm Water Management Program (SWMP)) must be made available to the public, the applications must be reviewed and determined to meet the applicable standard by the permitting authority before coverage commences, and there must be a process to accommodate public hearings. (*Id.* at 852-54.) Similarly, on February 28, 2005, the Second Circuit Court of Appeals held that the USEPA's confined animal feeding operation (CAFO) rule violated the CWA because it allowed dischargers to write their own nutrient management plans without public review. (*Waterkeeper Alliance v. USEPA* (2d Cir. 2005) 399 F.3d 486.) Although neither decision involved the issuance of construction storm water permits, the State Water Board’s Office of Chief Counsel has recommended that the new General Permit address the courts’ rulings where feasible[1].

[1] In *Texas Independent Producers and Royalty Owners Assn. v. USEPA* (7th Cir. 2005) 410 F.3d 964, the Seventh Circuit Court of Appeals held that the USEPA’s construction general permit was not required to provide the public with the opportunity for a public hearing on the Notice of Intent or Storm Water Pollution Prevention Plan. The Seventh Circuit briefly discussed why it agreed with the Ninth Circuit’s dissent in *Environmental Defense Center*, but generally did not discuss the substantive holdings in *Environmental Defense Center* and *Waterkeeper Alliance*, because neither court addressed the initial question of whether the plaintiffs had standing to challenge the permits at issue. However, notwithstanding the Seventh Circuit’s decision, it is not binding or controlling on the State Water Board because California is located within the Ninth Circuit.

The CWA and the USEPA's regulations provide states with the discretion to formulate permit terms, including specifying best management practices (BMPs), to achieve strict compliance with federal technology-based and water quality-based standards. (*Natural Resources Defense Council v. USEPA* (9th Cir. 1992) 966 F.2d 1292, 1308.) Accordingly, this General Permit has developed specific BMPs as well as numeric action levels (NALs) and numeric effluent limitations (NELs) in order to achieve these minimum federal standards. In addition, the General Permit requires a SWPPP and REAP (another dynamic, site-specific plan) to be developed but has removed all language requiring the discharger to implement these plans – instead, the discharger is required to comply with specific requirements. By requiring the dischargers to implement these specific BMPs, NALs, and NELs, this General Permit ensures that the dischargers do not "write their own permits." As a result this General Permit does not require each discharger's SWPPP and REAP to be reviewed and approved by the Regional Water Boards.

This General Permit also requires dischargers to electronically file all permit-related compliance documents. These documents include, but are not limited to, NOIs, SWPPPs, annual reports, Notice of Terminations (NOTs), and numeric action level (NAL) exceedance reports. Electronically submitted compliance information is immediately available to the public, as well as the Regional Water Quality Control Board (Regional Water Board) offices, via the Internet. In addition, this General Permit enables public review and hearings on permit applications when appropriate. Under this General Permit, the public clearly has a meaningful opportunity to participate in the permitting process.

C. Blue Ribbon Panel of Experts and Feasibility of Numeric Effluent Limitations

In 2005 and 2006, the State Water Board convened an expert panel (panel) to address the feasibility of numeric effluent limitations (NELs) in California's storm water permits. Specifically, the panel was asked to address:

"Is it technically feasible to establish numeric effluent limitations, or some other quantifiable limit, for inclusion in storm water permits? How would such limitations or criteria be established, and what information and data would be required?"

"The answers should address industrial general permits, construction general permits, and area-wide municipal permits. The answers should also address both technology-based limitations or criteria and water quality-based limitations or criteria. In evaluating establishment of any objective criteria, the panel should address all of the following:

The ability of the State Water Board to establish appropriate objective limitations or criteria;

How compliance determinations would be made;

The ability of dischargers and inspectors to monitor for compliance; and

The technical and financial ability of dischargers to comply with the limitations or criteria."

Through a series of public participation processes (State Water Board meetings, State Water Board workshops, and the solicitation of written comments), a number of water quality, public process and overall program effectiveness problems were identified. Some of these problems are addressed through this General Permit.

D. Summary of Panel Findings on Construction Activities

The panel's final report can be downloaded and viewed through links at www.waterboards.ca.gov or by clicking here[2].

The panel made the following observations:

"Limited field studies indicate that traditional erosion and sediment controls are highly variable in performance, resulting in highly variable turbidity levels in the site discharge."

"Site-to-site variability in runoff turbidity from undeveloped sites can also be quite large in many areas of California, particularly in more arid regions with less natural vegetative cover and steep slopes."

"Active treatment technologies involving the use of polymers with relatively large storage systems now exist that can provide much more consistent and very low discharge turbidity. However, these technologies have as yet only been applied to larger construction sites, generally five acres or greater. Furthermore, toxicity has been observed at some locations, although at the vast majority of sites, toxicity has not occurred. There is also the potential for an accidental large release of such chemicals with their use."

"To date most of the construction permits have focused on TSS and turbidity, but have not addressed other, potentially significant pollutants such as phosphorus and an assortment of chemicals used at construction sites."

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

"The quality of storm water discharges from construction sites that effectively employ BMPs likely varies due to site conditions such as climate, soil, and topography."

"The States of Oregon and Washington have recently adopted similar concepts to the Action Levels described earlier."

In addition, the panel made the following conclusions:

"It is the consensus of the Panel that active treatment technologies make Numeric Limits technically feasible for pollutants commonly associated with storm water discharges from construction sites (e.g. TSS and turbidity) for larger construction sites. Technical practicalities and cost-effectiveness may make these technologies less feasible for smaller sites, including small drainages within a larger site, as these technologies have seen limited use at small construction sites. If chemical addition is not permitted, then Numeric Limits are not likely feasible."

"The Board should consider Numeric Limits or Action Levels for other pollutants of relevance to construction sites, but in particular pH. It is of particular concern where fresh concrete or wash water from cement mixers/equipment is exposed to storm water."

"The Board should consider the phased implementation of Numeric Limits and Action Levels, commensurate with the capacity of the dischargers and support industry to respond."

[2] http://www.waterboards.ca.gov/stormwtr/docs/numeric/swpanel_final_report.pdf

E. How the Panel's Findings are Used in this General Permit

The State Water Board carefully considered the findings of the panel and related public comments. The State Water Board also reviewed and considered the comments regarding statewide storm water policy and the reissuance of the Industrial General Permit. From the input received the State Water Board identified some permit and program performance gaps that are addressed in this General Permit. The Summary of Significant Changes (below) in this General Permit are a direct result of this process.

F. Summary of Significant Changes in This General Permit

The State Water Board has significant changes to Order 99-08-DWQ. This General Permit differs from Order 99-08-DWQ in the following significant ways:

Rainfall Erosivity Waiver: this General Permit includes the option allowing a small construction site (>1 and <5 acres) to self-certify if the rainfall erosivity value (R value) for their site's given location and time frame compute to be less than or equal to 5.

Technology-Based Numeric Action Levels: this General Permit includes NALs for pH and turbidity.

Technology-Based Numeric Effluent Limitations: this General Permit contains daily average NELs for pH during any construction phase where there is a high risk of pH discharge and daily average NELs turbidity for all discharges in Risk Level 3. The daily average NEL for turbidity is set at 500 NTU to represent the minimum technology that sites need to employ (to meet the traditional Best Available Technology Economically Achievable (BAT)/ Best Conventional Pollutant Control Technology (BCT) standard) and the traditional, numeric receiving water limitations for turbidity.

Risk-Based Permitting Approach: this General Permit establishes three levels of risk possible for a construction site. Risk is calculated in two parts: 1) Project Sediment Risk, and 2) Receiving Water Risk.

Minimum Requirements Specified: this General Permit imposes more minimum BMPs and requirements that were previously only required as elements of the SWPPP or were suggested by guidance.

Project Site Soil Characteristics Monitoring and Reporting: this General Permit provides the option for dischargers to monitor and report the soil characteristics at their project location. The primary purpose of this requirement is to provide better risk determination and eventually better program evaluation.

Effluent Monitoring and Reporting: this General Permit requires effluent monitoring and reporting for pH and turbidity in storm water discharges. The purpose of this monitoring is to determine compliance with the NELs and evaluate whether NALs included in this General Permit are exceeded.

Receiving Water Monitoring and Reporting: this General Permit requires some Risk Level 3 dischargers to monitor receiving waters and conduct bioassessments.

Post-Construction Storm Water Performance Standards: this General Permit specifies runoff reduction requirements for all sites not covered by a Phase I or Phase II MS4 NPDES permit, to avoid, minimize and/or mitigate post-construction storm water runoff impacts.

Rain Event Action Plan: this General Permit requires certain sites to develop and implement a Rain Event Action Plan (REAP) that must be designed to protect all exposed portions of the site within 48 hours prior to any likely precipitation event.

Annual Reporting: this General Permit requires all projects that are enrolled for more than one continuous three-month period to submit information and annually certify that their site is in compliance

with these requirements. The primary purpose of this requirement is to provide information needed for overall program evaluation and pubic information.

Certification/Training Requirements for Key Project Personnel: this General Permit requires that key personnel (e.g., SWPPP preparers, inspectors, etc.) have specific training or certifications to ensure their level of knowledge and skills are adequate to ensure their ability to design and evaluate project specifications that will comply with General Permit requirements.

Linear Underground/Overhead Projects: this General Permit includes requirements for all Linear Underground/Overhead Projects (LUPs).

II. RATIONALE

A. General Permit Approach

A general permit for construction activities is an appropriate permitting approach for the following reasons:

1. A general permit is an efficient method to establish the essential regulatory requirements for a broad range of construction activities under differing site conditions;

2. A general permit is the most efficient method to handle the large number of construction storm water permit applications;

3. The application process for coverage under a general permit is far less onerous than that for individual permit and hence more cost effective;

4. A general permit is consistent with USEPA's four-tier permitting strategy, the purpose of which is to use the flexibility provided by the CWA in designing a workable and efficient permitting system; and

5. A general permit is designed to provide coverage for a group of related facilities or operations of a specific industry type or group of industries. It is appropriate when the discharge characteristics are sufficiently similar, and a standard set of permit requirements can effectively provide environmental protection and comply with water quality standards for discharges. In most cases, the general permit will provide sufficient and appropriate management requirements to protect the quality of receiving waters from discharges of storm water from construction sites.

There may be instances where a general permit is not appropriate for a specific construction project. A Regional Water Board may require any discharger otherwise covered under the General Permit to apply for and obtain an Individual Permit or apply for coverage under a more specific General Permit. The Regional Water Board must determine that this General Permit does not provide adequate assurance that water quality will be protected, or that there is a site-specific reason why an individual permit should be required.

B. Construction Activities Covered

1. **Construction activity subject to this General Permit:**

Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or sale of one or more acres of disturbed land surface.

Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to USEPA regulations, such as dairy barns or food processing facilities.

Construction activity associated with LUPs including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete

and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[3]

Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction[4] (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction projects that intend to disturb one or more acres of land within the jurisdictional boundaries of a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the project.

2. Linear Underground/Overhead Projects (LUPs) subject to this General Permit:

Underground/overhead facilities typically constructed as LUPs include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

Water Quality Order 2003-0007-DWQ regulated construction activities associated with small LUPs that resulted in land disturbances greater than one acre, but less than five acres. These projects were considered non-traditional construction projects. Attachment A of this Order now regulates all construction activities from LUPs resulting in land disturbances greater than one acre.

3. Common Plan of Development or Sale

USEPA regulations include the term “common plan of development or sale” to ensure that acreage within a common project does not artificially escape the permit requirements because construction activities are phased, split among smaller parcels, or completed by different owners/developers. In the absence of an exact definition of “common plan of development or sale,” the State Water Board is required to exercise its regulatory discretion in providing a common sense interpretation of the term as it applies to construction projects and permit coverage. An overbroad interpretation of the term would render meaningless the clear “one acre” federal permitting threshold and would potentially trigger permitting of

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[3] Pursuant to the Ninth Circuit Court of Appeals’ decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the USEPA’s petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

[4] A construction site that includes a dredge and/or fill discharge to any water of the United States (e.g., wetland, channel, pond, or marine water) requires a CWA Section 404 permit from the U.S. Army Corps of Engineers and a CWA Section 401 Water Quality Certification from the Regional Water Board or State Water Board.

almost any construction activity that occurs within an area that had previously received area-wide utility or road improvements.

Construction projects generally receive grading and/or building permits (Local Permits) from local authorities prior to initiating construction activity. These Local Permits spell out the scope of the project, the parcels involved, the type of construction approved, etc. Referring to the Local Permit helps define "common plan of development or sale." In cases such as tract home development, a Local Permit will include all phases of the construction project including rough grading, utility and road installation, and vertical construction. All construction activities approved in the Local Permit are part of the common plan and must remain under the General Permit until construction is completed. For custom home construction, Local Permits typically only approve vertical construction as the rough grading, utilities, and road improvements were already independently completed under the a previous Local Permit. In the case of a custom home site, the homeowner must submit plans and obtain a distinct and separate Local Permit from the local authority in order to proceed. It is not the intent of the State Water Board to require permitting for an individual homeowner building a custom home on a private lot of less than one acre if it is subject to a separate Local Permit. Similarly, the installation of a swimming pool, deck, or landscaping that disturbs less than one acre that was not part of any previous Local Permit are not required to be permitted.

The following are several examples of construction activity of less than one acre that would require permit coverage:

a. A landowner receives a building permit(s) to build tract homes on a 100-acre site split into 200 one-third acre parcels, (the remaining acreage consists of streets and parkways) which are sold to individual homeowners as they are completed. The landowner completes and sells all the parcels except for two. Although the remaining two parcels combined are less than one acre, the landowner must continue permit coverage for the two parcels.

b. One of the parcels discussed above is sold to another owner who intends to complete the construction as already approved in the Local Permit. The new landowner must file Permit Registration Documents (PRDs) to complete the construction even if the new landowner is required to obtain a separate Local Permit.

c. Landowner in (1) above purchases 50 additional one half-acre parcels adjacent to the original 200-acre project. The landowner seeks a Local Permit (or amendment to existing Local permit) to build on 20 parcels while leaving the remaining 30 parcels for future development. The landowner must amend PRDs to include the 20 parcels 14 days prior to commencement of construction activity on those parcels.

C. Construction Activities Not Covered

1. Traditional Construction Projects Not Covered

This General Permit does not apply to the following construction activity:

a. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

b. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

c. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

d. Discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction projects in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit. Construction projects within the Lahontan region must also comply with the Lahontan Region Project Guideline for Erosion Control (R6T-2005-0007 Section), which can be found at **http://www.waterboards.ca.gov/lahontan/Adopted_Orders/2005/r6t_2005_0007.pdf**

e. Construction activity that disturbs less than one acre of land surface, unless part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

f. Construction activity covered by an individual NPDES Permit for storm water discharges.

g. Landfill construction activity that is subject to the Industrial General Permit.

h. Construction activity that discharges to Combined Sewer Systems.

i. Conveyances that discharge storm water runoff combined with municipal sewage.

j. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

2. **Linear Projects Not Covered**

a. LUP construction activity does not include linear routine maintenance projects. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements, or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

i. Maintain the original purpose of the facility or hydraulic capacity.

ii. Update existing lines[5] and facilities to comply with applicable codes, standards, and regulations regardless if such projects result in increased capacity.

iii. Repairing leaks.

Routine maintenance does not include construction of new[6] lines or facilities resulting from compliance with applicable codes, standards, and regulations.

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must secure new areas,

[5]Update existing lines includes replacing existing lines with new materials or pipes.
[6]New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

b. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

c. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered construction activities where all other LUP construction activities associated with the tie-in are covered by an NOI and SWPPP of a third party or municipal agency.

3. **EPA's Small Construction Rainfall Erosivity Waiver**

EPA's Storm Water Phase II Final Rule provides the option for a Small Construction Rainfall Erosivity Waiver. This waiver applies to small construction sites between 1 and 5 acres, and allows permitting authorities to waive those sites that do not have adverse water quality impacts.

Dischargers eligible for this waiver are exempt from Construction General Permit Coverage. In order to obtain the waiver, the discharger must certify to the State Water Board that small construction activity will occur only when the rainfall erosivity factor is less than 5 ("R" in the Revised Universal Soil Loss Equation). The period of construction activity begins at initial earth disturbance and ends with final stabilization. Where vegetation will be used for final stabilization, the date of installation of a practice that provides interim non-vegetative stabilization can be used for the end of the construction period. The operator must agree (as a condition waiver eligibility) to periodically inspect and properly maintain the area until the criteria for final stabilization as defined in the General Permit have been met. If use of this interim stabilization eligibility condition was relied on to qualify for the waiver, signature on the waiver with a certification statement constitutes acceptance of and commitment to complete the final stabilization process. The discharger must submit a waiver certification to the State Board prior to commencing construction activities.

USEPA funded a cooperative agreement with Texas A&M University to develop an online rainfall erosivity calculator. Dischargers can access the calculator from EPA's website at: www.epa.gov/npdes/stormwater/cgp. Use of the calculator allows the discharger to determine potential eligibility for the rainfall erosivity waiver. It may also be useful in determining the time periods during which construction activity could be waived from permit coverage.

D. Obtaining and Terminating Permit Coverage

The appropriate Legally Responsible Person (LRP) must obtain coverage under this General Permit. To obtain coverage, the LRP or the LRP's Approved Signatory must file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

To obtain coverage under this General Permit, LRPs must electronically file the PRDs, which include a Notice of Intent (NOI), Storm Water Pollution Prevention Plan (SWPPP), and other documents required by this General Permit, and mail the appropriate permit fee to the State Water Board. It is expected that as the storm water program develops, the Regional Water Boards may issue General Permits or Individual Permits that contain more specific permit provisions. When this occurs, this General Permit will no longer regulate those dischargers that obtain coverage under Individual Permits.

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

The application requirements of the General Permit establish a mechanism to clearly identify the responsible parties, locations, and scope of operations of dischargers covered by the General Permit and to document the discharger's knowledge of the General Permit's requirements.

This General Permit provides a grandfathering exception to existing dischargers subject to Water Quality Order No. 99-08-DWQ. Construction projects covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at Risk Level 1. LUP projects covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage at LUP Type 1. The Regional Water Boards have the authority to require Risk Determination to be performed on projects currently covered under Water Quality Order No. 99-08-DWQ and 2003-0007-DWQ where they deem necessary.

LRPs must file a Notice of Termination (NOT) with the Regional Water Board when construction is complete and final stabilization has been reached or ownership has been transferred. The discharger must certify that all State and local requirements have been met in accordance with this General Permit. In order for construction to be found complete, the discharger must install post-construction storm water management measures and establish a long-term maintenance plan. This requirement is intended to ensure that the post-construction conditions at the project site do not cause or contribute to direct or indirect water quality impacts (i.e., pollution and/or hydromodification) upstream and downstream. Specifically, the discharger must demonstrate compliance with the post-construction standards set forth in this General Permit (Section XIII). The discharger is responsible for all compliance issues including all annual fees until the NOT has been filed and approved by the local Regional Water Board.

E. Discharge Prohibitions

This General Permit authorizes the discharge of storm water to surface waters from construction activities that result in the disturbance of one or more acres of land, provided that the discharger satisfies all permit conditions set forth in the Order. This General Permit prohibits the discharge of pollutants other than storm water and non-storm water discharges authorized by this General Permit or another NPDES permit. This General Permit also prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges. In addition, this General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the nine Regional Water Boards. Discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural BMPs. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction projects. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water dewatering, and other discharges not subject to a separate general NPDES permit adopted by a region. Therefore this General Permit authorizes such discharges provided they meet the following conditions.

These authorized non-storm water discharges must:

1. be infeasible to eliminate;

2. comply with BMPs as described in the SWPPP;

3. filter or treat, using appropriate technology, all dewatering discharges from sedimentation basins;

4. meet the NELs and NALs for pH and turbidity; and

5. not cause or contribute to a violation of water quality standards.

Additionally, authorized non-storm water discharges must not be used to clean up failed or inadequate construction or post-construction BMPs designed to keep materials onsite. Authorized non-storm water dewatering discharges may require a permit because some Regional Water Boards have adopted General Permits for dewatering discharges.

This General Permit prohibits the discharge of storm water that causes or threatens to cause pollution, contamination, or nuisance.

F. Effluent Standards for All Types of Discharges

1. Technology-Based Effluent Limitations

Permits for storm water discharges associated with construction activity must meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize best available technology economically achievable (BAT) for toxic pollutants and non conventional pollutants and best conventional pollutant control technology (BCT) for conventional pollutants. Additionally, these provisions require controls of pollutant discharges to reduce pollutants and any more stringent controls necessary to meet water quality standards. The USEPA has already established such limitations, known as effluent limitation guidelines (ELGs), for some industrial categories. This is not the case with construction discharges. In instances where there are no ELGs the permit writer is to use best professional judgment (BPJ) to establish requirements that the discharger must meet using BAT/BCT technology. This General Permit contains both narrative effluent limitations and new numeric effluent limitations for pH and turbidity, set using the best professional judgment (BPJ) equivalent to BAT and BCT (respectively).

BAT/BCT technologies not only include passive systems such as conventional runoff and sediment control, but also treatment systems such as coagulation/flocculation using sand filtration, when appropriate. Such technologies allow for effective treatment of soil particles less 0.02 mm (medium silt) in diameter. The discharger must install structural controls, as necessary, such as erosion and sediment controls that meet BAT and BCT to achieve compliance with water quality standards. The narrative effluent limitations constitute compliance with the requirements of the CWA.

The numeric effluent limitations for pH and turbidity are based upon BPJ, which authorizes the State Water Board to issue a permit containing "such conditions as the Administrator determines are necessary to carry out the provisions of this Chapter" (CWA § 402(a)(1), 33 U.S.C. § 1342(a)(1).) Because the USEPA has not yet issued an effluent limit guideline for storm water, the State Water Board must use BPJ to consider the appropriate technology for the category or class of point sources, based upon all available information and any unique factors relating to the sources. In addition, the permitting authority must consider a number of factors including the cost of achieving effluent reductions in relation to the effluent reduction benefits, the age of the equipment and facilities, the processes employed and any required process changes, engineering aspects of the control technologies, non-water quality environmental impacts (including energy requirements), and other such other factors as the State Water Board deems appropriate (CWA 304(b)(1)(B)).

Because the permit is an NPDES permit, there is no legal requirement to address the factors set forth in Water Code sections 13241 and 13263, unless the permit is more stringent than what federal law requires. (See *City of Burbank v. State Water Resources Control Bd.* (2005) 35 Cal.4th 613, 618, 627.) None of the requirements in this permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT/BCT and strict compliance with water quality standards. The inclusion of numeric effluent limitations (NELs) in the permit do not cause the permit to be

more stringent than current federal law. NELs and best management practices are simply two different methods of achieving the same federal requirement: strict compliance with state water quality standards. Federal law authorizes both narrative and numeric effluent limitations to meet state water quality standards. The use of NELs to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs. (State Water Board Order No. WQ 2006-0012 (*Boeing*).) Accordingly, the State Water Board does not need to take into account the factors in Water Code sections 13241 and 13263.

The State Water Board has concluded that the establishment of BAT/BCT will not create or aggravate other environmental problems through increases in air pollution, solid waste generation, or energy consumption. While there may be a slight increase in non-water quality impacts due to the implementation of additional monitoring or the construction of additional BMPs, these impacts will be negligible in comparison with the construction activities taking place on site and would be justified by the water quality benefits associated with compliance.

Considerations related to the processes employed and the changes necessitated by the adoption of the BAT/BCT effluent limits have been assessed throughout the stakeholder process (e.g., the Blue Ribbon Panel and the March 2007 preliminary draft) and are discussed in detail in Section I.C of this Fact Sheet. The following sections set forth the engineering aspects of the control technologies and the rationale for the determination of the numeric effluents for pH and turbidity.

In consideration of the costs for the establishment of BAT and BCT limits for pH and turbidity, existing requirements for the control of storm water pollution from construction sites have been established by USEPA and the previous Construction General Permit (State Water Board Order No. 99-08-DWQ) issued by the State Water Board. The General Permit establishes one, consistent set of performance standards for all levels and types of discharges (i.e., risk, linear utility, and ATS).The only difference is that for each level or type of discharge there may be more or less specific effluent limitations (e.g., the addition of numeric effluent limitations for turbidity applies to level/type 3 discharges). And the numeric effluent limitations themselves represent a minimum technology standard. In other words, the additional numeric effluent limitations, compared to the existing permit's narrative effluent limitations, do not increase compliance requirements; rather, they simply represent a point where one can quantitatively measure compliance with the lower end of the range of required technologies. Therefore, the compliance costs associated with the BAT/BCT numeric effluent limitations in this permit only differ by the costs required to measure compliance with the NELs when compared to the baseline compliance costs to comply with the limitations already established through EPA regulations and the existing Construction General Permit.

The State Water Board estimates these measurement costs to be approximately $1000 per construction site for the duration of the project. This represents the estimated cost of purchasing (or renting) monitoring equipment, in this case a turbidimeter (~$600) and a pH meter (~$400). In some cases the costs may be higher or lower. Costs could be lower if the discharger chooses to design and implement the project in a manner where effluent monitoring is likely to be avoided (e.g., no exposure during wet weather seasons, no discharge due to containment, etc.). Costs could be more if the project is subject to many effluent monitoring events or if the discharger exceeds NALs and/or NELs, resulting in additional monitoring requirements.

i. ***pH NEL***

Given the potential contaminants, the minimum standard method for control of pH in runoff requires the use of preventive measures such as avoiding concrete pours during rainy weather, covering concrete and directing flow away from fresh concrete if a pour occurs during rain, covering scrap drywall and stucco materials when stored outside and potentially exposed to rain, and other housekeeping measures. If necessary, pH-impaired storm water from construction sites can be treated in a filter or settling pond or basin, with additional natural or chemical treatment required to meet pH limits set forth in this permit. The basin or pond acts as a collection point and holds storm water for a sufficient period for the contaminants to be settled out, either naturally or artificially, and allows any additional treatment to take place. The State Water Board considers these techniques to be equivalent to BCT. In determining the pH

concentration limit for discharges, the State Water Board used BPJ to set these limitations.

The chosen limits were established by calculating three standard deviations above and below the mean pH of runoff from highway construction sites[7] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.0 to 9.0 pH Units.

ii. ***Turbidity NEL***

The Turbidity NEL of 500 NTU is a technology-based numeric effluent limitation and was developed using three different analyses aimed at finding the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality and cost-effectiveness. The analyses fell into three, main types: (1) an ecoregion-specific dataset developed by Simon et. al. (2004) [8]; (2) Statewide Regional Water Quality Control Board enforcement data; and (3) published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.

A 1:3 relationship between turbidity (expressed as NTU) and suspended sediment concentration (expressed as mg/L) is assumed based on a review of suspended sediment and turbidity data from three gages used in the USGS National Water Quality Assessment Program:

USGS 11074000 SANTA ANA R BL PRADO DAM CA
USGS 11447650 SACRAMENTO R A FREEPORT CA
USGS 11303500 SAN JOAQUIN R NR VERNALIS CA

The turbidity NEL represents a feasible and cost effective performance standard that is demonstrated to be achievable. Although data has been collected to demonstrate that lower effluent levels may be achievable at some sites, staff cannot conclude at this time that a lower NEL is achievable within all the ecoregions of the state. The NEL represents staff determination that the NEL is the most practicable based on available data. The turbidity NEL represents a bridge between the narrative effluent limitations and receiving water limitations. The NEL limit may be considered an interim performance standard as additional data becomes available for evaluation during the next permit cycle. To support this NEL, State Water Board staff analyzed construction site discharge information (monitoring data, estimates) and receiving water monitoring information.

Since the turbidity NEL represents an appropriate threshold level expected at a site, compliance with this value does not necessarily represent compliance with either the narrative effluent limitations (as enforced through the BAT/BCT standard) or the receiving water limitations. In the San Diego region, some inland surface waters have a receiving water objective for turbidity equal to 20 NTU. Obviously a discharge up to, but not exceeding, the turbidity NEL of 500 NTU may still cause or contribute to the exceedance of the 20 NTU standard. Most of the waters of the State are protected by turbidity objectives based on background conditions**.**

Table 1 - Regional Water Board Basin Plans, Water Quality Objectives for Turbidity

REGIONAL WATER BOARD	WQ Objective	Background/Natural Turbidity	Maximum Increase
1	Based on background	All levels	20%

[7] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.
[8] Simon, A., W.D. Dickerson, and A. Heins. 2004. Suspended-sediment transport rates at the 1.5-year recurrence interval for ecoregions of the United States: transport conditions at the bankfull and effective discharge. Geomorphology 58: pp. 243-262.

2	Based on background	> 50 NTU	10%
3	Based on background	0-50 JTU 50-100 JTU > 100 JTU	20% 10 NTU 10%
4	Based on background	0-50 NTU > 50 NTU	20% 10%
5	Based on background	0-5 NTU 5-50 NTU 50-100 NTU >100 NTU	1 NTU 20% 10 NTU 10%
6	Based on background	All levels	10%
7	Based on background	N/A	N/A
8	Based on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%
9	Inland Surface Waters, 20 NTU All others, based on background	0-50 NTU 50-100 NTU >100 NTU	20% 10 NTU 10%

Table 2 shows the suspended sediment concentrations at the 1.5 year flow recurrence interval for the 12 ecoregions in California from Simon et. al (2004).

Table 2 - Results of Ecoregion Analysis

Ecoregion	Percent of California Land Area	Median Suspended Sediment Concentration (mg/L)
1	9.1	874
4	0.2	120
5	8.8	35.6
6	20.7	1530
7	7.7	122
8	3.0	47.4
9	9.4	284
13	5.2	143
14	21.7	5150
78	8.1	581
80	2.4	199
81	3.7	503
Area-weighted average		1633

If a 1:3 relationship between turbidity and suspended sediment is assumed, the median turbidity is 544 NTU.

The following table is composed of turbidity readings measured in NTUs from administrative civil liberty (ACL) actions for construction sites from 2003 - 2009. This data was derived from the complete listing of construction-related ACLs for the six year period. All ACLs were reviewed and those that included turbidimeter readings at the point of storm water discharge were selected for this dataset.

Table 3 – ACL Sampling Data taken by Regional Water Board Staff

WDID#	Region	Discharger	Turbidity (NTU)
5S34C331884	5S	Bradshaw Interceptor Section 6B	1800
5S05C325110	5S	Bridalwood Subdivision	1670
5S48C336297	5S	Cheyenne at Browns Valley	1629
5R32C314271	5R	Grizzly Ranch Construction	1400
6A090406008	6T	El Dorado County Department of Transportation, Angora Creek	97.4
5S03C346861	5S	TML Development, LLC	1600
6A31C325917	6T	Northstar Village	See Subdata Set

Subdata Set - Turbidity for point of storm water runoff discharge at Northstar Village

Date	Turbidity (NTU)	Location
10/5/2006	900	Middle Martis Creek
11/2/2006	190	Middle Martis Creek
01/04/2007	36	West Fork, West Martis Creek
02/08/2007	180	Middle Martis Creek
02/09/2007	130	Middle Martis Creek
02/09/2007	290	Middle Martis Creek
02/09/2007	100	West Fork, West Martis Creek
02/10/2007	28	Middle Martis Creek
02/10/2007	23	Middle Martis Creek
02/10/2007	32	Middle Martis Creek
02/10/2007	12	Middle Martis Creek
02/10/2007	60	West Fork, West Martis Creek
02/10/2007	34	West Fork, West Martis Creek

A 95% confidence interval for mean turbidity in an ACL order was constructed. The data set used was a small sample size, so the 500 NTU (the value derived as the NEL for this General Permit) needed to be verified as a possible population mean. In this case, the population refers to a hypothetical population of turbidity measurements of which our sample of 20 represents. A t-distribution was assumed due to the small sample size:

Mean: 512.23 NTU
Standard Deviation: 686.85
Margin of Error: 321.45
Confidence Interval: 190.78 NTU (Low)
833.68 NTU (High)

Based on a constructed 95% confidence interval, an ACL order turbidity measurement will be between 190.78 – 833.68 NTU. 500 NTU falls within this range. Using the same data set, a small-sample hypothesis test was also performed to test if the ACL turbidity data set contains enough information to cast doubt on choosing a 500 NTU as a mean. 500 NTU was again chosen due to its proposed use as an acceptable NEL value. The test was carried out using a 95% confidence interval. Results indicated that the ACL turbidity data set *does not* contain significant sample evidence to reject the claim of 500 NTU as an acceptable mean for the ACL turbidity population.

There are not many published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites. The most often cited study is a report titled, "Improving the Cost Effectiveness of Highway Construction Site Erosion and Pollution Control" (Horner, Guedry, and Kortenhof 1990, http://www.wsdot.wa.gov/Research/Reports/200/200.1.htm). In a comment letter summarizing this report sent to the State Water Board, the primary author, Dr. Horner, states:

"The most effective erosion control product was wood fiber mulch applied at two different rates along with a bonding agent and grass seed in sufficient time before the tests to achieve germination. Plots treated in this way reduced influent turbidity by more than 97 percent and discharged effluent exhibiting mean and maximum turbidity values of 21 and 73 NTU, respectively. Some other mulch and blanket materials performed nearly as well. These tests demonstrated the control ability of widely available BMPs over a very broad range of erosion potential."

Other technologies studied in this report produced effluent quality at or near 100 NTU. It is the BPJ of the State Water Board staff that erosion control, while preferred, is not always an option on construction sites and that technology performance in a controlled study showing effluent quality directly leaving a BMP is always easier and cheaper to control than effluent being discharged from the project (edge of property, etc.). As a result, it is the BPJ of the State Water Board staff that it is not cost effective or feasible, at this time, for all risk level and type 3 sites in California to achieve effluent discharges with turbidity values that are less than 100 NTU.

To summarize, the analysis showed that: (1) results of the Simon et. al dataset reveals turbidity values in background receiving water in California's ecoregions range from 16 NTU to 1716 NTU (with a mean of 544 NTU); (2) based on a constructed 95% confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU; and (3) sites with highly controlled discharges employing and maintaining good erosion control practices can discharge effluent from the BMP with turbidity values less than 100 NTU. Therefore, the appropriate threshold to set the technology-based limit to ensure environmental protection, effluent quality, and cost-effectiveness ranges from 100 NTU to over 1700 NTU. To keep this parameter and the costs of compliance as low as possible, State Water Board staff has determined, using its BPJ, that it is most cost effective to set the numeric effluent limitation for turbidity at 500 NTU.

a. Compliance Storm Event

In response to public comments on the last draft and the recommendations of the expert panel, this General Permit contains "compliance storm event" exceptions from the technology-based NELs. The rationale is that technology-based requirements are developed assuming a certain design storm (defined as the storm producing a rainfall amount for a specified BMPs capacity). Compliance thresholds are needed for storm events above and beyond the design storms assumed to determine the technology-based NELs. For Risk Level 3 project sites applicable to NELs, this General Permit establishes a compliance storm event as the equivalent rainfall in a 5-year, 24-hour storm. This compliance storm was chosen due to its relative infrequent occurrence and the fact that the runoff volume associated with it is not as large as a 10-year, 24-hour storm event. The discharger shall determine this value using Western

Regional Climate Center Precipitation Frequency Maps[9] for 5-year 24-hour storm events in Northern and Southern California (note that these are expressed in tenths of inches – divide by 10 to get inches).

b. TMDLs and Waste Load Allocations

Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL for sediment has been adopted by the Regional Water Board or USEPA, must comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of sediment. If it does, the TMDL should include a specific waste load allocation for this activity/source. The discharger, in this case, may be required by a separate Regional Water Board order to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. If a specific waste load allocation has been established that would apply to a specific discharge, the Regional Water Board may adopt an order requiring specific implementation actions necessary to meet that allocation. In the instance where an approved TMDL has specified a general waste load allocation to construction storm water discharges, but no specific requirements for construction sites have been identified in the TMDL, dischargers must consult with the state TMDL authority[10] to confirm that adherence to a SWPPP that meets the requirements of the General Permit will be consistent with the approved TMDL.

2. Determining Compliance with Effluent Standards

a. Technology-Based Numeric Action Levels (NALs)

This General Permit contains technology-based NALs for pH and turbidity, and requirements for effluent monitoring at all Risk level 2 & 3, and LUP Type 2 & 3 sites. Numeric action levels are essentially numeric benchmark values for certain parameters that, if exceeded in effluent sampling, trigger the discharger to take actions. Exceedance of an NAL does not itself constitute a violation of the General Permit. If the discharger fails to take the corrective action required by the General Permit, though, that may consititute a violation.

The primary purpose of NALs is to assist dischargers in evaluating the effectiveness of their on-site measures. Construction sites need to employ many different systems that must work together to achieve compliance with the permit's requirements. The NALs chosen should indicate whether the systems are working as intended.

Another purpose of NALs is to provide information regarding construction activities and water quality impacts. This data will provide the State and Regional Water Boards and the rest of the storm water community with more information about levels and types of pollutants present in runoff and how effective the dischargers BMPs are at reducing pollutants in effluent. The State Water Board also hopes to learn more about the linkage between effluent and receiving water quality. In addition, these requirements will provide information on the mechanics needed to establish compliance monitoring programs at construction sites in future permit deliberations.

i. *pH*

[9] http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif & http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif .
[10] http://www.waterboards.ca.gov/tmdl/tmdl.html.

The chosen limits were established by calculating one standard deviation above and below the mean pH of runoff from highway construction sites[11] in California. Proper implementation of BMPs should result in discharges that are within the range of 6.5 to 8.5 pH Units.

The Caltrans study included 33 highway construction sites throughout California over a period of four years, which included 120 storm events. All of these sites had BMPs in place that would be generally implemented at all types of construction sites in California.

ii. ***Turbidity***

BPJ was used to develop an NAL that can be used as a learning tool to help dischargers improve their site controls, and to provide meaningful information on the effectiveness of storm water controls. A statewide turbidity NAL has been set at 250 NTU.

G. Receiving Water Limitations

Construction-related activities that cause or contribute to an exceedance of water quality standards must be addressed. The dynamic nature of construction activity gives the discharger the ability to quickly identify and monitor the source of the exceedances. This is because when storm water mobilizes sediment, it provides visual cues as to where corrective actions should take place and how effective they are once implemented.

This General Permit requires that storm water discharges and authorized non-storm water discharges must not contain pollutants that cause or contribute to an exceedance of any applicable water quality objective or water quality standards. The monitoring requirements in this General Permit for sampling and analysis procedures will help determine whether BMPs installed and maintained are preventing pollutants in discharges from the construction site that may cause or contribute to an exceedance of water quality standards.

Water quality standards consist of designated beneficial uses of surface waters and the adoption of ambient criteria necessary to protect those uses. When adopted by the State Water Board or a Regional Water Board, the ambient criteria are termed "water quality objectives." If storm water runoff from construction sites contains pollutants, there is a risk that those pollutants could enter surface waters and cause or contribute to an exceedance of water quality standards. For that reason, dischargers should be aware of the applicable water quality standards in their receiving waters. (The best method to ensure compliance with receiving water limitations is to implement BMPs that prevent pollutants from contact with storm water or from leaving the construction site in runoff.)

In California, water quality standards are published in the Basin Plans adopted by each Regional Water Board, the California Toxics Rule (CTR), the National Toxics Rule (NTR), and the Ocean Plan.

Dischargers can determine the applicable water quality standards by contacting Regional Water Board staff or by consulting one of the following sources. The actual Basin Plans that contain the water quality standards can be viewed at the website of the appropriate Regional Water Board. (http://www.waterboards.ca.gov/regions.html), the State Water Board site for statewide plans (http://www.waterboards.ca.gov/plnspols/index.html), or the USEPA regulations for the NTR and CTR (40 C.F.R. §§ 131.36-38). Basin Plans and statewide plans are also available by mail from the appropriate Regional Water Board or the State Water Board. The USEPA regulations are available at http://www.epa.gov/. Additional information concerning water quality standards can be accessed through http://www.waterboards.ca.gov/stormwtr/gen_const.html.

[11] Caltrans Construction Sites Runoff Characterization Study, 2002. Available at: http://www.dot.ca.gov/hq/env/stormwater/pdf/CTSW-RT-02-055.pdf.

H. Training Qualifications and Requirements

The Blue Ribbon Panel (BRP) made the following observation about the lack of industry-specific training requirements:

"Currently, there is no required training or certification program for contractors, preparers of soil erosion and sediment control Storm Water Pollution Prevention Plans, or field inspectors."

Order 99-08-DWQ required that all dischargers train their employees on how to comply with the permit, but it did not specificy a curriculum or certification program. This has resulted in inconsistent implementation by all affected parties - the dischargers, the local governments where the construction activity occurs, and the regulators required to enforce 99-08-DWQ. This General Permit requires Qualified SWPPP Developers and practitioners to obtain appropriate training, and makes this curriculum mandatory two years after adoption, to allow time for course completion. The State and Regional Water Board are working with many stakeholders to develop the curriculum and mechanisms needed to develop and deliver the courses.

To ensure that the preparation, implementation, and oversight of the SWPPP is sufficient for effective pollution prevention, the Qualified SWPPP Developer and Qualified SWPPP Practitioners responsible for creating, revising, overseeing, and implementing the SWPPP must attend a State Water Board-sponsored or approved Qualified SWPPP Developer and Qualified SWPPP Practitioner training course.

I. Sampling, Monitoring, Reporting and Record Keeping

1. Traditional Construction Monitoring Requirements

This General Permit requires visual monitoring at all sites, and effluent water quality at all Risk Level 2 & 3 sites. It requires receiving water monitoring at some Risk Level 3 sites. All sites are required to submit annual reports, which contain various types of information, depending on the site characteristics and events. A summary of the monitoring and reporting requirements is found in Table 4.

Table 4 - Required Monitoring Elements for Risk Levels

	Visual	Non-visible Pollutant	Effluent	Receiving Water
Risk Level 1	three types required for all Risk Levels: non-storm water, pre-rain and post-rain	As needed for all Risk Levels (see below)	where applicable	not required
Risk Level 2			pH, turbidity	not required
Risk Level 3			(if NEL exceeded) pH, turbidity and SSC	(if NEL exceeded) pH, turbidity and SSC. Bioassessment for sites 30 acres or larger.

a. Visual

All dischargers are required to conduct quarterly, non-storm water visual inspections. For these inspections, the discharger must visually observe each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources. For storm-related inspections, dischargers must visually observe storm water discharges at all discharge locations within two business days after a qualifying event. For this requirement, a qualifying rain event is one producing precipitation of ½ inch or more of discharge. Dischargers must conduct a post-storm event inspection to

(1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify any additional BMPs necessary and revise the SWPPP accordingly. Dischargers must maintain on-site records of all visual observations, personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

b. Non-Visible Pollutant Monitoring

This General Permit requires that all dischargers develop a sampling and analysis strategy for monitoring pollutants that are not visually detectable in storm water. Monitoring for non-visible pollutants must be required at any construction site when the exposure of construction materials occurs and where a discharge can cause or contribute to an exceedance of a water quality objective.

Of significant concern for construction discharges are the pollutants found in materials used in large quantities at construction sites throughout California and exposed throughout the rainy season, such as cement, flyash, and other recycled materials or by-products of combustion. The water quality standards that apply to these materials will depend on their composition. Some of the more common storm water pollutants from construction activity are not CTR pollutants. Examples of non-visible pollutants include glyphosate (herbicides), diazinon and chlorpyrifos (pesticides), nutrients (fertilizers), and molybdenum (lubricants). The use of diazinon and chlorpyrifos is a common practice among landscaping professionals and may trigger sampling and analysis requirements if these materials come into contact with storm water. High pH values from cement and gypsum, high pH and SSC from wash waters, and chemical/fecal contamination from portable toilets, also are not CTR pollutants. Although some of these constituents do have numeric water quality objectives in individual Basin Plans, many do not and are subject only to narrative water quality standards (i.e. not causing toxicity). Dischargers are encouraged to discuss these issues with Regional Water Board staff and other storm water quality professionals.

The most effective way to avoid the sampling and analysis requirements, and to ensure permit compliance, is to avoid the exposure of construction materials to precipitation and storm water runoff. Materials that are not exposed do not have the potential to enter storm water runoff, and therefore receiving waters sampling is not required. Preventing contact between storm water and construction materials is one of the most important BMPs at any construction site.

Preventing or eliminating the exposure of pollutants at construction sites is not always possible. Some materials, such as soil amendments, are designed to be used in a manner that will result in exposure to storm water. In these cases, it is important to make sure that these materials are applied according to the manufacturer's instructions and at a time when they are unlikely to be washed away. Other construction materials can be exposed when storage, waste disposal or the application of the material is done in a manner not protective of water quality. For these situations, sampling is required unless there is capture and containment of all storm water that has been exposed. In cases where construction materials may be exposed to storm water, but the storm water is contained and is not allowed to run off the site, sampling will only be required when inspections show that the containment failed or is breached, resulting in potential exposure or discharge to receiving waters.

The discharger must develop a list of potential pollutants based on a review of potential sources, which will include construction materials soil amendments, soil treatments, and historic contamination at the site. The discharger must review existing environmental and real estate documentation to determine the potential for pollutants that could be present on the construction site as a result of past land use activities.

Good sources of information on previously existing pollution and past land uses include:

i. Environmental Assessments;

ii. Initial Studies;

iii. Phase 1 Assessments prepared for property transfers; and

iv. Environmental Impact Reports or Environmental Impact Statements prepared under the requirements of the National Environmental Policy Act or the California Environmental Quality Act.

In some instances, the results of soil chemical analyses may be available and can provide additional information on potential contamination.

The potential pollutant list must include all non-visible pollutants that are known or should be known to occur on the construction site including, but not limited to, materials that:

i. are being used in construction activities;

ii. are stored on the construction site;

iii. were spilled during construction operations and not cleaned up;

iv. were stored (or used) in a manner that created the potential for a release of the materials during past land use activities;

v. were spilled during previous land use activities and not cleaned up; or

vi. were applied to the soil as part of past land use activities.

C. Effluent Monitoring

Federal regulations[12] require effluent monitoring for discharges subject to NALs and NELs. Subsequently, all Risk Level 2 and 3 dischargers must perform sampling and analysis of effluent discharges to characterize discharges associated with construction activity from the entire area disturbed by the project. Dischargers must collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

Table 5 - Storm Water Effluent Monitoring Requirements by Risk Level

	Frequency	Effluent Monitoring (Section E, below)
Risk Level 1	when applicable	non-visible pollutant parameters (if applicable)
Risk Level 2	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	pH, turbidity, and non-visible pollutant parameters (if applicable)
Risk Level 3	Minimum of 3 samples per day during qualifying rain event characterizing discharges associated with construction activity from the entire project disturbed area.	If NEL exceeded: pH, turbidity and suspended sediment concentration (SSC)., Plus non-visible pollutant parameters if applicable

Risk Level 1 dischargers must analyze samples for:

[12] 40 C.F.R. § 122.44.

i. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment C contained in the General Permit.

Risk Level 2 dischargers must analyze samples for:

i. pH and turbidity;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment D contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

Risk Level 3 dischargers must analyze samples for:

i. pH, turbidity and SSC;

ii. any parameters indicating the presence of pollutants identified in the pollutant source assessment required in Attachment E contained in the General Permit, and

iii. any additional parameters for which monitoring is required by the Regional Water Board.

2. **Linear Monitoring and Sampling Requirements**

Attachment A, establishes minimum monitoring and reporting requirements for all LUPs. It establishes different monitoring requirements depending on project complexity and risk to water quality. The monitoring requirements for Type 1 LUPs are less than Type 2 & 3 projects because Type 1 projects have a lower potential to impact water quality.

A discharger shall prepare a monitoring program prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project.

a. **Type 1 LUP Monitoring Requirements**

A discharger must conduct daily visual inspections of Type 1 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be conducted in conjunction with other daily activities. Inspections will be conducted to ensure the BMPs are adequate, maintained, and in place at the end of the construction day. The discharger will revise the SWPPP, as appropriate, based on the results of the daily inspections. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures have been installed, and successful final vegetative cover or other stabilization criteria have been met).

A discharger shall implement the monitoring program for inspecting Type 1 LUPs. This program requires temporary and permanent stabilization BMPs after active construction is completed. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where re-vegetation is chosen until minimum vegetative coverage has been established. Photographs shall be taken during site inspections and submitted to the State Water Board.

b. Type 2 & 3 LUP Monitoring Requirements

A discharger must conduct daily visual inspections of Type 2 & 3 LUPs during working hours while construction activities are occurring. Inspections are to be conducted by qualified personnel and can be in conjunction with other daily activities.

All dischargers of Type 2 & 3 LUPs are required to conduct inspections by qualified personnel of the construction site during normal working hours prior to all anticipated storm events and after actual storm events. During extended storm events, the discharger shall conduct inspections during normal working hours for each 24-hour period. Inspections can be discontinued in non-active construction areas where soil disturbing activities have been completed and final stabilization has been achieved (e.g., trench has been paved, substructures installed, and successful vegetative cover or other stabilization criteria have been met).

The goals of these inspections are (1) to identify areas contributing to a storm water discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate and properly installed and functioning in accordance with the terms of the General Permit; and (3) to determine whether additional control practices or corrective maintenance activities are needed. Equipment, materials, and workers must be available for rapid response to failures and emergencies. All corrective maintenance to BMPs shall be performed as soon as possible, depending upon worker safety.

All dischargers shall develop and implement a monitoring program for inspecting Type 2 & 3 LUPs that require temporary and permanent stabilization BMPs after active construction is completed. Inspections will be conducted to ensure the BMPs are adequate and maintained. Inspection activities will continue until adequate permanent stabilization has been established and will continue in areas where revegetation is chosen until minimum vegetative coverage has been established.

A log of inspections conducted before, during, and after the storm events must be maintained in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection. Photographs must be taken during site inspections and submitted to the State Water Board.

c. Sampling Requirements for all LUP Project Types

LUPs are also subject to sampling and analysis requirements for visible pollutants (i.e., sedimentation/siltation, turbidity) and for non-visible pollutants.

Sampling for visible pollutants is required for Type 2 & 3 LUPs.

Non-visible pollutant monitoring is required for pollutants associated with construction sites and activities that (1) are not visually detectable in storm water discharges, and (2) are known or should be known to occur on the construction site, and (3) could cause or contribute to an exceedance of water quality objectives in the receiving waters. Sample collection for non-visible pollutants must only be required (1) during a storm event when pollutants associated with construction activities may be discharged with storm water runoff due to a spill, or in the event there was a breach, malfunction, failure, and/or leak of any BMP, and (2) when the discharger has failed to adequately clean the area of material and pollutants. Failure to implement appropriate BMPs will trigger the same sampling requirements as those required for a breach, malfunction and/or leak, or when the discharger has failed to implement appropriate BMPs prior to the next storm event.

Additional monitoring parameters may be required by the Regional Water Boards.

It is not anticipated that many LUPs will be required to collect samples for pollutants not visually detected in runoff due to the nature and character of the construction site and activities as previously described in this fact sheet. Most LUPs are constructed in urban areas with public access (e.g., existing roadways, road shoulders, parking areas, etc.). This raises a concern regarding the potential contribution of pollutants from vehicle use and/or from normal activities of the public (e.g., vehicle washing, landscape fertilization, pest spraying, etc.) in runoff from the project site. Since the dischargers are not the land

owners of the project area and are not able to control the presence of these pollutants in the storm water that runs through their projects, it is not the intent of this General Permit to require dischargers to sample for these pollutants. This General Permit does not require the discharger to sample for these types of pollutants except where the discharger has brought materials onsite that contain these pollutants and when a condition (e.g., breach, failure, etc.) described above occurs.

3. Receiving Water Monitoring

In order to ensure that receiving water limitations are met, discharges subject to numeric effluent limitations (i.e., Risk Level 3, LUP Type 3, and ATS with direct discharges into receiving waters) must also monitor the downstream receiving water(s) for turbidity, SSC, and pH (if applicable) when an NEL is exceeded.

a. Bioassessment Monitoring

This General Permit requires a bioassessment of receiving waters for dischargers of Risk Level 3 or LUP Type 3 construction projects equal to or larger than 30 acres with direct discharges into receiving waters. Benthic macroinvertebrate samples will be taken upstream and downstream of the site's discharge point in the receiving water. Bioassessments measure the quality of the stream by analyzing the aquatic life present. Higher levels of appropriate aquatic species tend to indicate a healthy stream; whereas low levels of organisms can indicate stream degradation. Active construction sites have the potential to discharge large amounts of sediment and pollutants into receiving waters. Requiring a bioassessment for large project sites, with the most potential to impact water quality, provides a snapshot of the health of the receiving water prior to initiation of construction activities. This snapshot can be used in comparison to the health of the receiving water after construction has commenced.

Each ecoregion (biologically and geographically related area) in the State has a specific yearly peak time where stream biota is in a stable and abundant state. This time of year is called an Index Period. The bioassessment requirements in this General Permit, requires benthic macroinvertebrate sampling within a sites index period. The State Water Board has developed a map designating index periods for the ecoregions in the State (see State Water Board Website).

This General Permit requires the bioassessment methods to be in accordance with the Surface Water Ambient Monitoring Program (SWAMP) in order to provide data consistency within the state as well as generate useable biological stream data.

Table 6 - Receiving Water Monitoring Requirements

	Receiving Water Monitoring Parameters
Risk Level 1 /LUP Type 1	not required
Risk Level 2 / LUP Type 2	not required
Risk Level 3 / LUP Type 3	If NEL exceeded: pH (if applicable), turbidity, and SSC. Bioassessment for sites 30 acres or larger.

4. Reporting Requirements

a. NEL Violation Report

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via SMARTS, no later than 5 days after the conclusion of the storm event. The purpose of the electronic filing of the NEL Violation Report is to 1) inform stakeholder agencies and organizations and the general public, and 2) notify the State and Regional Water Boards of

the exceedance so that they can determine whether any follow-up (e.g., inspection, enforcement, etc.) is necessary to bring the site into compliance.

In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3/LUP Type 3 dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification. Specifically, the NEL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NEL and any proposed corrective actions taken.

b. NAL Exceedance Report

All Risk Level 3 and LUP Type 3 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards, via the electronic data system, no later than 5 days after the conclusion of the storm event. In the event that any effluent sample exceeds an applicable NAL, all Risk Level 2 and LUP Type 2 dischargers must electronically submit all storm event sampling results to the State and Regional Water Boards no later than 10 days after the conclusion of the storm event. The Regional Water Boards have the authority to require the submittal of an NAL Exceedance Report.

Specifically, the NAL Exceedance Report is required to contain:

- the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit are to be reported as "less than the method detection limit or <MDL");
- the date, place, and time of sampling;
- any visual observation (inspections);
- any measurements, including precipitation; and
- a description of the current BMPs associated with the effluent sample that exceeded the NAL and any proposed corrective actions taken.

c. Annual Report

All dischargers must prepare and electronically submit an annual report no later than September 1 of each year using the Storm water Multi-Application Reporting and Tracking System (SMARTS). The Annual Report must include a summary and evaluation of all sampling and analysis results, original laboratory reports, chain of custody forms, a summary of all corrective actions taken during the compliance year, and identification of any compliance activities or corrective actions that were not implemented.

5. Record Keeping

According to 40 C.F.R. Parts 122.21(p) and 122.41(j), the discharger is required to retain paper or electronic copies of all records required by this General Permit for a period of at least three years from the date generated or the date submitted to the State Water Board or Regional Water Boards. A discharger must retain records for a period beyond three years as directed by Regional Water Board.

J. Risk Determination

1. Traditional Projects

a. Overall Risk Determination

There are two major requirements related to site planning and risk determination in this General Permit. The project's overall risk is broken up into two elements – (1) project sediment risk (the relative amount of sediment that can be discharged, given the project and location details) and (2) receiving water risk (the risk sediment discharges pose to the receiving waters).

Project Sediment Risk:
Project Sediment Risk is determined by multiplying the R, K, and LS factors from the Revised Universal Soil Loss Equation (RUSLE) to obtain an estimate of project-related bare ground soil loss expressed in tons/acre. The RUSLE equation is as follows:

A = (R)(K)(LS)(C)(P)

Where: A = the rate of sheet and rill erosion
R = rainfall-runoff erosivity factor
K = soil erodibility factor
LS = length-slope factor
C = cover factor (erosion controls)
P = management operations and support practices (sediment controls)

The C and P factors are given values of 1.0 to simulate bare ground conditions.

There is a map option and a manual calculation option for determining soil loss. For the map option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The product of K and LS are shown on Figure 1. To determine soil loss in tons per acre, the discharger multiplies the R factor times the value for K times LS from the map.

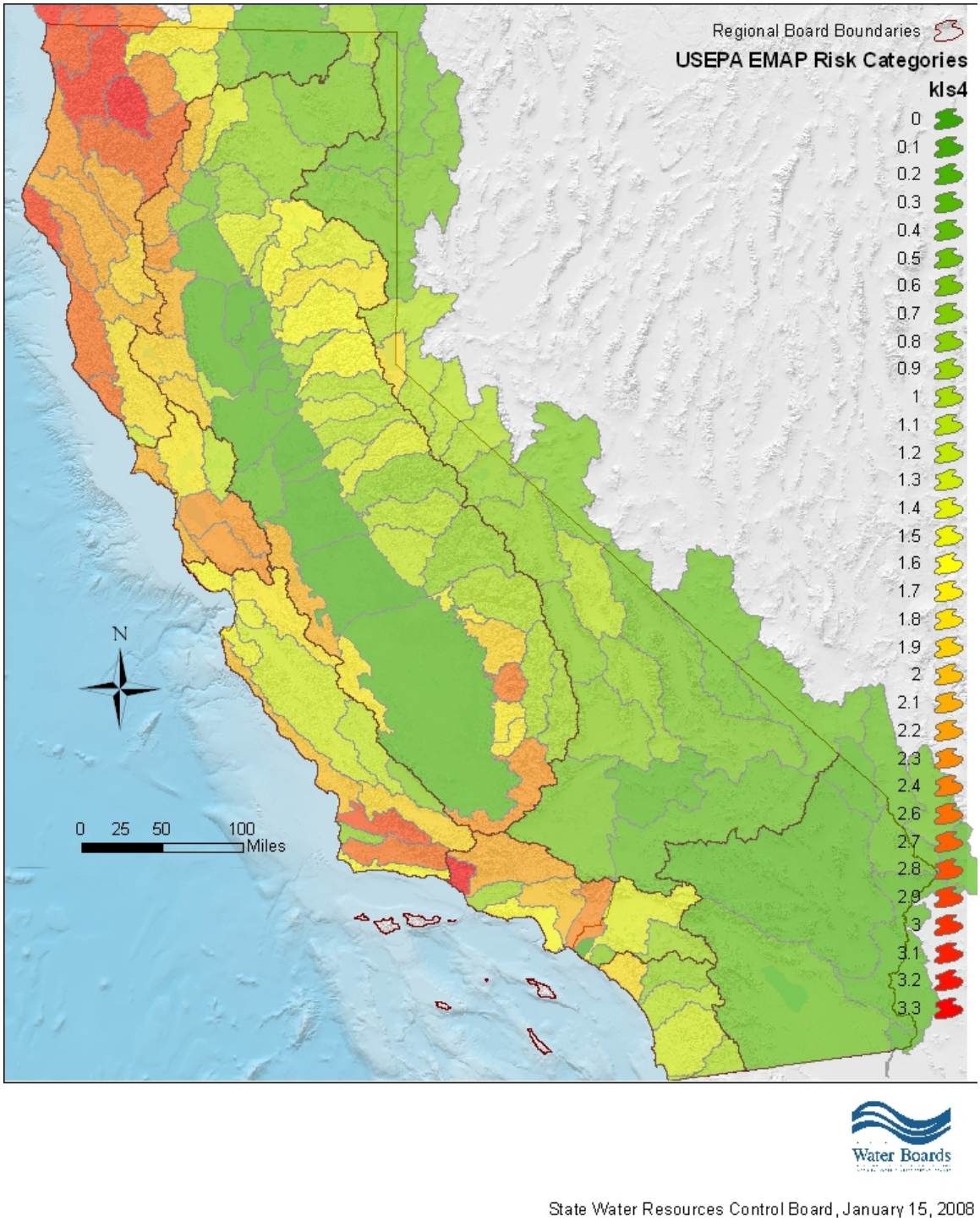

Figure 1 -Statewide Map of K * LS

For the manual calculation option, the R factor for the project is calculated using the online calculator at http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm. The K and LS factors are determined using Appendix 1.

Soil loss of less than 15 tons/acre is considered **low** sediment risk.
Soil loss between 15 and 75 tons/acre is **medium** sediment risk.
Soil loss over 75 tons/acre is considered **high** sediment risk.

The soil loss values and risk categories were obtained from mean and standard deviation RKLS values from the USEPA EMAP program. High risk is the mean RKLS value plus two standard deviations. Low risk is the mean RKLS value minus two standard deviations.

Receiving Water Risk:
Receiving water risk is based on whether a project drains to a sediment-sensitive waterbody. A sediment-sensitive waterbody is either

on the most recent 303d list for waterbodies impaired for sediment;
has a USEPA-approved Total Maximum Daily Load implementation plan for sediment; **or**
has the beneficial uses of COLD, SPAWN, and MIGRATORY.

A project that meets at least one of the three criteria has a high receiving water risk. A list of sediment-sensitive waterbodies will be posted on the State Water Board's website. It is anticipated that an interactive map of sediment sensitive water bodies in California will be available in the future.

The Risk Levels have been altered by eliminating the possibility of a Risk Level 4, and expanding the constraints for Risk Levels 1, 2, and 3. Therefore, projects with high receiving water risk and high sediment risk will be considered a Risk Level 3 risk to water quality.

In response to public comments, the Risk Level requirements have also been changed such that Risk Level 1 projects will be subject to minimum BMP and visual monitoring requirements, Risk Level 2 projects will be subject to NALs and some additional monitoring requirements, and Risk Level 3 projects will be subject to NELs, and more rigorous monitoring requirements such as receiving water monitoring and in some cases bioassessment.

Table 7 - Combined Risk Level Matrix

Combined Risk Level Matrix				
Receiving Water Risk		Sediment Risk		
		Low	Medium	High
	Low	Level 1	Level 2	
	High	Level 2		Level 3

b. Effluent Standards

All dischargers are subject to the narrative effluent limitations specified in the General Permit. The narrative effluent limitations require storm water discharges associated with construction activity to meet all applicable provisions of Sections 301 and 402 of the CWA. These provisions require controls of pollutant discharges that utilize BAT and BCT to reduce pollutants and any more stringent controls necessary to meet water quality standards.

Risk Level 2, and 3 dischargers are subject to numeric effluent standards comparable to the project's risk to water quality. Risk Level 2 dischargers that pose a medium risk to water quality are subject to technology-based NALs for pH and turbidity. Risk Level 3 dischargers that pose a high risk to water quality are subject to technology-based NALs and technology-based NELs for pH and turbidity.

c. Good Housekeeping

Proper handling and managing of construction materials can help minimize threats to water quality. The discharger must consider good housekeeping measures for: construction materials, waste management, vehicle storage & maintenance, landscape materials, and potential pollutant sources. Examples include; conducting an inventory of products used, implementing proper storage & containment, and properly cleaning all leaks from equipment and vehicles.

d. Non-Storm Water Management

Non-storm water discharges directly connected to receiving waters or the storm drain system have the potential to negatively impact water quality. The discharger must implement measures to control all non-storm water discharges during construction, and from dewatering activities associated with construction. Examples include; properly washing vehicles in contained areas, cleaning streets, and minimizing irrigation runoff.

e. Erosion Control

The best way to minimize the risk of creating erosion and sedimentation problems during construction is to disturb as little of the land surface as possible by fitting the development to the terrain. When development is tailored to the natural contours of the land, little grading is necessary and, consequently, erosion potential is lower.[14] Other effective erosion control measures include: preserving existing vegetation where feasible, limiting disturbance, and stabilizing and re-vegetating disturbed areas as soon as possible after grading or construction activities. Particular attention must be paid to large, mass-graded sites where the potential for soil exposure to the erosive effects of rainfall and wind is great and where there is potential for significant sediment discharge from the site to surface waters. Until permanent vegetation is established, soil cover is the most cost-effective and expeditious method to protect soil particles from detachment and transport by rainfall. Temporary soil stabilization can be the single most important factor in reducing erosion at construction sites. The discharger is required to consider measures such as: covering disturbed areas with mulch, temporary seeding, soil stabilizers, binders, fiber rolls or blankets, temporary vegetation, and permanent seeding. These erosion control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed. Erosion control BMPs should be the primary means of preventing storm water contamination, and sediment control techniques should be used to capture any soil that becomes eroded.[13]

Risk Level 3 dischargers pose a higher risk to water quality and are therefore additionally required to ensure that post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Sediment Control

Sediment control BMPs should be the secondary means of preventing storm water contamination. When erosion control techniques are ineffective, sediment control techniques should be used to capture any soil that becomes eroded. The discharger is required to consider perimeter control measures such as: installing silt fences or placing straw wattles below slopes. These sediment control measures are only examples of what should be considered and should not preclude new or innovative approaches currently available or being developed.

Because Risk Level 2 and 3 dischargers pose a higher risk to water quality, additional requirements for the application of sediment controls are imposed on these projects. This General Permit also authorizes the Regional Water Boards to require Risk Level 3 dischargers to implement additional site-specific

[13] U.S. Environmental Protection Agency. 2007. Developing Your Storm Water Pollution Prevention Plan: A Guide for Construction Sites.

sediment control requirements if the implementation of other erosion or sediment controls are not adequately protecting the receiving waters.

g. Run-on and Runoff Control

Inappropriate management of run-on and runoff can result in excessive physical impacts to receiving waters from sediment and increased flows. The discharger is required to manage all run-on and runoff from a project site. Examples include: installing berms and other temporary run-on and runoff diversions.

Risk Level 1 dischargers with lower risks to impact water quality are not subject to the run-on and runoff control requirements unless an evaluation deems them necessary or visual inspections show that such controls are required.

h. Inspection, Maintenance and Repair

All measures must be periodically inspected, maintained and repaired to ensure that receiving water quality is protected. Frequent inspections coupled with thorough documentation and timely repair is necessary to ensure that all measures are functioning as intended.

i. Rain Event Action Plan (REAP)

A Rain Event Action Plan (REAP) is a written document, specific for each rain event. A REAP should be designed that when implemented it protects all exposed portions of the site within 48 hours of any likely precipitation event forecast of 50% or greater probability.

This General Permit requires Risk Level 2 and 3 dischargers to develop and implement a REAP designed to protect all exposed portions of their sites within 48 hours prior to any likely precipitation event. The REAP requirement is designed to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures that are intended to reduce the amount of sediment and other pollutants generated from the active site. A REAP must be developed when there is likely a forecast of 50% or greater probability of precipitation in the project area. (The National Oceanic and Atmospheric Administration (NOAA) defines a chance of precipitation as a probability of precipitation of 30% to 50% chance of producing precipitation in the project area.[14] NOAA defines the probability of precipitation (PoP) as the likelihood of occurrence (expressed as a percent) of a measurable amount (0.01 inch or more) of liquid precipitation (or the water equivalent of frozen precipitation) during a specified period of time at any given point in the forecast area.) Forecasts are normally issued for 12-hour time periods. Descriptive terms for uncertainty and aerial coverage are used as follows:

Table 8 -National Oceanic and Atmospheric Administration (NOAA) Definition of Probability of Precipitation (PoP)

PoP	Expressions of Uncertainty	Aerial Coverage
0%	none used	none used
10%	none used	isolated
20%	slight chance	isolated
30-50%	chance	scattered

[14] http://www.crh.noaa.gov/lot/severe/wxterms.php.

60-70%	likely	numerous
80-100%	none used	none used

The discharger must obtain the precipitation forecast information from the National Weather Service Forecast Office (http://www.srh.noaa.gov/).

2. **Linear Projects**

a. **Linear Risk Determination**

LUPs vary in complexity and water quality concerns based on the type of project. This General Permit has varying application requirements based on the project's risk to water quality. Factors that lead to the characterization of the project include location, sediment risk, and receiving water risk.

Based on the location and complexity of a project area or project section area, LUPs are separated into project types. As described below, LUPs have been categorized into three project types.

i. ***Type 1 LUPs***

Type 1 LUPs are those construction projects where:

(1) 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day, or

(2) greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

Areas disturbed during construction will be returned to pre-construction conditions or equivalent protection established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization Best Management Practices (BMPs) will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

Type 1 LUPs typically do not have a high potential to impact storm water quality because (1) these construction activities are not typically conducted during a rain event, (2) these projects are normally constructed over a short period of time[15], minimizing the duration that pollutants could potentially be exposed to rainfall; and (3) disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.

[15] Short period of time refers to a project duration of weeks to months, but typically less than one year in duration.

Type 1 LUPs are determined during the risk assessment found in Attachment A.1 to be 1) low sediment risk and low receiving water risk; 2) low sediment risk and medium receiving water risk; and 3) medium sediment risk and low receiving water risk.

This General Permit requires the discharger to ensure a SWPPP is developed for these construction activities that is specific to project type, location and characteristics.

ii. ***Type 2 LUPs:***

Type 2 projects are determined to have a combination of High, Medium, and Low project sediment risk along with High, Medium, and Low receiving water risk. Like Type 1 projects, Type 2 projects are typically constructed over a short period of time. However, these projects have a higher potential to impact water quality because they:

(1) typically occur outside the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location and characteristics.

iii. ***Type 3 LUPs:***

Type 3 projects are determined to have a combination of High and Medium project sediment risk along with High and Medium receiving water risk. Similar to Type 2 projects, Type 3 projects have a higher potential to impact water quality because they:

(1) typically occur outside of the more urban/developed areas;

(2) have larger areas of soil disturbance that are not closed or restored at the end of the day;

(3) may have onsite stockpiles of soil, spoil and other materials;

(4) cross or occur in close proximity to a wide variety of sensitive resources that may include, but are not limited to, steep topography and/or water bodies; and

(5) have larger areas of disturbed soils that may be exposed for a longer time interval before final stabilization, cleanup and/or reclamation occurs.

This General Permit requires the discharger to develop and implement a SWPPP for these construction activities that are specific for project type, location, and characteristics.

b. **Linear Effluent Standards**

All LUPs are subject to the narrative effluent limitations specified in the General Permit.

Type 2 and 3 LUPs are subject to NELs comparable to the project type's risk to water quality. Type 2 projects that pose an intermediate risk to water quality are subject to technology-based NALs for pH and turbidity. Type 3 projects posing a high risk to water quality are subject to technology-based NALs and NELs for pH and turbidity.

c. Linear Good Housekeeping

Improper use and handling of construction materials could potentially cause a threat to water quality. In order to ensure proper site management of these construction materials, all LUP dischargers must comply with a minimum set of Good Housekeeping measures specified in Attachment A of this General Permit.

d. Linear Non-Storm Water Management

In order to ensure control of all non-storm water discharges during construction, all LUP dischargers must comply with the Non-Storm Water Management measures specified in Attachment A of this General Permit.

e. Linear Erosion Control

This General Permit requires all LUP dischargers to implement effective wind erosion control measures, and soil cover for inactive areas. Type 3 LUPs posing a higher risk to water quality are additionally required to ensure the post-construction soil loss is equivalent to or less than the pre-construction levels.

f. Linear Sediment Control

In order to ensure control and containment of all sediment discharges, all LUP dischargers must comply with the general Sediment Control measures specified in Attachment A or this General Permit. Additional requirements for sediment controls are imposed on Type 2 & 3 LUPs due to their higher risk to water quality.

g. Linear Run-on and Runoff Control

Discharges originating outside of a project's perimeter and flowing onto the property can adversely affect the quantity and quality of discharges originating from a project site. In order to ensure proper management of run-on and runoff, all LUPs must comply with the run-on and runoff control measures specified in Attachment A of this General Permit. Due to the lower risk of impacting water quality, Type 1 LUPs are not required to implement run-on and runoff controls unless deemed necessary by the discharger.

h. Linear Inspection, Maintenance and Repair

Proper inspection, maintenance, and repair activities are important to ensure the effectiveness of on-site measures to control water quality. In order to ensure that inspection, maintenance, and repair activities are adequately performed, the all LUP dischargers a re required to comply with the Inspection, Maintenance, and Repair requirements specified in Attachment A of this General Permit.

K. ATS[16] Requirements

There are instances on construction sites where traditional erosion and sediment controls do not effectively control accelerated erosion. Under such circumstances, or under circumstances where storm water discharges leaving the site may cause or contribute to an exceedance of a water quality standard, the use of an Active Treatment System (ATS) may be necessary. Additionally, it may be appropriate to use an ATS when site constraints inhibit the ability to construct a correctly sized sediment basin, when clay and/or highly erosive soils are present, or when the site has very steep or long slope lengths.[17]

Although treatment systems have been in use in some form since the mid-1990s, the ATS industry in California is relatively young, and detailed regulatory standards have not yet been developed. Many developers are using these systems to treat storm water discharges from their construction sites. The new ATS requirements set forth in this General Permit are based on those in place for small wastewater treatment systems, ATS regulations from the Central Valley Regional Water Quality Control Board (September 2005 memorandum "2005/2006 Rainy Season – Monitoring Requirements for Storm Water Treatment Systems that Utilize Chemical Additives to Enhance Sedimentation"), the Construction Storm Water Program at the State of Washington's Department of Ecology, as well as recent advances in technology and knowledge of coagulant performance and aquatic safety.

The effective design of an ATS requires a detailed survey and analysis of site conditions. With proper planning, ATS performance can provide exceptional water quality discharge and prevent significant impacts to surface water quality, even under extreme environmental conditions.

These systems can be very effective in reducing the sediment in storm water runoff, but the systems that use additives/polymers to enhance sedimentation also pose a potential risk to water quality (e.g., operational failure, equipment failure, additive/polymer release, etc.). The State Water Board is concerned about the potential acute and chronic impacts that the polymers and other chemical additives may have on fish and aquatic organisms if released in sufficient quantities or concentrations. In addition to anecdotal evidence of polymer releases causing aquatic toxicity in California, the literature supports this concern.[18] For example, cationic polymers have been shown to bind with the negatively charged gills of fish, resulting in mechanical suffocation.[19] Due to the potential toxicity impacts, which may be caused by the release of additives/polymers into receiving waters, this General Permit establishes residual polymer monitoring and toxicity testing requirements have been established in this General Permit for discharges from construction sites that utilize an ATS in order to protect receiving water quality and beneficial uses.

The primary treatment process in an ATS is coagulation/flocculation. ATS's operate on the principle that the added coagulant is bound to suspended sediment, forming floc, which is gravitationally settled in tanks or a basin, or removed by sand filters. A typical installation utilizes an injection pump upstream from the clarifier tank, basin, or sand filters, which is electronically metered to both flow rate and suspended solids level of the influent, assuring a constant dose. The coagulant mixes and reacts with the influent, forming a dense floc. The floc may be removed by gravitational setting in a clarifier tank or basin, or by filtration. Water from the clarifier tank, basin, or sand filters may be routed through cartridge(s) and/or bag filters for final polishing. Vendor-specific systems use various methods of dose control, sediment/floc removal, filtration, etc., that are detailed in project-specific documentation. The

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[16] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation in order to reduce turbidity caused by fine suspended sediment.

[17] Pitt, R., S. Clark, and D. Lake. 2006. Construction Site Erosion and Sediment Controls: Planning, Design, and Performance. DEStech Publications. Lancaster, PA. 370pp.

[18] RomØen, K., B. Thu, and Ø. Evensen. 2002. Immersion delivery of plasmid DNA II. A study of the potentials of a chitosan based delivery system in rainbow trout (*Oncorhynchus mykiss*) fry. *Journal of Controlled Release* **85**: 215-225.

[19] Bullock, G., V. Blazer, S. Tsukuda, and S. Summerfelt. 2000. Toxicity of acidified chitosan for cultured rainbow trout (*Oncorhynchus mykiss*). *Aquaculture* **185**:273-280.

particular coagulant/flocculant to be used for a given project is determined based on the water chemistry of the site because the coagulants are specific in their reactions with various types of sediments. Appropriate selection of dosage must be carefully matched to the characteristics of each site.

ATS's are operated in two differing modes, either Batch or Flow-Through. Batch treatment can be defined as Pump-Treat-Hold-Test-Release. In Batch treatment, water is held in a basin or tank, and is not discharged until treatment is complete. Batch treatment involves holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full. In Flow-Through treatment, water is pumped into the ATS directly from the runoff collection system or storm water holding pond, where it is treated and filtered as it flows through the system, and is then directly discharged. "Flow-Through Treatment" is also referred to as "Continuous Treatment."

1. **Effluent Standards**

This General Permit establishes NELs for discharges from construction sites that utilize an ATS. These systems lend themselves to NELs for turbidity and pH because of their known reliable treatment. Advanced systems have been in use in some form since the mid-1990s. An ATS is considered reliable, can consistently produce a discharge of less than 10 NTU, and has been used successfully at many sites in several states since 1995 to reduce turbidity to very low levels.[20]

This General Permit contains "compliance storm event" exceptions from the technology-based NELs for ATS discharges. The rationale is that technology-based requirements are developed assuming a certain design storm. In the case of ATS the industry-standard design storm is 10-year, 24-hour (as stated in Attachment F of this General Permit), so the compliance storm event has been established as the 10-year 24-hour event as well to provide consistency.

2. **Training**

Operator training is critical to the safe and efficient operation and maintenance of the ATS, and to ensure that all State Water Board monitoring and sampling requirements are met. The General Permit requires that all ATS operators have training specific to using ATS's liquid coagulants.

L. Post-Construction Requirements

Under past practices, new and redevelopment construction activities have resulted in modified natural watershed and stream processes. This is caused by altering the terrain, modifying the vegetation and soil characteristics, introducing impervious surfaces such as pavement and buildings, increasing drainage density through pipes and channels, and altering the condition of stream channels through straightening, deepening, and armoring. These changes result in a drainage system where sediment transport capacity is increased and sediment supply is decreased. A receiving channel's response is dependent on dominant channel materials and its stage of adjustment.

Construction activity can lead to impairment of beneficial uses in two main ways. First, during the actual construction process, storm water discharges can negatively affect the chemical, biological, and physical properties of downstream receiving waters. Due to the disturbance of the landscape, the most likely pollutant is sediment, however pH and other non-visible pollutants are also of great concern. Second, after most construction activities are completed at a construction site, the finished project may result in significant modification of the site's response to precipitation. New development and redevelopment

[20] Currier, B., G. Minton, R. Pitt, L. Roesner, K. Schiff, M. Stenstrom, E. Strassler, and E. Strecker. 2006. The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities.

projects have almost always resulted in permanent post-construction water quality impacts because more precipitation ends up as runoff and less precipitation is intercepted, evapotranspired, and infiltrated.

General Permit 99-08-DWQ required the SWPPP to include a description of all post-construction BMPs on a site and a maintenance schedule. An effective storm water management strategy must address the full suite of storm events (water quality, channel protection, overbank flood protection, extreme flood protection) (Figure 2).

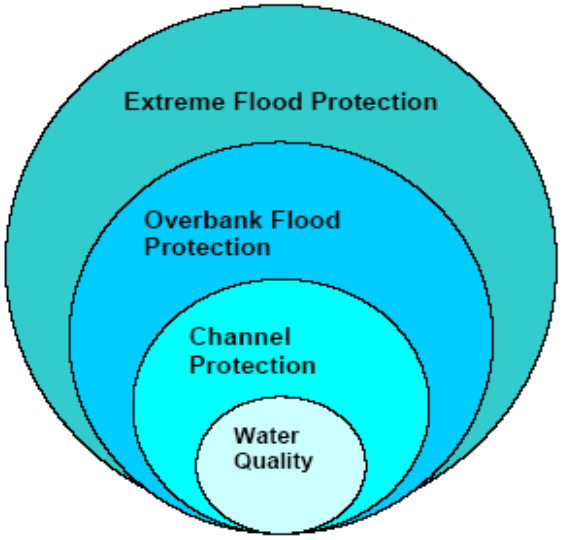

Figure 2 - Suite of Storm Events

The post-construction storm water performance standards in this General Permit specifically address water quality and channel protection events. Overbank flood protection and extreme flood protection events are traditionally dealt with in local drainage and flood protection ordinances. However, measures in this General Permit to address water quality and channel protection also reduce overbank and extreme flooding impacts. This General Permit aims to match post-construction runoff to pre-construction runoff for the 85th percentile storm event, which not only reduces the risk of impact to the receiving water's channel morphology but also provides some protection of water quality.

This General Permit clarifies that its runoff reduction requirements only apply to projects that lie outside of jurisdictions covered by a Standard Urban Storm water Management Plan (SUSMP) (or other more protective) post-construction requirements in either Phase I or Phase II permits.

Figures 3 and 4, below, show the General Permit enrollees (to Order 99-08-DWQ, as of March 10, 2008) overlaid upon a map with SUSMP (or more protective) areas in blue and purple. Areas without blue or purple indicate where the General Permit's runoff reduction requirements would actually apply.

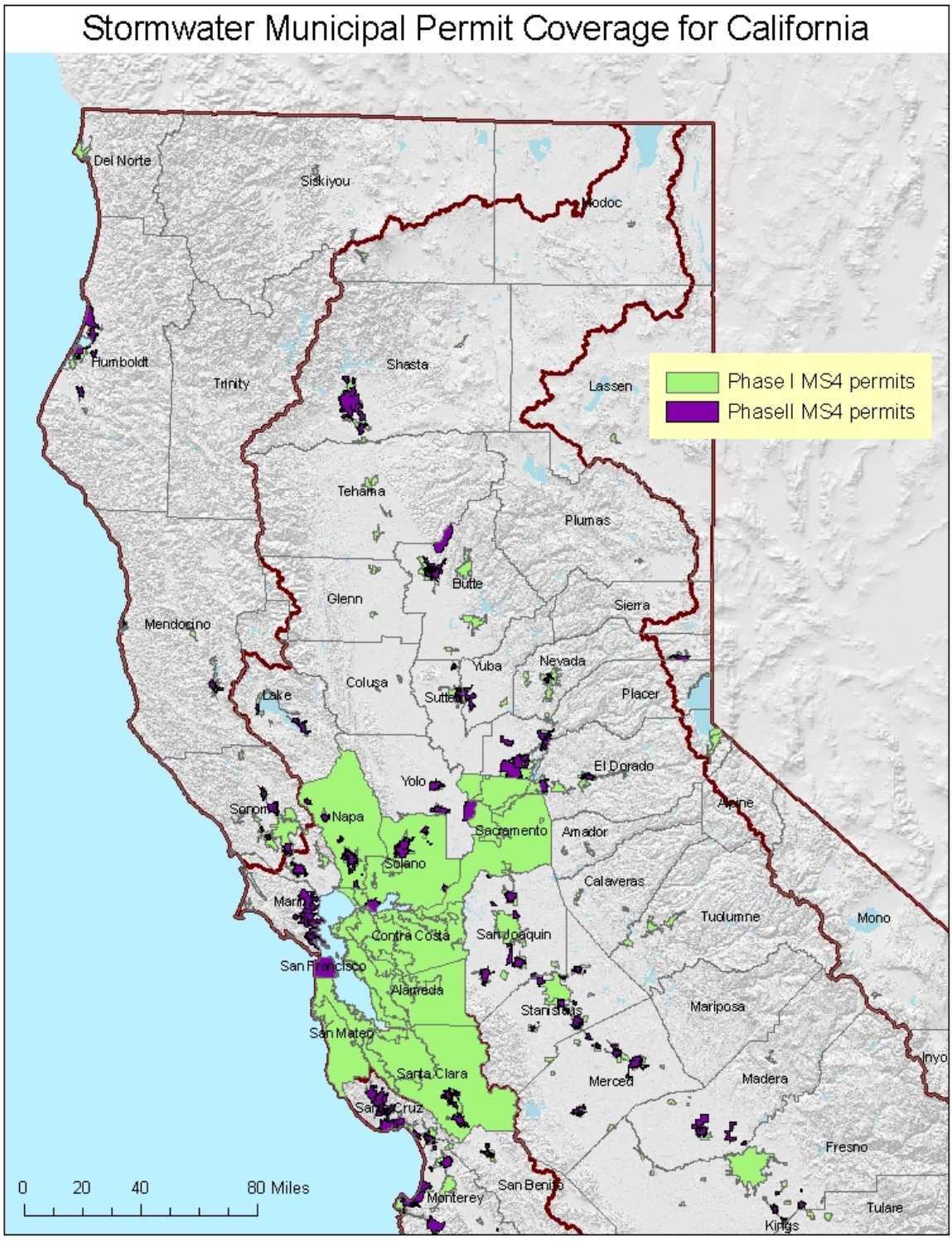

Figure 3 - Northern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Stormwater Municipal Permit Coverage for California

Figure 4 - Southern CA (2009) Counties / Cities With SUSMP-Plus Coverage

Water Quality:
This General Permit requires dischargers to replicate the pre-project runoff water balance (defined as the amount of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event, or the smallest storm event that generates runoff, whichever is larger. Contemporary storm water management generally routes these flows directly to the drainage system, increasing pollutant loads and potentially causing adverse effects on receiving waters. These smaller water quality events happen much more frequently than larger events and generate much higher pollutant loads on an annual basis. There are other adverse hydrological impacts that result from not designing according to the site's pre-construction water balance. In Maryland, Klein[21] noted that baseflow decreases as the extent of urbanization increases. Ferguson and Suckling[22] noted a similar relation in watersheds in Georgia. On Long Island, Spinello and Simmons[23] noted substantial decreases in base flow in intensely urbanized watersheds.

The permit emphasizes runoff reduction through on-site storm water reuse, interception, evapo-transpiration and infiltration through non-structural controls and conservation design measures (e.g., downspout disconnection, soil quality preservation/enhancement, interceptor trees). Employing these measures close to the source of runoff generation is the easiest and most cost-effective way to comply with the pre-construction water balance standard. Using low-tech runoff reduction techniques close to the source is consistent with a number of recommendations in the literature.[24] In many cases, BMPs implemented close to the source of runoff generation cost less than end-of the pipe measures.[25] Dischargers are given the option of using Appendix 2 to calculate the required runoff volume or a watershed process-based, continuous simulation model such as the EPA's Storm Water Management Model (SWMMM) or Hydrologic Simulation Program Fortran (HSPF). Such methods used by the discharger will be reviewed by the Regional Water Board upon NOT application.

Channel Protection:
In order to address channel protection, a basic understanding of fluvial geomorphic concepts is necessary. A dominant paradigm in fluvial geomorphology holds that streams adjust their channel dimensions (width and depth) in response to long-term changes in sediment supply and bankfull discharge (1.5 to 2 year recurrence interval). The bankfull stage corresponds to the discharge at which channel maintenance is the most effective, that is, the discharge at which the moving sediment, forming or removing bars, forming or changing bends and meanders, and generally doing work that results in the average morphologic characteristics of channels.[26] Lane (1955 as cited in Rosgen 1996[27]) showed the generalized relationship between sediment load, sediment size, stream discharge and stream slope in Figure 5. A change in any one of these variables sets up a series of mutual adjustments in the companion variables with a resulting direct change in the physical characteristics of the stream channel.

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[21] Klein 1979 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[22] Ferguson and Suckling 1990 as cited Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.
[23] Center for Watershed Protection (CWP). 2000. The Practice of Watershed Protection: Techniques for protecting our nation's streams, lakes, rivers, and estuaries. Ellicott City, MD. 741 pp.
[24] Bay Area Storm Water Management Agencies Association (BASMAA). 1997. Start at the Source: Residential Site Planning and Design Guidance Manual for Storm Water Quality Protection. Palo Alto, CA;
McCuen, R.H. 2003 Smart Growth: hydrologic perspective. Journal of Professional Issues in Engineering Education and Practice. Vol (129), pp.151-154;
Moglen, G.E. and S. Kim. 2007. Impervious imperviousness-are threshold based policies a good idea? Journal of the American Planning Association, Vol 73 No. 2. pp 161-171.
[25] Delaware Department of natural Resources (DDNR). 2004. Green technology: The Delaware urban Runoff Management Approcah. Dover, DE. 117 pp.
[26] Dunne, T and L.B. Leopold. 1978. Water in Environmental Planning. San Francisco W.H. Freeman and Company
[27] Rosgen. D.L. 1996. Applied River Morphology. Pagosa Springs. Wildland Hydrology

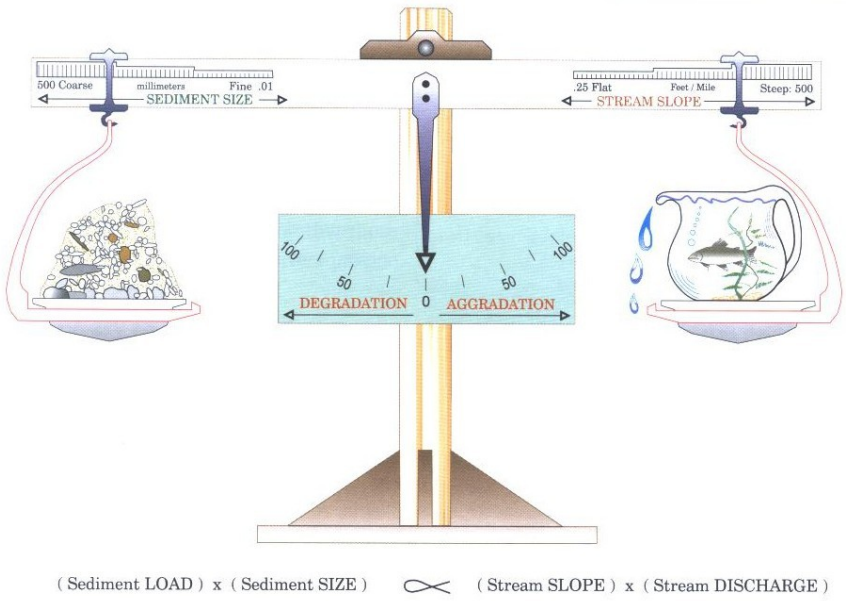

Figure 5 - Schematic of the Lane Relationship

After Lane (1955) as cited in Rosgen (1996)

Stream slope multiplied by stream discharge (the right side of the scale) is essentially an approximation of stream power, a unifying concept in fluvial geomorphology (Bledsoe 1999). Urbanization generally increases stream power and affects the resisting forces in a channel (sediment load and sediment size represented on the left side of the scale).

During construction, sediment loads can increase from 2 to 40,000 times over pre-construction levels.[28] Most of this sediment is delivered to stream channels during large, episodic rain events.[29] This increased sediment load leads to an initial aggradation phase where stream depths may decrease as sediment fills the channel, leading to a decrease in channel capacity and increase in flooding and overbank deposition. A degradation phase initiates after construction is completed.

Schumm et. al (1984) developed a channel evolution model that describes the series of adjustments from initial downcutting, to widening, to establishing new floodplains at lower elevations (Figure 6).

[28] Goldman S.J., K. Jackson, and T.A. Bursztynsky. 1986. Erosion and Sediment Control Handbook. McGraw Hill. San Francisco.
[29] Wolman 1967 as cited in Paul, M.P. and J.L. Meyer. 2001. Streams in the Urban Landscape. *Annu. Rev.Ecol. Syst.* 32: 333-365.

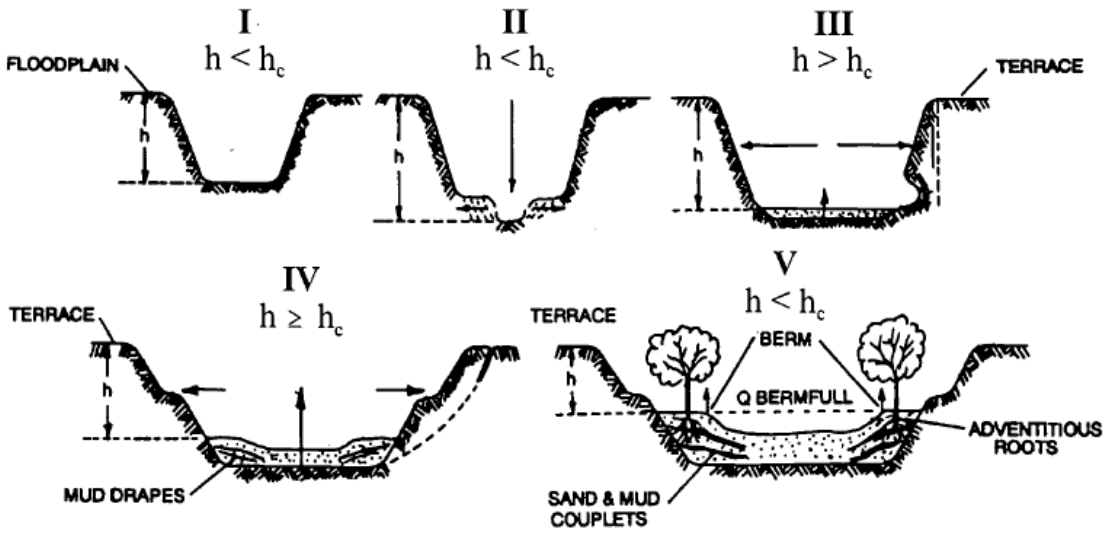

Figure 6 - Channel Changes Associated with Urbanization

After Incised Channel Evolution Sequence in Schumm et. al 1984

Channel incision (Stage II) and widening (Stages III and to a lesser degree, Stage IV) are due to a number of fundamental changes on the landscape. Connected impervious area and compaction of pervious surfaces increase the frequency and volume of bankfull discharges.[30] Increased drainage density (miles of stream length per square mile of watershed) also negatively impacts receiving stream channels.[31] Increased drainage density and hydraulic efficiency leads to an increase in the frequency and volume of bankfull discharges because the time of concentration is shortened. Flows from engineered pipes and channels are also often "sediment starved" and seek to replenish their sediment supply from the channel.

Encroachment of stream channels can also lead to an increase in stream slope, which leads to an increase in stream power. In addition, watershed sediment loads and sediment size (with size generally represented as the median bed and bank particle size, or d_{50}) decrease during urbanization.[32] This means that even if pre- and post-development stream power are the same, more erosion will occur in the post-development stage because the smaller particles are less resistant (provided they are non-cohesive).

[30] Booth, D. B. and C. R. Jackson. 1997. Urbanization of Aquatic Systems: Degradation Thresholds, Storm Water Detection, and the Limits of Mitigation. Journal of the American Water Resources Association Vol. 33, No.5, pp. 1077-1089.

[31] May, C.W. 1998. Cumulative effects of urbanization on small streams in the Puget Sound Lowland ecoregion. Conference proceedings from Puget Sound Research '98 held March 12, 13 1998 in Seattle, WA;
Santa Clara Valley Urban Runoff Pollution Prevention Program. 2002. Hydromodification Management Plan Literature Review. 80 pp.

[32] Finkenbine, J.K., D.S. Atwater, and D.S. Mavinic. 2000. Stream health after urbanization. *J. Am. Water Resour. Assoc.* 36:1149-60;
Pizzuto, J.E. W.S. Hession, and M. McBride. 2000. Comparing gravel-bed rivers in paired urban and rural catchments of southeastern Pennsylvania. *Geology* 28:79-82.

As shown in Stages II and III, the channel deepens and widens to accommodate the increased stream power [33]and decrease in sediment load and sediment size. Channels may actually narrow as entrained sediment from incision is deposited laterally in the channel. After incised channels begin to migrate laterally (Stage III), bank erosion begins, which leads to general channel widening.[34] At this point, a majority of the sediment that leaves a drainage area comes from within the channel, as opposed to the background and construction related hillslope contribution. Stage IV is characterized by more aggradation and localized bank instability. Stage V represents a new quasi-equilibrium channel morphology in balance with the new flow and sediment supply regime. In other words, stream power is in balance with sediment load and sediment size.

The magnitude of the channel morphology changes discussed above varies along a stream network as well as with the age of development, slope, geology (sand-bedded channels may cycle through the evolution sequence in a matter of decades whereas clay-dominated channels may take much longer), watershed sediment load and size, type of urbanization, and land use history. It is also dependent on a channel's stage in the channel evolution sequence when urbanization occurs. Management strategies must take into account a channel's stage of adjustment and account for future changes in the evolution of channel form (Stein and Zaleski 2005). [35]

Traditional structural water quality BMPs (e.g. detention basins and other devices used to store volumes of runoff) unless they are highly engineered to provide adequate flow duration control, do not adequately protect receiving waters from accelerated channel bed and bank erosion, do not address post-development increases in runoff volume, and do not mitigate the decline in benthic macroinvertebrate communities in the receiving waters[36] suggest that structural BMPs are not as effective in protecting aquatic communities as a continuous riparian buffer of native vegetation. This is supported by the findings of Zucker and White[37], where instream biological metrics were correlated with the extent of forested buffers.

This General Permit requires dischargers to maintain pre-development drainage densities and times of concentration in order to protect channels and encourages dischargers to implement setbacks to reduce channel slope and velocity changes that can lead to aquatic habitat degradation.

There are a number of other approaches for modeling fluvial systems, including statistical and physical models and simpler stream power models.[38] The use of these models in California is described in Stein and Zaleski (2005).[39] Rather than prescribe a specific one-size-fits-all modeling method in this permit, the State Water Board intends to develop a stream power and channel evolution model-based framework to assess channels and develop a hierarchy of suitable analysis methods and management strategies. In time, this framework may become a State Water Board water quality control policy.

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[33] Hammer 1973 as cited in Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp;
Booth, D.B. 1990. Stream Channel Incision Following Drainage Basin Urbanization. *Water Resour. Bull.* 26:407-417.

[34] Trimble, S.W. 1997. Contribution of Stream Channel Erosion to Sediment Yield from an Urbanizing Watershed. *Science*: Vol. 278 (21), pp. 1442-1444.

[35] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

[36] Horner, R.R. 2006. Investigation of the Feasibility and Benefits of Low-Impact Site Design Practices (LID) for the San Diego Region. Available at: http://www.projectcleanwater.org/pdf/permit/case-study_lid.pdf.

[37] Delaware Department of Natural Resources (DDNR). 2004. Green Technology: The Delaware Urban Runoff Management Approach. Dover, DE. 117 pp.

[38] Finlayson, D.P. and D.R. Montgomery. 2003. Modeling large-scale fluvial erosion in geographic information systems. Geomorphology (53), pp. 147-164).

[39] Stein, E.S. and S. Zaleski. 2005.Managing runoff to protect natural stream: the latest developments on investigation and management of hydromodification in California. Southern California Coastal Water Research Project Technical Report 475. 26 pp.

Permit Linkage to Overbank and Extreme Flood Protection
Site design BMPs (e.g. rooftop and impervious disconnection, vegetated swales, setbacks and buffers) filter and settle out pollutants and provide for more infiltration than is possible for traditional centralized structural BMPs placed at the lowest point in a site. They provide source control for runoff and lead to a reduction in pollutant loads. When implemented, they also help reduce the magnitude and volume of larger, less frequent storm events (e.g., 10-yr, 24-hour storm and larger), thereby reducing the need for expensive flood control infrastructure. Nonstructural BMPs can also be a landscape amenity, instead of a large isolated structure requiring substantial area for ancillary access, buffering, screening and maintenance facilities.[25] The multiple benefits of using non-structural benefits will be critically important as the state's population increases and imposes strains upon our existing water resources.

Maintaining predevelopment drainage densities and times of concentration will help reduce post-development peak flows and volumes in areas not covered under a municipal permit. The most effective way to preserve drainage areas and maximize time of concentration is to implement landform grading, incorporate site design BMPs and implement distributed structural BMPs (e.g., bioretention cells, rain gardens, rain cisterns).

M. Storm Water Pollution Prevention Plans

USEPA's Construction General Permit requires that qualified personnel conduct inspections. USEPA defines qualified personnel as "a person knowledgeable in the principles and practice of erosion and sediment controls who possesses the skills to assess conditions at the construction site that could impact storm water quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of storm water discharges from the construction activity."[40] USEPA also suggests that qualified personnel prepare SWPPPs and points to numerous states that require certified professionals to be on construction sites at all times. States that currently have certification programs are Washington, Georgia, Florida, Delaware, Maryland, and New Jersey. The Permit 99-08-DWQ did not require that qualified personnel prepare SWPPPs or conduct inspections. However, to ensure that water quality is being protected, this General Permit requires that all SWPPPs be written, amended, and certified by a Qualified SWPPP Developer. A Qualified SWPPP Developer must possess one of the eight certifications and or registrations specified in this General Permit and effective two years after the adoption date of this General Permit, must have attended a State Water Board-sponsored or approved Qualified SWPPP Developer training course. Table 9 provides an overview of the criteria used in determining qualified certification titles for a QSD and QSP.

40 US Environmental Protection Agency. Stormwater Pollution Prevention Plans for Construction Activities. <http://cfpub.epa.gov/npdes/stormwater/swppp.cfm> and <http://www.epa.gov/npdes/pubs/sw_swppp_guide.pdf>.

Table 9 - Qualified SWPPP Developer/ Qualified SWPPP Practitioner Certification Criteria

Certification/ Title	Registered By	QSD/QSP	Certification Criteria
Professional Civil Engineer	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Geologist or Engineering Geologist	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Landscape Architect	California	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Professional Hydrologist	American Institute of Hydrology	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites
Certified Professional in Erosion and Sediment Control™ (CPESC)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Inspector of Sediment and Erosion Control™ (CISEC)	Certified Inspector of Sediment and Erosion Control, Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Erosion, Sediment and Storm Water Inspector™ (CESSWI)	Enviro Cert International Inc.	QSP	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education
Certified Professional in Storm Water Quality™ (CPSWQ)	Enviro Cert International Inc.	Both	1. Approval Process 2. Code of Ethics 3. Accountability 4. Pre-requisites 5. Continuing Education

The previous versions of the General Permit required development and implementation of a SWPPP as the primary compliance mechanism. The SWPPP has two major objectives: (1) to help identify the sources of sediment and other pollutants that affect the quality of storm water discharges; and (2) to describe and ensure the implementation of BMPs to reduce or eliminate sediment and other pollutants in storm water and non-storm water discharges. The SWPPP must include BMPs that address source control, BMPs that address pollutant control, and BMPs that address treatment control.

This General Permit shifts some of the measures that were covered by this general requirement to specific permit requirements, each individually enforceable as a permit term. This General Permit emphasizes the use of appropriately selected, correctly installed and maintained pollution reduction BMPs. This approach provides the flexibility necessary to establish BMPs that can effectively address source control of pollutants during changing construction activities. These specific requirements also improve both the clarity and the enforceability of the General Permit so that the dischargers understand, and the public can determine whether the discharges are in compliance with, permit requirements.

The SWPPP must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The SWPPP must remain on the site during construction activities, commencing with the initial mobilization and ending with the termination of coverage under the General Permit. For LUPs the discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio or telephone. Once construction activities are complete, until stabilization is achieved, the SWPPP shall be available from the SWPPP contact listed in the PRDs

A SWPPP must be appropriate for the type and complexity of a project and will be developed and implemented to address project specific conditions. Some projects may have similarities or complexities, yet each project is unique in its progressive state that requires specific description and selection of BMPs needed to address all possible generated pollutants

N. Regional Water Board Authorities

Because this General Permit will be issued to thousands of construction sites across the State, the Regional Water Boards retain discretionary authority over certain issues that may arise from the discharges in their respective regions. This General Permit does not grant the Regional Water Boards any authority they do not otherwise have; rather, it merely emphasizes that the Regional Water Boards can take specific actions related to this General Permit. For example, the Regional Water Boards will be enforcing this General Permit and may need to adjust some requirements for a discharger based on the discharger's compliance history.

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5455
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
Fax (916) 341-5463 • http://www.waterboards.ca.gov

Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
GENERAL PERMIT FOR
STORM WATER DISCHARGES
ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE
ACTIVITIES

ORDER NO. 2009-0009-DWQ
NPDES NO**. CAS000002**

This Order was adopted by the State Water Resources Control Board on:	**September 2, 2009**
This Order shall become effective on:	**July 1, 2010**
This Order shall expire on:	**September 2, 2014**

IT IS HEREBY ORDERED, that this Order supersedes Order No. 99-08-DWQ [as amended by Order No. 2010-0014-DWQ] except for enforcement purposes. The Discharger shall comply with the requirements in this Order to meet the provisions contained in Division 7 of the California Water Code (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act and regulations and guidelines adopted thereunder.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on September 2, 2009.

AYE: Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: Chairman Charles R. Hoppin

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

Linda S. Adams
Secretary for
Environmental Protection

State Water Resources Control Board

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Arnold Schwarzenegger
Governor

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) GENERAL PERMIT FOR STORM WATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

ORDER NO. 2010-0014-DWQ
NPDES NO. CAS000002

Order No. 2009-0009-DWQ was adopted by the State Water Resources Control Board on:	**September 2, 2009**
Order No. 2009-0009-DWQ became effective on:	**July 1, 2010**
Order No. 2009-0009-DWQ shall expire on:	**September 2, 2014**
This Order, which amends Order No. 2009-0009-DWQ, was adopted by the State Water Resources Control Board on:	**November 16, 2010**
This Order shall become effective on:	**February 14, 2011**

IT IS HEREBY ORDERED that this Order amends Order No. 2009-0009-DWQ. Additions to Order No. 2009-0009-DWQ are reflected in blue-underline text and deletions are reflected in red-strikeout text.

IT IS FURTHER ORDERED that staff are directed to prepare and post a conformed copy of Order No. 2009-0009-DWQ incorporating the revisions made by this Order.

I, Jeanine Townsend, Clerk to the Board, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the State Water Resources Control Board, on **November 16, 2010.**

AYE: Chairman Charles R. Hoppin
Vice Chair Frances Spivy-Weber
Board Member Arthur G. Baggett, Jr.
Board Member Tam M. Doduc

NAY: None

ABSENT: None

ABSTAIN: None

Jeanine Townsend
Clerk to the Board

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Attachment B – Permit Registration Documents
Attachment C – Risk Level 1 Requirements
Attachment D – Risk Level 2 Requirements
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Attachment F – Active Treatment System (ATS) Requirements

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Appendix 1 – Risk Determination Worksheet
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Appendix 3 – Bioassessment Monitoring Guidelines
Appendix 4 – Adopted/Implemented Sediment TMDLs
Appendix 5 – Glossary
Appendix 6 – Acronyms
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STATE WATER RESOURCES CONTROL BOARD
ORDER NO. 2009-0009-DWQ
[AS AMENDED BY ORDER NO. 2010-0014-DWQ]
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
GENERAL PERMIT NO. CAS000002

WASTE DISCHARGE REQUIREMENTS
FOR
DISCHARGES OF STORM WATER RUNOFF ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES

I. FINDINGS

A. General Findings

The State Water Resources Control Board (State Water Board) finds that:

1. The federal Clean Water Act (CWA) prohibits certain discharges of storm water containing pollutants except in compliance with a National Pollutant Discharge Elimination System (NPDES) permit (Title 33 United States Code (U.S.C.) §§ 1311 and 1342(p); also referred to as Clean Water Act (CWA) §§ 301 and 402(p)). The U.S. Environmental Protection Agency (U.S. EPA) promulgates federal regulations to implement the CWA's mandate to control pollutants in storm water runoff discharges. (Title 40 Code of Federal Regulations (C.F.R.) Parts 122, 123, and 124). The federal statutes and regulations require discharges to surface waters comprised of storm water associated with construction activity, including demolition, clearing, grading, and excavation, and other land disturbance activities (except operations that result in disturbance of less than one acre of total land area and which are not part of a larger common plan of development or sale), to obtain coverage under an NPDES permit. The NPDES permit must require implementation of Best Available Technology Economically Achievable (BAT) and Best Conventional Pollutant Control Technology (BCT) to reduce or eliminate pollutants in storm water runoff. The NPDES permit must also include additional requirements necessary to implement applicable water quality standards.

2. This General Permit authorizes discharges of storm water associated with construction activity so long as the dischargers comply with all requirements, provisions, limitations and prohibitions in the permit. In addition, this General Permit regulates the discharges of storm water associated with construction activities from all Linear

Underground/Overhead Projects resulting in the disturbance of greater than or equal to one acre (Attachment A).

3. This General Permit regulates discharges of pollutants in storm water associated with construction activity (storm water discharges) to waters of the United States from construction sites that disturb one or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface.

4. This General Permit does not preempt or supersede the authority of local storm water management agencies to prohibit, restrict, or control storm water discharges to municipal separate storm sewer systems or other watercourses within their jurisdictions.

5. This action to adopt a general NPDES permit is exempt from the provisions of Chapter 3 of the California Environmental Quality Act (CEQA) (Public Resources Code Section 21100, et seq.), pursuant to Section 13389 of the California Water Code.

6. Pursuant to 40 C.F.R. § 131.12 and State Water Board Resolution No. 68-16,[1] which incorporates the requirements of § 131.12 where applicable, the State Water Board finds that discharges in compliance with this General Permit will not result in the lowering of water quality standards, and are therefore consistent with those provisions. Compliance with this General Permit will result in improvements in water quality.

7. This General Permit serves as an NPDES permit in compliance with CWA § 402 and will take effect on July 1, 2010 by the State Water Board provided the Regional Administrator of the U.S. EPA has no objection. If the U.S. EPA Regional Administrator objects to its issuance, the General Permit will not become effective until such objection is withdrawn.

8. Following adoption and upon the effective date of this General Permit, the Regional Water Quality Control Boards (Regional Water Boards) shall enforce the provisions herein.

9. Regional Water Boards establish water quality standards in Basin Plans. The State Water Board establishes water quality standards in various statewide plans, including the California Ocean Plan. U.S. EPA establishes water quality standards in the National Toxic Rule (NTR) and the California Toxic Rule (CTR).

[1] Resolution No. 68-16 generally requires that existing water quality be maintained unless degradation is justified based on specific findings.

10. This General Permit does not authorize discharges of fill or dredged material regulated by the U.S. Army Corps of Engineers under CWA § 404 and does not constitute a waiver of water quality certification under CWA § 401.

11. The primary storm water pollutant at construction sites is excess sediment. Excess sediment can cloud the water, which reduces the amount of sunlight reaching aquatic plants, clog fish gills, smother aquatic habitat and spawning areas, and impede navigation in our waterways. Sediment also transports other pollutants such as nutrients, metals, and oils and greases.

12. Construction activities can impact a construction site's runoff sediment supply and transport characteristics. These modifications, which can occur both during and after the construction phase, are a significant cause of degradation of the beneficial uses established for water bodies in California. Dischargers can avoid these effects through better construction site design and activity practices.

13. This General Permit recognizes four distinct phases of construction activities. The phases are Grading and Land Development Phase, Streets and Utilities Phase, Vertical Construction Phase, and Final Landscaping and Site Stabilization Phase. Each phase has activities that can result in different water quality effects from different water quality pollutants. This General Permit also recognizes inactive construction as a category of construction site type.

14. Compliance with any specific limits or requirements contained in this General Permit does not constitute compliance with any other applicable requirements.

15. Following public notice in accordance with State and Federal laws and regulations, the State Water Board heard and considered all comments and testimony in a public hearing on 06/03/2009. The State Water Board has prepared written responses to all significant comments.

16. Construction activities obtaining coverage under the General Permit may have multiple discharges subject to requirements that are specific to general, linear, and/or active treatment system discharge types.

17. The State Water Board may reopen the permit if the U.S. EPA adopts a final effluent limitation guideline for construction activities.

B. Activities Covered Under the General Permit

18. Any construction or demolition activity, including, but not limited to, clearing, grading, grubbing, or excavation, or any other activity that results in a land disturbance of equal to or greater than one acre.

19. Construction activity that results in land surface disturbances of less than one acre if the construction activity is part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

20. Construction activity related to residential, commercial, or industrial development on lands currently used for agriculture including, but not limited to, the construction of buildings related to agriculture that are considered industrial pursuant to U.S. EPA regulations, such as dairy barns or food processing facilities.

21. Construction activity associated with Linear Underground/Overhead Utility Projects (LUPs) including, but not limited to, those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/borrow locations.

22. Discharges of sediment from construction activities associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities.[2]

23. Storm water discharges from dredge spoil placement that occur outside of U.S. Army Corps of Engineers jurisdiction (upland sites) and that disturb one or more acres of land surface from construction activity are covered by this General Permit. Construction sites that intend to disturb one or more acres of land within the jurisdictional boundaries of

[2] Pursuant to the Ninth Circuit Court of Appeals' decision in *NRDC v. EPA* (9th Cir. 2008) 526 F.3d 591, and subsequent denial of the U.S. EPA's petition for reconsideration in November 2008, oil and gas construction activities discharging storm water contaminated only with sediment are no longer exempt from the NPDES program.

a CWA § 404 permit should contact the appropriate Regional Water Board to determine whether this permit applies to the site.

C. Activities Not Covered Under the General Permit

24. Routine maintenance to maintain original line and grade, hydraulic capacity, or original purpose of the facility.

25. Disturbances to land surfaces solely related to agricultural operations such as disking, harrowing, terracing and leveling, and soil preparation.

26. Discharges of storm water from areas on tribal lands; construction on tribal lands is regulated by a federal permit.

27. Construction activity and land disturbance involving discharges of storm water within the Lake Tahoe Hydrologic Unit. The Lahontan Regional Water Board has adopted its own permit to regulate storm water discharges from construction activity in the Lake Tahoe Hydrologic Unit (Regional Water Board 6SLT). Owners of construction sites in this watershed must apply for the Lahontan Regional Water Board permit rather than the statewide Construction General Permit.

28. Construction activity that disturbs less than one acre of land surface, and that is not part of a larger common plan of development or the sale of one or more acres of disturbed land surface.

29. Construction activity covered by an individual NPDES Permit for storm water discharges.

30. Discharges from small (1 to 5 acre) construction activities with an approved Rainfall Erosivity Waiver authorized by U.S. EPA Phase II regulations certifying to the State Board that small construction activity will occur only when the Rainfall Erosivity Factor is less than 5 (“R” in the Revised Universal Soil Loss Equation).

31. Landfill construction activity that is subject to the Industrial General Permit.

32. Construction activity that discharges to Combined Sewer Systems.

33. Conveyances that discharge storm water runoff combined with municipal sewage.

34. Discharges of storm water identified in CWA § 402(*l*)(2), 33 U.S.C. § 1342(*l*)(2).

35. Discharges occurring in basins that are not tributary or hydrologically connected to waters of the United States (for more information contact your Regional Water Board).

D. Obtaining and Modifying General Permit Coverage

36. This General Permit requires all dischargers to electronically file all Permit Registration Documents (PRDs), Notices of Termination (NOT), changes of information, annual reporting, and other compliance documents required by this General Permit through the State Water Board's Storm water Multi-Application and Report Tracking System (SMARTS) website.

37. Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

38. This General Permit grants an exception from the Risk Determination requirements for existing sites covered under Water Quality Orders No. 99-08-DWQ, and No. 2003-0007-DWQ. For certain sites, adding additional requirements may not be cost effective. Construction sites covered under Water Quality Order No. 99-08-DWQ shall obtain permit coverage at the Risk Level 1. LUPs covered under Water Quality Order No. 2003-0007-DWQ shall obtain permit coverage as a Type 1 LUP. The Regional Water Boards have the authority to require Risk Determination to be performed on sites currently covered under Water Quality Orders No. 99-08-DWQ and No. 2003-0007-DWQ where they deem it necessary. The State Water Board finds that there are two circumstances when it may be appropriate for the Regional Water Boards to require a discharger that had filed an NOI under State Water Board Order No. 99-08-DWQ to recalculate the site's risk level. These circumstances are: (1) when the discharger has a demonstrated history of noncompliance with State Water Board Order No. 99-08-DWQ or; (2) when the discharger's site poses a significant risk of causing or contributing to an exceedance of a water quality standard without the implementation of the additional Risk Level 2 or 3 requirements.

E. Prohibitions

39. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit. Non-storm water discharges include a wide variety of sources, including improper dumping, spills, or leakage from storage tanks or transfer areas. Non-storm water discharges may

contribute significant pollutant loads to receiving waters. Measures to control spills, leakage, and dumping, and to prevent illicit connections during construction must be addressed through structural as well as non-structural Best Management Practices (BMPs)[3]. The State Water Board recognizes, however, that certain non-storm water discharges may be necessary for the completion of construction.

40. This General Permit prohibits all discharges which contain a hazardous substance in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

41. This General Permit incorporates discharge prohibitions contained in water quality control plans, as implemented by the State Water Board and the nine Regional Water Boards.

42. Pursuant to the Ocean Plan, discharges to Areas of Special Biological Significance (ASBS) are prohibited unless covered by an exception that the State Water Board has approved.

43. This General Permit prohibits the discharge of any debris[4] from construction sites. Plastic and other trash materials can cause negative impacts to receiving water beneficial uses. The State Water Board encourages the use of more environmentally safe, biodegradable materials on construction sites to minimize the potential risk to water quality.

F. Training

44. In order to improve compliance with and to maintain consistent enforcement of this General Permit, all dischargers are required to appoint two positions - the Qualified SWPPP Developer (QSD) and the Qualified SWPPP Practitioner (QSP) - who must obtain appropriate training. Together with the key stakeholders, the State and Regional Water Boards are leading the development of this curriculum through a collaborative organization called The Construction General Permit (CGP) Training Team.

45. The Professional Engineers Act (Bus. & Prof. Code section 6700, et seq.) requires that all engineering work must be performed by a California licensed engineer.

[3] BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants to waters of the United States. BMPs also include treatment requirements, operating procedures, and practice to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

[4] Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

G. Determining and Reducing Risk

46. The risk of accelerated erosion and sedimentation from wind and water depends on a number of factors, including proximity to receiving water bodies, climate, topography, and soil type.

47. This General Permit requires dischargers to assess the risk level of a site based on both sediment transport and receiving water risk. This General Permit contains requirements for Risk Levels 1, 2 and 3, and LUP Risk Type 1, 2, and 3 (Attachment A). Risk levels are established by determining two factors: first, calculating the site's sediment risk; and second, receiving water risk during periods of soil exposure (i.e. grading and site stabilization). Both factors are used to determine the site-specific Risk Level(s). LUPs can be determined to be Type 1 based on the flowchart in Attachment A.1.

48. Although this General Permit does not mandate specific setback distances, dischargers are encouraged to set back their construction activities from streams and wetlands whenever feasible to reduce the risk of impacting water quality (e.g., natural stream stability and habitat function). Because there is a reduced risk to receiving waters when setbacks are used, this General Permit gives credit to setbacks in the risk determination and post-construction storm water performance standards. The risk calculation and runoff reduction mechanisms in this General Permit are expected to facilitate compliance with any Regional Water Board and local agency setback requirements, and to encourage voluntary setbacks wherever practicable.

49. Rain events can occur at any time of the year in California. Therefore, a Rain Event Action Plan (REAP) is necessary for Risk Level 2 and 3 traditional construction projects (LUPs exempt) to ensure that active construction sites have adequate erosion and sediment controls implemented prior to the onset of a storm event, even if construction is planned only during the dry season.

50. Soil particles smaller than 0.02 millimeters (mm) (i.e., finer than medium silt) do not settle easily using conventional measures for sediment control (i.e., sediment basins). Given their long settling time, dislodging these soils results in a significant risk that fine particles will be released into surface waters and cause unacceptable downstream impacts. If operated correctly, an Active Treatment System (ATS[5]) can prevent or reduce the release of fine particles from construction sites.

[5] An ATS is a treatment system that employs chemical coagulation, chemical flocculation, or electro coagulation in order to reduce turbidity caused by fine suspended sediment.

Use of an ATS can effectively reduce a site's risk of impacting receiving waters.

51. Dischargers located in a watershed area where a Total Maximum Daily Load (TMDL) has been adopted or approved by the Regional Water Board or U.S. EPA may be required by a separate Regional Water Board action to implement additional BMPs, conduct additional monitoring activities, and/or comply with an applicable waste load allocation and implementation schedule. Such dischargers may also be required to obtain an individual Regional Water Board permit specific to the area.

H. Effluent Standards

52. The State Water Board convened a blue ribbon panel of storm water experts that submitted a report entitled, “The Feasibility of Numeric Effluent Limits Applicable to Discharges of Storm Water Associated with Municipal, Industrial and Construction Activities,” dated June 19, 2006. The panel concluded that numeric limits or action levels are technically feasible to control construction storm water discharges, provided that certain conditions are considered. The panel also concluded that numeric effluent limitations (NELs) are feasible for discharges from construction sites that utilize an ATS. The State Water Board has incorporated the expert panel’s suggestions into this General Permit, which includes both numeric action levels (NALs) and NELs for pH and turbidity, and special numeric limits for ATS discharges.

Numeric Effluent Limitations

53. Discharges of storm water from construction activities may become contaminated from alkaline construction materials resulting in high pH (greater than pH 7). Alkaline construction materials include, but are not limited to, hydrated lime, concrete, mortar, cement kiln dust (CKD), Portland cement treated base (CTB), fly ash, recycled concrete, and masonry work. This General Permit includes an NEL for pH (6.0-9.0) that applies only at sites that exhibit a "high risk of high pH discharge." A "high risk of high pH discharge" can occur during the complete utilities phase, the complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations to the background pH of any discharges.

54. For Risk Level 3 discharges, this General Permit establishes technology-based, numeric effluent limitations (NELs) for turbidity of 500 NTU. Exceedances of the turbidity NEL constitutes a violation of this General Permit.

55. This General Permit establishes a 5 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based NELs for Risk Level 3 dischargers.

Determining Compliance with Numeric Limitations

56. This General Permit sets a pH NAL of 6.5 to 8.5, and a turbidity NAL of 250 NTU. The purpose of the NAL and its associated monitoring requirement is to provide operational information regarding the performance of the measures used at the site to minimize the discharge of pollutants and to protect beneficial uses and receiving waters from the adverse effects of construction-related storm water discharges. The NALs in this General Permit for pH and turbidity are not directly enforceable and do not constitute NELs.

57. This General Permit requires dischargers with NAL exceedances to immediately implement additional BMPs and revise their Storm Water Pollution Prevention Plans (SWPPPs) accordingly to either prevent pollutants and authorized non-storm water discharges from contaminating storm water, or to substantially reduce the pollutants to levels consistently below the NALs. NAL exceedances are reported in the State Water Boards SMARTS system, and the discharger is required to provide an NAL Exceedance Report when requested by a Regional Water Board.

58. If run-on is caused by a forest fire or any other natural disaster, then NELs do not apply.

59. Exceedances of the NELs are a violation of this Permit. This General Permit requires dischargers with NEL exceedances to implement additional monitoring, BMPs, and revise their SWPPPs accordingly. Dischargers are required to notify the State and Regional Water Boards of the violation through the State Water Boards SMARTs system, and provide an NEL Violation Report sharing additional information concerning the NEL exceedance.

I. Receiving Water Limitations

60. This General Permit requires all enrolled dischargers to determine the receiving waters potentially affected by their discharges and to comply with all applicable water quality standards, including any more stringent standards applicable to a water body.

J. Sampling, Monitoring, Reporting and Record Keeping

61. Visual monitoring of storm water and non-storm water discharges is required for all sites subject to this General Permit.

62. Records of all visual monitoring inspections are required to remain on-site during the construction period and for a minimum of three years.

63. For all Risk Level 3 and Risk Level 2 sites, this General Permit requires effluent monitoring for pH and turbidity. Sampling, analysis and monitoring requirements for effluent monitoring for pH and turbidity are contained in this General Permit.

64. Risk Level 3 sites in violation of the Numeric Effluent Limitations contained in this General Permit and with direct discharges to receiving water are required to conduct receiving water monitoring.

65. For Risk Level 3 sites larger than 30 acres and with direct discharges to receiving waters, this General Permit requires bioassessment sampling before and after site completion to determine if significant degradation to the receiving water's biota has occurred. Bioassessment sampling guidelines are contained in this General Permit.

66. A summary and evaluation of the sampling and analysis results will be submitted in the Annual Reports.

67. This General Permit contains sampling, analysis and monitoring requirements for non-visible pollutants at all sites subject to this General Permit.

68. Compliance with the General Permit relies upon dischargers to electronically self-report any discharge violations and to comply with any Regional Water Board enforcement actions.

69. This General Permit requires that all dischargers maintain a paper or electronic copy of all required records for three years from the date generated or date submitted, whichever is last. These records must be available at the construction site until construction is completed. For LUPs, these documents may be retained in a crew member's vehicle and made available upon request.

K. Active Treatment System (ATS) Requirements

70. Active treatment systems add chemicals to facilitate flocculation, coagulation and filtration of suspended sediment particles. The uncontrolled release of these chemicals to the environment can negatively affect the beneficial uses of receiving waters and/or degrade water quality (e.g., acute and chronic toxicity). Additionally, the batch storage and treatment of storm water through an ATS' can potentially

cause physical impacts on receiving waters if storage volume is inadequate or due to sudden releases of the ATS batches and improperly designed outfalls.

71. If designed, operated and maintained properly an ATS can achieve very high removal rates of suspended sediment (measured as turbidity), albeit at sometimes significantly higher costs than traditional erosion/sediment control practices. As a result, this General Permit establishes NELs consistent with the expected level of typical ATS performance.

72. This General Permit requires discharges of storm water associated with construction activity that undergo active treatment to comply with special operational and effluent limitations to ensure that these discharges do not adversely affect the beneficial uses of the receiving waters or cause degradation of their water quality.

73. For ATS discharges, this General Permit establishes technology-based NELs for turbidity.

74. This General Permit establishes a 10 year, 24 hour (expressed in inches of rainfall) Compliance Storm Event exemption from the technology-based numeric effluent limitations for ATS discharges. Exceedances of the ATS turbidity NEL constitutes a violation of this General Permit.

L. Post-Construction Requirements

75. This General Permit includes performance standards for post-construction that are consistent with State Water Board Resolution No. 2005-0006, "Resolution Adopting the Concept of Sustainability as a Core Value for State Water Board Programs and Directing Its Incorporation," and 2008-0030, “Requiring Sustainable Water Resources Management.“ The requirement for all construction sites to match pre-project hydrology will help ensure that the physical and biological integrity of aquatic ecosystems are sustained. This “runoff reduction” approach is analogous in principle to Low Impact Development (LID) and will serve to protect related watersheds and waterbodies from both hydrologic-based and pollution impacts associated with the post-construction landscape.

76. LUP projects are not subject to post-construction requirements due to the nature of their construction to return project sites to pre-construction conditions.

M. Storm Water Pollution Prevention Plan Requirements

77. This General Permit requires the development of a site-specific SWPPP. The SWPPP must include the information needed to demonstrate compliance with all requirements of this General Permit, and must be kept on the construction site and be available for review. The discharger shall ensure that a QSD develops the SWPPP.

78. To ensure proper site oversight, this General Permit requires a Qualified SWPPP Practitioner to oversee implementation of the BMPs required to comply with this General Permit.

N. Regional Water Board Authorities

79. Regional Water Boards are responsible for implementation and enforcement of this General Permit. A general approach to permitting is not always suitable for every construction site and environmental circumstances. Therefore, this General Permit recognizes that Regional Water Boards must have some flexibility and authority to alter, approve, exempt, or rescind permit authority granted under this General Permit in order to protect the beneficial uses of our receiving waters and prevent degradation of water quality.

IT IS HEREBY ORDERED that all dischargers subject to this General Permit shall comply with the following conditions and requirements (including all conditions and requirements as set forth in Attachments A, B, C, D, E and F)[6]:

II. CONDITIONS FOR PERMIT COVERAGE

A. Linear Underground/Overhead Projects (LUPs)

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g. telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. The Legally Responsible Person is responsible for obtaining coverage under the General Permit where the construction of pipelines, utility lines, fiber-optic cables, or other linear underground/overhead projects will occur across several properties unless the LUP construction activities are covered under another construction storm water permit.

3. Only LUPs shall comply with the conditions and requirements in Attachment A, A.1 & A.2 of this Order. The balance of this Order is not applicable to LUPs except as indicated in Attachment A.

[6] These attachments are part of the General Permit itself and are not separate documents that are capable of being updated independently by the State Water Board.

B. Obtaining Permit Coverage Traditional Construction Sites

1. The Legally Responsible Person (LRP) (see Special Provisions, Electronic Signature and Certification Requirements, Section IV.I.1) must obtain coverage under this General Permit.

2. To obtain coverage, the LRP must electronically file Permit Registration Documents (PRDs) prior to the commencement of construction activity. Failure to obtain coverage under this General Permit for storm water discharges to waters of the United States is a violation of the CWA and the California Water Code.

3. PRDs shall consist of:

   a. Notice of Intent (NOI)
   b. Risk Assessment (Section VIII)
   c. Site Map
   d. Storm Water Pollution Prevention Plan (Section XIV)
   e. Annual Fee
   f. Signed Certification Statement

   Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted.

   Attachment B contains additional PRD information. Dischargers must electronically file the PRDs, and mail the appropriate annual fee to the State Water Board.

4. This permit is effective on July 1, 2010.

   a. **Dischargers Obtaining Coverage On or After July 1, 2010:** All dischargers requiring coverage on or after July 1, 2010, shall electronically file their PRDs prior to the commencement of construction activities, and mail the appropriate annual fee no later than seven days prior to the commencement of construction activities. Permit coverage shall not commence until the PRDs and the annual fee are received by the State Water Board, and a WDID number is assigned and sent by SMARTS.

   b. **Dischargers Covered Under 99-08-DWQ and 2003-0007-DWQ:** Existing dischargers subject to State Water Board Order No. 99-08-DWQ (existing dischargers) will continue coverage under 99-08-DWQ until July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 99-08-DWQ will be terminated.

Existing dischargers shall electronically file their PRDs no later than July 1, 2010. If an existing discharger's site acreage subject to the annual fee has changed, it shall mail a revised annual fee no less than seven days after receiving the revised annual fee notification, **or else lose permit coverage**. All existing dischargers shall be exempt from the risk determination requirements in Section VIII of this General Permit until two years after permit adoption. All existing dischargers are therefore subject to Risk Level 1 requirements regardless of their site's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the Section VIII risk determination requirements.

5. The discharger is only considered covered by this General Permit upon receipt of a Waste Discharger Identification (WDID) number assigned and sent by the State Water Board Storm water Multi-Application and Report Tracking System (SMARTS). In order to demonstrate compliance with this General Permit, the discharger must obtain a WDID number and must present documentation of a valid WDID upon demand.

6. During the period this permit is subject to review by the U.S. EPA, the prior permit (State Water Board Order No. 99-08-DWQ) remains in effect. Existing dischargers under the prior permit will continue to have coverage under State Water Board Order No. 99-08-DWQ until this General Permit takes effect on July 1, 2010. Dischargers who complete their projects and electronically file an NOT prior to July 1, 2010, are not required to obtain coverage under this General Permit.

7. Small Construction Rainfall Erosivity Waiver

   EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

   Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

   If a small construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the

rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

8. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. Revising Permit Coverage for Change of Acreage or New Ownership

1. The discharger may reduce or increase the total acreage covered under this General Permit when a portion of the site is complete and/or conditions for termination of coverage have been met (See Section II.D Conditions for Termination of Coverage); when ownership of a portion of the site is sold to a different entity; or when new acreage, subject to this General Permit, is added to the site.

2. Within 30 days of a reduction or increase in total disturbed acreage, the discharger shall electronically file revisions to the PRDs that include:

   a. A revised NOI indicating the new project size;

   b. A revised site map showing the acreage of the site completed, acreage currently under construction, acreage sold/transferred or added, and acreage currently stabilized in accordance with the Conditions for Termination of Coverage in Section II.D below.

   c. SWPPP revisions, as appropriate; and

   d. Certification that any new landowners have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address of the new landowner.

   e. If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

3. The discharger shall continue coverage under the General Permit for any parcel that has not achieved "Final Stabilization" as defined in Section II.D.

4. When an LRP with active General Permit coverage transfers its LRP status to another person or entity that qualifies as an LRP, the existing LRP shall inform the new LRP of the General Permit's requirements. In order for the new LRP to continue the construction activity on its parcel of property, the new LRP, or the new LRP's approved signatory, must submit PRDs in accordance with this General Permit's requirements.

D. Conditions for Termination of Coverage

1. Within 90 days of when construction is complete or ownership has been transferred, the discharger shall electronically file a Notice of Termination (NOT), a final site map, and photos through the State Water Boards SMARTS system. Filing a NOT certifies that all General Permit requirements have been met. The Regional Water Board will consider a construction site complete only when all portions of the site have been transferred to a new owner, or all of the following conditions have been met:

   a. For purposes of "final stabilization," the site will not pose any additional sediment discharge risk than it did prior to the commencement of construction activity;

   b. There is no potential for construction-related storm water pollutants to be discharged into site runoff;

   c. Final stabilization has been reached;

   d. Construction materials and wastes have been disposed of properly;

   e. Compliance with the Post-Construction Standards in Section XIII of this General Permit has been demonstrated;

   f. Post-construction storm water management measures have been installed and a long-term maintenance plan[7] has been established; and

   g. All construction-related equipment, materials and any temporary BMPs no longer needed are removed from the site.

[7] For the purposes of this requirement a long-term maintenance plan will be designed for a minimum of five years, and will describe the procedures to ensure that the post-construction storm water management measures are adequately maintained.

2. The discharger shall certify that final stabilization conditions are satisfied in their NOT. Failure to certify shall result in continuation of permit coverage and annual billing.

3. The NOT must demonstrate through photos, RUSLE or RUSLE2, or results of testing and analysis that the site meets all of the conditions above (Section II.D.1) and the final stabilization condition (Section II.D.1.a) is attained by one of the following methods:

   a. "70% final cover method," no computational proof required

      OR:

   b. "RUSLE or RUSLE2 method," computational proof required

      OR:

   c. "Custom method", the discharger shall demonstrate in some other manner than a or b, above, that the site complies with the "final stabilization" requirement in Section II.D.1.a.

III. DISCHARGE PROHIBITIONS

A. Dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

B. All discharges are prohibited except for the storm water and non-storm water discharges specifically authorized by this General Permit or another NPDES permit.

C. Authorized non-storm water discharges may include those from de-chlorinated potable water sources such as: fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, uncontaminated ground water from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. The discharge of non-storm water is authorized under the following conditions:

1. The discharge does not cause or contribute to a violation of any water quality standard;

2. The discharge does not violate any other provision of this General Permit;

3. The discharge is not prohibited by the applicable Basin Plan;

4. The discharger has included and implemented specific BMPs required by this General Permit to prevent or reduce the contact of the non-storm water discharge with construction materials or equipment.

5. The discharge does not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

6. The discharge is monitored and meets the applicable NALs and NELs; and

7. The discharger reports the sampling information in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not already authorized by this General Permit or another NPDES permit, to determine whether a separate NPDES permit is necessary.

D. Debris resulting from construction activities are prohibited from being discharged from construction sites.

E. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

IV. SPECIAL PROVISIONS

A. Duty to Comply

1. The discharger shall comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

2. The discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

B. General Permit Actions

1. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

2. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

C. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

D. Duty to Mitigate

The discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

E. Proper Operation and Maintenance

The discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

F. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

G. Duty to Maintain Records and Provide Information

1. The discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be available at the construction site until construction is completed.

2. The discharger shall furnish the Regional Water Board, State Water Board, or U.S. EPA, within a reasonable time, any requested information to determine compliance with this General Permit. The discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

H. Inspection and Entry

The discharger shall allow the Regional Water Board, State Water Board, U.S. EPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

1. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

2. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

3. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

4. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

I. Electronic Signature and Certification Requirements

1. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

2. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or together with any reports, information or applications to be signed by an Approved Signatory.

3. All Annual Reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, U.S. EPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

J. Certification

Any person signing documents under Section IV.I above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

K. Anticipated Noncompliance

The discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

L. Bypass

Bypass[8] is prohibited. The Regional Water Board may take enforcement action against the discharger for bypass unless:

1. Bypass was unavoidable to prevent loss of life, personal injury or severe property damage;[9]

2. There were no feasible alternatives to bypass, such as the use of auxiliary treatment facilities, retention of untreated waste, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that could occur during normal periods of equipment downtime or preventative maintenance;

3. The discharger submitted a notice at least ten days in advance of the need for a bypass to the Regional Water Board; or

4. The discharger may allow a bypass to occur that does not cause effluent limitations to be exceeded, but only if it is for essential maintenance to assure efficient operation. In such a case, the above bypass conditions are not applicable. The discharger shall submit notice of an unanticipated bypass as required.

M. Upset

1. A discharger that wishes to establish the affirmative defense of an upset[10] in an action brought for noncompliance shall demonstrate,

[8] The intentional diversion of waste streams from any portion of a treatment facility

[9] Severe property damage means substantial physical damage to property, damage to the treatment facilities that causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

[10] An exceptional incident in which there is unintentional and temporary noncompliance the technology based numeric effluent limitations because of factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation.

through properly signed, contemporaneous operating logs, or other relevant evidence that:

a. An upset occurred and that the discharger can identify the cause(s) of the upset

b. The treatment facility was being properly operated by the time of the upset

c. The discharger submitted notice of the upset as required; and

d. The discharger complied with any remedial measures required

2. No determination made before an action of noncompliance occurs, such as during administrative review of claims that noncompliance was caused by an upset, is final administrative action subject to judicial review.

3. In any enforcement proceeding, the discharger seeking to establish the occurrence of an upset has the burden of proof

N. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

O. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the discharger is or may be subject to under Section 311 of the CWA.

P. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

Q. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of U.S. EPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

R. Penalties for Violations of Permit Conditions

1. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[11] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

2. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

S. Transfers

This General Permit is not transferable.

T. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

[11] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act.

V. EFFLUENT STANDARDS

A. Narrative Effluent Limitations

1. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

2. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

B. Numeric Effluent Limitations (NELs)

Table 1- Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		Risk Level 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2	1	NTU	250 NTU	N/A
		Risk Level 3			250 NTU	500 NTU

1. Numeric Effluent Limitations (NELs):

   a. **Storm Event, Daily Average pH Limits –** For Risk Level 3 dischargers, the pH of storm water and non-storm water discharges

shall be within the ranges specified in Table 1 during any site phase where there is a "high risk of pH discharge."[12]

b. **Storm Event Daily Average Turbidity Limit –** For Risk Level 3 dischargers, the turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

2. If daily average sampling results are outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file monitoring results in violation within 5 business days of obtaining the results.

3. **Compliance Storm Event**:

   Discharges of storm water from Risk Level 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for Risk Level 3 discharges is the 5 year, 24 hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

   Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

4. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

C. Numeric Action Levels (NALs)

1. For Risk Level 2 and 3 dischargers, the lower storm event average NAL for pH is 6.5 pH units and the upper storm event average NAL for pH is 8.5 pH units. The discharger shall take actions as described below if the discharge is outside of this range of pH values.

[12] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

2. For Risk Level 2 and 3 dischargers, the NAL storm event daily average for turbidity is 250 NTU. The discharger shall take actions as described below if the discharge is outside of this range of turbidity values.

3. Whenever the results from a storm event daily average indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL exceedance and shall immediately implement corrective actions if they are needed.

4. The site evaluation shall be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

    a. Are related to the construction activities and whether additional BMPs are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

        AND/OR:

    b. Are related to the run-on associated with the construction site location and whether additional BMPs measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) what corrective action(s) were taken or will be taken with a description of the schedule for completion.

VI. RECEIVING WATER LIMITATIONS

A. The discharger shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

B. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

C. The discharger shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

D. Dischargers located within the watershed of a CWA § 303(d) impaired water body, for which a TMDL has been approved by the U.S. EPA, shall comply with the approved TMDL if it identifies "construction activity" or land disturbance as a source of the pollution.

VII. TRAINING QUALIFICATIONS AND CERTIFICATION REQUIREMENTS

A. General

The discharger shall ensure that all persons responsible for implementing requirements of this General Permit shall be appropriately trained in accordance with this Section. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Those responsible for preparing and amending SWPPPs shall comply with the requirements in this Section VII.

The discharger shall provide documentation of all training for persons responsible for implementing the requirements of this General Permit in the Annual Reports.

B. SWPPP Certification Requirements

1. **Qualified SWPPP Developer:** The discharger shall ensure that SWPPPs are written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

   a. A California registered professional civil engineer;

   b. A California registered professional geologist or engineering geologist;

   c. A California registered landscape architect;

   d. A professional hydrologist registered through the American Institute of Hydrology;

   e. A Certified Professional in Erosion and Sediment Control (CPESC) ™ registered through Enviro Cert International, Inc.;

   f. A Certified Professional in Storm Water Quality (CPSWQ) ™ registered through Enviro Cert International, Inc.; or

   g. A professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

2. The discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

3. **Qualified SWPPP Practitioner:** The discharger shall ensure that all BMPs required by this General Permit are implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   a. A certified erosion, sediment and storm water inspector registered through Enviro Cert International, Inc.; or

   b. A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

4. The LRP shall list in the SWPPP, the name of any Approved Signatory, and provide a copy of the written agreement or other mechanism that provides this authority from the LRP in the SWPPP.

5. The discharger shall include, in the SWPPP, a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

6. The discharger shall ensure that the SWPPP and each amendment will be signed by the Qualified SWPPP Developer. The discharger shall include a listing of the date of initial preparation and the date of each amendment in the SWPPP.

VIII. RISK DETERMINATION

The discharger shall calculate the site's sediment risk and receiving water risk during periods of soil exposure (i.e. grading and site stabilization) and use the calculated risks to determine a Risk Level(s) using the methodology in

Appendix 1. For any site that spans two or more planning watersheds,[13] the discharger shall calculate a separate Risk Level for each planning watershed. The discharger shall notify the State Water Board of the site's Risk Level determination(s) and shall include this determination as a part of submitting the PRDs. If a discharger ends up with more than one Risk Level determination, the Regional Water Board may choose to break the project into separate levels of implementation.

IX. RISK LEVEL 1 REQUIREMENTS

Risk Level 1 Dischargers shall comply with the requirements included in Attachment C of this General Permit.

X. RISK LEVEL 2 REQUIREMENTS

Risk Level 2 Dischargers shall comply with the requirements included in Attachment D of this General Permit.

XI. RISK LEVEL 3 REQUIREMENTS

Risk Level 3 Dischargers shall comply with the requirements included in Attachment E of this General Permit.

XII. ACTIVE TREATMENT SYSTEMS (ATS)

Dischargers choosing to implement an ATS on their site shall comply with all of the requirements in Attachment F of this General Permit.

[13] Planning watershed: defined by the Calwater Watershed documents as a watershed that ranges in size from approximately 3,000 to 10,000 acres http://cain.ice.ucdavis.edu/calwater/calwfaq.html, http://gis.ca.gov/catalog/BrowseRecord.epl?id=22175 .

XIII. POST-CONSTRUCTION STANDARDS

A. All dischargers shall comply with the following runoff reduction requirements unless they are located within an area subject to post-construction standards of an active Phase I or II municipal separate storm sewer system (MS4) permit that has an approved Storm Water Management Plan.

1. This provision shall take effect three years from the adoption date of this permit, or later at the discretion of the Executive Officer of the Regional Board.

2. The discharger shall demonstrate compliance with the requirements of this section by submitting with their NOI a map and worksheets in accordance with the instructions in Appendix 2. The discharger shall use non-structural controls unless the discharger demonstrates that non-structural controls are infeasible or that structural controls will produce greater reduction in water quality impacts.

3. The discharger shall, through the use of non-structural and structural measures as described in Appendix 2, replicate the pre-project water balance (for this permit, defined as the volume of rainfall that ends up as runoff) for the smallest storms up to the 85th percentile storm event (or the smallest storm event that generates runoff, whichever is larger). Dischargers shall inform Regional Water Board staff at least 30 days prior to the use of any structural control measure used to comply with this requirement. Volume that cannot be addressed using non-structural practices shall be captured in structural practices and approved by the Regional Water Board. When seeking Regional Board approval for the use of structural practices, dischargers shall document the infeasibility of using non-structural practices on the project site, or document that there will be fewer water quality impacts through the use of structural practices.

4. For sites whose disturbed area exceeds two acres, the discharger shall preserve the pre-construction drainage density (miles of stream length per square mile of drainage area) for all drainage areas within the area serving a first order stream[14] or larger stream and ensure that post-project time of runoff concentration is equal or greater than pre-project time of concentration.

[14] A first order stream is defined as a stream with no tributaries.

B. All dischargers shall implement BMPs to reduce pollutants in storm water discharges that are reasonably foreseeable after all construction phases have been completed at the site (Post-construction BMPs).

XIV. SWPPP REQUIREMENTS

A. The discharger shall ensure that the Storm Water Pollution Prevention Plans (SWPPPs) for all traditional project sites are developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

1. All pollutants and their sources, including sources of sediment associated with construction, construction site erosion and all other activities associated with construction activity are controlled;

2. Where not otherwise required to be under a Regional Water Board permit, all non-storm water discharges are identified and either eliminated, controlled, or treated;

3. Site BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from construction activity to the BAT/BCT standard;

4. Calculations and design details as well as BMP controls for site run-on are complete and correct, and

5. Stabilization BMPs installed to reduce or eliminate pollutants after construction are completed.

B. To demonstrate compliance with requirements of this General Permit, the QSD shall include information in the SWPPP that supports the conclusions, selections, use, and maintenance of BMPs.

C. The discharger shall make the SWPPP available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

XV. REGIONAL WATER BOARD AUTHORITIES

A. In the case where the Regional Water Board does not agree with the discharger's self-reported risk level (e.g., they determine themselves to be a Level 1 Risk when they are actually a Level 2 Risk site), Regional Water Boards may either direct the discharger to reevaluate the Risk Level(s) for their site or terminate coverage under this General Permit.

B. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

C. Regional Water Boards may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

D. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

E. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

XVI. ANNUAL REPORTING REQUIREMENTS

A. All dischargers shall prepare and electronically submit an Annual Report no later than September 1 of each year.

B. The discharger shall certify each Annual Report in accordance with the Special Provisions.

C. The discharger shall retain an electronic or paper copy of each Annual Report for a minimum of three years after the date the annual report is filed.

D. The discharger shall include storm water monitoring information in the Annual Report consisting of:

1. a summary and evaluation of all sampling and analysis results, including copies of laboratory reports;

2. the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit");

3. a summary of all corrective actions taken during the compliance year;

4. identification of any compliance activities or corrective actions that were not implemented;

5. a summary of all violations of the General Permit;

6. the names of individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurements;

7. the date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge); and

8. the visual observation and sample collection exception records and reports specified in Attachments C, D, and E.

E. The discharger shall provide training information in the Annual Report consisting of:

1. documentation of all training for individuals responsible for all activities associated with compliance with this General Permit;

2. documentation of all training for individuals responsible for BMP installation, inspection, maintenance, and repair; and

3. documentation of all training for individuals responsible for overseeing, revising, and amending the SWPPP.

ATTACHMENT A
Linear Underground/ Overhead Requirements

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All Linear Underground/Overhead project dischargers who submit permit registration documents (PRDs) indicating their intention to be regulated under the provisions of this General Permit shall comply with the following:

A. DEFINITION OF LINEAR UNDERGROUND/OVERHEAD PROJECTS

1. Linear Underground/Overhead Projects (LUPs) include, but are not limited to, any conveyance, pipe, or pipeline for the transportation of any gaseous, liquid (including water and wastewater for domestic municipal services), liquiescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio, or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to, (a) those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment, and associated ancillary facilities); and include, but are not limited to, (b) underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/tower pad and cable/wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/ or pavement repair or replacement, and stockpile/borrow locations.

2. LUP evaluation shall consist of two tasks:

a. Confirm that the project or project section(s) qualifies as an LUP. The State Water Board website contains a project determination guidance flowchart. http://www.waterboards.ca.gov/water_issues/programs/stormwater/constpermits.shtml

b. Identify which Type(s) (1, 2 or 3 described in Section I below) are applicable to the project or project sections based on project sediment and receiving water risk. (See Attachment A.1)

3. A Legally Responsible Person (LRP) for a Linear Underground/Overhead project is required to obtain CGP coverage under one or more permit registration document (PRD) electronic submittals to the State Water Board's Storm Water Multi-Application and Report Tracking (SMARTs) system. Attachment A.1 contains a flow chart to be used when determining if a linear project qualifies for coverage and to determine LUP Types. Since a LUP may be constructed within both developed and undeveloped locations and portions of LUPs may be constructed by different contractors, LUPs may be broken into logical permit sections. Sections may be determined based on portions of a project conducted by one contractor. Other situations may also occur, such as the time period in which the sections of a project will be constructed (e.g. project phases), for which separate permit coverage is possible. For projects that are broken into separate sections, a description of how each section relates to the overall project and the definition of the boundaries between sections shall be clearly stated.

4. Where construction activities transverse or enter into different Regional Water Board jurisdictions, LRPs shall obtain permit coverage for each Regional Water Board area involved prior to the commencement of construction activities.

5. Small Construction Rainfall Erosivity Waiver

EPA's Small Construction Erosivity Waiver applies to sites between one and five acres demonstrating that there are no adverse water quality impacts.

Dischargers eligible for a Rainfall Erosivity Waiver based on low erosivity potential shall complete the electronic Notice of Intent (NOI) and Sediment Risk form through the State Water Board's SMARTS system, certifying that the construction activity will take place during a period when the value of the rainfall erosivity factor is less than five. Where the LRP changes or another LRP is added during construction, the new LRP must also submit a waiver certification through the SMARTS system.

If a small linear construction site continues beyond the projected completion date given on the waiver certification, the LRP shall recalculate the rainfall erosivity factor for the new project duration and submit this information through the SMARTS system. If the new R factor is below five (5), the discharger shall update through SMARTS all applicable information on the waiver certification and retain a copy of the revised waiver onsite. The LRP shall submit the new waiver certification 30 days prior to the projected completion date listed on the original waiver form to assure exemption from permitting requirements is uninterrupted. If the new R factor is five (5) or above, the LRP shall be required to apply for coverage under this Order.

B. LINEAR PROJECT PERMIT REGISTRATION DOCUMENTS (PRDs)

Any information provided to the Regional Water Board shall comply with the Homeland Security Act and any other federal law that concerns security in the United States; any information that does not comply should not be submitted. PRDs shall consist of the following:

1. Notice of Intent (NOI)

Prior to construction activities, the LRP of a proposed linear underground/overhead project shall utilize the processes and methods provided in Attachment A.2, Permit Registration Documents (PRDs) – General Instructions for Linear Underground/Overhead Projects to comply with the Construction General Permit.

2. Site Maps

LRPs submitting PRDs shall include at least 3 maps. The first map will be a zoomed[1] 1000-1500 ft vicinity map that shows the starting point of the project. The second will be a zoomed map of 1000-1500 ft showing the ending location of the project. The third will be a larger view vicinity map, 1000 ft to 2000 ft, displaying the entire project location depending on the project size, and indicating the LUP type (1, 2 or 3) areas within the total project footprint.

3. Drawings

LRPs submitting PRDs shall include a construction drawing(s) or other appropriate drawing(s) or map(s) that shows the locations of storm drain

[1] An image with a close-up/enhanced detailed view of site features that show minute details such as streets and neighboring structures.
Or: An image with a close-up/enhanced detailed view of the site's surrounding infrastructure.
Or: An image with a close up detailed view of the project and its surroundings.

inlets and waterbodies[2] that may receive discharges from the construction activities and that shows the locations of BMPs to be installed for all those BMPs that can be illustrated on the revisable drawing(s) or map(s). If storm drain inlets, waterbodies, and/or BMPs cannot be adequately shown on the drawing(s) or map(s) they should be described in detail within the SWPPP.

4. Storm Water Pollution Prevention Plan (SWPPP)

LUP dischargers shall comply with the SWPPP Preparation, Implementation, and Oversight requirements in Section K of this Attachment.

5. Contact information

LUP dischargers shall include contact information for all contractors (or subcontractors) responsible for each area of an LUP project. This should include the names, telephone numbers, and addresses of contact personnel. Specific areas of responsibility of each contact, and emergency contact numbers should also be included.

6. In the case of a public emergency that requires immediate construction activities, a discharger shall submit a brief description of the emergency construction activity within five days of the onset of construction, and then shall submit all PRDs within thirty days.

C. LINEAR PROJECT TERMINATION OF COVERAGE REQUIREMENTS

The LRP may terminate coverage of an LUP when construction activities are completed by submitting an electronic notice of termination (NOT) through the State Water Board's SMARTS system. Termination requirements are different depending on the complexity of the LUP. An LUP is considered complete when: (a) there is no potential for construction-related storm water pollution; (b) all elements of the SWPPP have been completed; (c) construction materials and waste have been disposed of properly; (d) the site is in compliance with all local storm water management requirements; and (e) the LRP submits a notice of termination (NOT) and has received approval for termination from the appropriate Regional Water Board office.

1. LUP Stabilization Requirements

The LUP discharger shall ensure that all disturbed areas of the construction site are stabilized prior to termination of coverage under this General Permit. Final stabilization for the purposes of submitting an NOT

[2] Includes basin(s) that the MS4 storm sewer systems may drain to for Hydromodification or Hydrological Conditional of Concerns under the MS4 permits.

is satisfied when all soil disturbing activities are completed and one of the following criteria is met:

a. In disturbed areas that were vegetated prior to construction activities of the LUP, the area disturbed must be re-established to a uniform vegetative cover equivalent to 70 percent coverage of the preconstruction vegetative conditions. Where preconstruction vegetation covers less than 100 percent of the surface, such as in arid areas, the 70 percent coverage criteria is adjusted as follows: if the preconstruction vegetation covers 50 percent of the ground surface, 70 percent of 50 percent (.70 X .50=.35) would require 35 percent total uniform surface coverage; or

b. Where no vegetation is present prior to construction, the site is returned to its original line and grade and/or compacted to achieve stabilization; or

c. Equivalent stabilization measures have been employed. These measures include, but are not limited to, the use of such BMPs as blankets, reinforced channel liners, soil cement, fiber matrices, geotextiles, or other erosion resistant soil coverings or treatments.

2. LUP Termination of Coverage Requirements

The LRP shall file an NOT through the State Water Board's SMARTS system. By submitting an NOT, the LRP is certifying that construction activities for an LUP are complete and that the project is in full compliance with requirements of this General Permit and that it is now compliant with soil stabilization requirements where appropriate. Upon approval by the appropriate Regional Water Board office, permit coverage will be terminated.

3. Revising Coverage for Change of Acreage

When the LRP of a portion of an LUP construction project changes, or when a phase within a multi-phase project is completed, the LRP may reduce the total acreage covered by this General Permit. In reducing the acreage covered by this General Permit, the LRP shall electronically file revisions to the PRDs that include:

a. a revised NOI indicating the new project size;

b. a revised site map showing the acreage of the project completed, acreage currently under construction, acreage sold, transferred or added, and acreage currently stabilized.

c. SWPPP revisions, as appropriate; and

d. certification that any new LRPs have been notified of applicable requirements to obtain General Permit coverage. The certification shall include the name, address, telephone number, and e-mail address (if known) of the new LRP.

If the project acreage has increased, dischargers shall mail payment of revised annual fees within 14 days of receiving the revised annual fee notification.

D. DISCHARGE PROHIBITIONS

1. LUP dischargers shall not violate any discharge prohibitions contained in applicable Basin Plans or statewide water quality control plans. Waste discharges to Areas of Special Biological Significance (ASBS) are prohibited by the California Ocean Plan, unless granted an exception issued by the State Water Board.

2. LUP dischargers are prohibited from discharging non-storm water that is not otherwise authorized by this General Permit. Non-storm water discharges authorized by this General Permit[3] may include, fire hydrant flushing, irrigation of vegetative erosion control measures, pipe flushing and testing, water to control dust, street cleaning, dewatering,[4] uncontaminated groundwater from dewatering, and other discharges not subject to a separate general NPDES permit adopted by a Regional Water Board. Such discharges are allowed by this General Permit provided they are not relied upon to clean up failed or inadequate construction or post-construction BMPs designed to keep materials on site. These authorized non-storm water discharges:

[3] Dischargers must identify all authorized non-storm water discharges in the LUP's SWPPP and identify BMPs that will be implemented to either eliminate or reduce pollutants in non-storm water discharges. Regional Water Boards may direct the discharger to discontinue discharging such non-storm water discharges if determined that such discharges discharge significant pollutants or threaten water quality.
[4] Dewatering activities may be prohibited or need coverage under a separate permit issued by the Regional Water Boards. Dischargers shall check with the appropriate Regional Water Boards for any required permit or basin plan conditions prior to initial dewatering activities to land, storm drains, or waterbodies.

a. Shall not cause or contribute to a violation of any water quality standard;

b. Shall not violate any other provision of this General Permit;

c. Shall not violate any applicable Basin Plan;

d. Shall comply with BMPs as described in the SWPPP;

e. Shall not contain toxic constituents in toxic amounts or (other) significant quantities of pollutants;

f. Shall be monitored and meets the applicable NALs and NELs; and

g. Shall be reported by the discharger in the Annual Report.

If any of the above conditions are not satisfied, the discharge is not authorized by this General Permit. The discharger shall notify the Regional Water Board of any anticipated non-storm water discharges not authorized by this General Permit to determine the need for a separate NPDES permit.

Additionally, some LUP dischargers may be required to obtain a separate permit if the applicable Regional Water Board has adopted a General Permit for dewatering discharges. Wherever feasible, alternatives, that do not result in the discharge of non-storm water, shall be implemented in accordance with this Attachment's Section K.2 - SWPPP Implementation Schedule.

3. LUP dischargers shall ensure that trench spoils or any other soils disturbed during construction activities that are contaminated[5] are not discharged with storm water or non-storm water discharges into any storm drain or water body except pursuant to an NPDES permit.

When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the LUP discharger shall have those soils sampled and tested to ensure that proper handling and public safety measures are

[5] Contaminated soil contains pollutants in concentrations that exceed the appropriate thresholds that various regulatory agencies set for those substances. Preliminary testing of potentially contaminated soils will be based on odor, soil discoloration, or prior history of the site's chemical use and storage and other similar factors. When soil contamination is found or suspected and a responsible party is not identified, or the responsible party fails to promptly take the appropriate action, the discharger shall have those soils sampled and tested to ensure proper handling and public safety measures are implemented. The legally responsible person will notify the appropriate local, State, or federal agency(ies) when contaminated soil is found at a construction site, and will notify the Regional Water Board by submitting an NOT at the completion of the project.

implemented. The LUP discharger shall notify the appropriate local, State, and federal agency(ies) when contaminated soil is found at a construction site, and will notify the appropriate Regional Water Board.

4. Discharging any pollutant-laden water that will cause or contribute to an exceedance of the applicable Regional Water Board's Basin Plan from a dewatering site or sediment basin into any receiving water or storm drain is prohibited.

5. Debris[6] resulting from construction activities are prohibited from being discharged from construction project sites.

E. SPECIAL PROVISIONS

1. Duty to Comply

a. The LUP discharger must comply with all of the conditions of this General Permit. Any permit noncompliance constitutes a violation of the Clean Water Act (CWA) and the Porter-Cologne Water Quality Control Act and is grounds for enforcement action and/or removal from General Permit coverage.

b. The LUP discharger shall comply with effluent standards or prohibitions established under Section 307(a) of the CWA for toxic pollutants within the time provided in the regulations that establish these standards or prohibitions, even if this General Permit has not yet been modified to incorporate the requirement.

2. General Permit Actions

a. This General Permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the discharger for a General Permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not annul any General Permit condition.

[6] Litter, rubble, discarded refuse, and remains of something destroyed.

b. If any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the CWA for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this General Permit, this General Permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition and the dischargers so notified.

3. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for an LUP discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this General Permit.

4. Duty to Mitigate

The LUP discharger shall take all responsible steps to minimize or prevent any discharge in violation of this General Permit, which has a reasonable likelihood of adversely affecting human health or the environment.

5. Proper Operation and Maintenance

The LUP discharger shall at all times properly operate and maintain any facilities and systems of treatment and control (and related appurtenances) which are installed or used by the discharger to achieve compliance with the conditions of this General Permit and with the requirements of the Storm Water Pollution Prevention Plan (SWPPP). Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. Proper operation and maintenance may require the operation of backup or auxiliary facilities or similar systems installed by a discharger when necessary to achieve compliance with the conditions of this General Permit.

6. Property Rights

This General Permit does not convey any property rights of any sort or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor does it authorize any infringement of Federal, State, or local laws or regulations.

7. Duty to Maintain Records and Provide Information

a. The LUP discharger shall maintain a paper or electronic copy of all required records, including a copy of this General Permit, for three years from the date generated or date submitted, whichever is last. These records shall be kept at the construction site or in a crew

member's vehicle until construction is completed, and shall be made available upon request.

b. The LUP discharger shall furnish the Regional Water Board, State Water Board, or USEPA, within a reasonable time, any requested information to determine compliance with this General Permit. The LUP discharger shall also furnish, upon request, copies of records that are required to be kept by this General Permit.

8. Inspection and Entry

The LUP discharger shall allow the Regional Water Board, State Water Board, USEPA, and/or, in the case of construction sites which discharge through a municipal separate storm sewer, an authorized representative of the municipal operator of the separate storm sewer system receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

a. Enter upon the discharger's premises at reasonable times where a regulated construction activity is being conducted or where records must be kept under the conditions of this General Permit;

b. Access and copy at reasonable times any records that must be kept under the conditions of this General Permit;

c. Inspect at reasonable times the complete construction site, including any off-site staging areas or material storage areas, and the erosion/sediment controls; and

d. Sample or monitor at reasonable times for the purpose of ensuring General Permit compliance.

9. Electronic Signature and Certification Requirements

a. All Permit Registration Documents (PRDs) and Notices of Termination (NOTs) shall be electronically signed, certified, and submitted via SMARTS to the State Water Board. Either the Legally Responsible Person (LRP), as defined in Appendix 5 – Glossary, or a person legally authorized to sign and certify PRDs and NOTs on behalf of the LRP (the LRP's Approved Signatory, as defined in Appendix 5 - Glossary) must submit all information electronically via SMARTS.

b. Changes to Authorization. If an Approved Signatory's authorization is no longer accurate, a new authorization satisfying the requirements of paragraph (a) of this section must be submitted via SMARTS prior to or

together with any reports, information or applications to be signed by an Approved Signatory.

c. All SWPPP revisions, annual reports, or other information required by the General Permit (other than PRDs and NOTs) or requested by the Regional Water Board, State Water Board, USEPA, or local storm water management agency shall be certified and submitted by the LRP or the LRP's Approved Signatory.

10. Certification

Any person signing documents under Section E.9 above, shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

11. Anticipated Noncompliance

The LUP discharger shall give advance notice to the Regional Water Board and local storm water management agency of any planned changes in the construction activity, which may result in noncompliance with General Permit requirements.

12. Penalties for Falsification of Reports

Section 309(c)(4) of the CWA provides that any person who knowingly makes any false material statement, representation, or certification in any record or other document submitted or required to be maintained under this General Permit, including reports of compliance or noncompliance shall upon conviction, be punished by a fine of not more than $10,000 or by imprisonment for not more than two years or by both.

13. Oil and Hazardous Substance Liability

Nothing in this General Permit shall be construed to preclude the institution of any legal action or relieve the discharger from any responsibilities, liabilities, or penalties to which the LUP discharger is or may be subject to under Section 311 of the CWA.

14. Severability

The provisions of this General Permit are severable; and, if any provision of this General Permit or the application of any provision of this General Permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this General Permit shall not be affected thereby.

15. Reopener Clause

This General Permit may be modified, revoked and reissued, or terminated for cause due to promulgation of amended regulations, receipt of USEPA guidance concerning regulated activities, judicial decision, or in accordance with 40 Code of Federal Regulations (CFR) 122.62, 122.63, 122.64, and 124.5.

16. Penalties for Violations of Permit Conditions

a. Section 309 of the CWA provides significant penalties for any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the CWA or any permit condition or limitation implementing any such section in a permit issued under Section 402. Any person who violates any permit condition of this General Permit is subject to a civil penalty not to exceed $37,500[7] per calendar day of such violation, as well as any other appropriate sanction provided by Section 309 of the CWA.

b. The Porter-Cologne Water Quality Control Act also provides for civil and criminal penalties, which in some cases are greater than those under the CWA.

17. Transfers

This General Permit is not transferable. A new LRP of an ongoing construction activity must submit PRDs in accordance with the requirements of this General Permit to be authorized to discharge under this General Permit. An LRP who is a property owner with active General Permit coverage who sells a fraction or all the land shall inform the new property owner(s) of the requirements of this General Permit.

18. Continuation of Expired Permit

This General Permit continues in force and effect until a new General Permit is issued or the SWRCB rescinds this General Permit. Only those

[7] May be further adjusted in accordance with the Federal Civil Penalties Inflation Adjustment Act

dischargers authorized to discharge under the expiring General Permit are covered by the continued General Permit.

F. EFFLUENT STANDARDS

1. Narrative Effluent Limitations

a. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges regulated by this General Permit do not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

b. LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of structural or non-structural controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric Effluent Limitations (NELs)

Table 1. Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	LUP Type 2	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	N/A
		LUP Type 3			lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	LUP Type 2	1	NTU	250 NTU	N/A
		LUP Type 3			250 NTU	500 NTU

a. Numeric Effluent Limitations (NELs):

i **Storm Event, Daily Average pH Limits –** For LUP Type 3 dischargers, the daily average pH of storm water and non-storm water discharges shall be within the ranges specified in Table 1 during any project phase where there is a "high risk of pH discharge."[8]

ii **Storm Event Daily Average Turbidity Limit –** For LUP Type 3 dischargers, the daily average turbidity of storm water and non-storm water discharges shall not exceed 500 NTU.

[8] A period of high risk of pH discharge is defined as a project's complete utilities phase, complete vertical build phase, and any portion of any phase where significant amounts of materials are placed directly on the land at the site in a manner that could result in significant alterations of the background pH of the discharges.

b. If a daily average sample result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General Permit and shall electronically file the results in violation within 5 business days of obtaining the results.

c. Compliance Storm Event:

Discharges of storm water from LUP Type 3 sites shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for LUP Type 3 discharges is the 5-year, 24-hour storm (expressed in tenths of an inch of rainfall), as determined by using these maps:

http://www.wrcc.dri.edu/pcpnfreq/nca5y24.gif
http://www.wrcc.dri.edu/pcpnfreq/sca5y24.gif

Compliance storm event verification shall be done by reporting on-site rain gauge readings as well as nearby governmental rain gauge readings.

d. Dischargers shall not be required to comply with NELs if the site receives run-on from a forest fire or any other natural disaster.

3. Numeric Action Levels (NALs)

a. For LUP Type 2 and 3 dischargers, the lower storm event daily average NAL for pH is 6.5 pH units and the upper storm event daily average NAL for pH is 8.5 pH units. The LUP discharger shall take actions as described below if the storm event daily average discharge is outside of this range of pH values.

b. For LUP Type 2 and 3 dischargers, the storm event daily average NAL for turbidity is 250 NTU. The discharger shall take actions as described below if the storm event daily average discharge is outside of this range of turbidity values.

c. Whenever daily average analytical effluent monitoring results indicate that the discharge is below the lower NAL for pH, exceeds the upper NAL for pH, or exceeds the turbidity NAL (as listed in Table 1), the LUP discharger shall conduct a construction site and run-on evaluation to determine whether pollutant source(s) associated with the site's construction activity may have caused or contributed to the NAL

exceedance and shall immediately implement corrective actions if they are needed.

d. The site evaluation will be documented in the SWPPP and specifically address whether the source(s) of the pollutants causing the exceedance of the NAL:

i Are related to the construction activities and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) determine what corrective action(s) were taken or will be taken and with a description of the schedule for completion.

AND/OR:

ii Are related to the run-on associated with the construction site location and whether additional BMPs or SWPPP implementation measures are required to (1) meet BAT/BCT requirements; (2) reduce or prevent pollutants in storm water discharges from causing exceedances of receiving water objectives; and (3) decide what corrective action(s) were taken or will be taken, including a description of the schedule for completion.

G. RECEIVING WATER LIMITATIONS

1. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges to any surface or ground water will not adversely affect human health or the environment.

2. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants in quantities that threaten to cause pollution or a public nuisance.

3. LUP dischargers shall ensure that storm water discharges and authorized non-storm water discharges will not contain pollutants that cause or contribute to an exceedance of any applicable water quality objectives or water quality standards (collectively, WQS) contained in a Statewide Water Quality Control Plan, the California Toxics Rule, the National Toxics Rule, or the applicable Regional Water Board's Water Quality Control Plan (Basin Plan).

H. TRAINING QUALIFICATIONS

1. General

All persons responsible for implementing requirements of this General Permit shall be appropriately trained. Training should be both formal and informal, occur on an ongoing basis, and should include training offered by recognized governmental agencies or professional organizations. Persons responsible for preparing, amending and certifying SWPPPs shall comply with the requirements in this Section H.

2. SWPPP Certification Requirements

a. **Qualified SWPPP Developer:** The LUP discharger shall ensure that all SWPPPs be written, amended and certified by a Qualified SWPPP Developer (QSD). A QSD shall have one of the following registrations or certifications, and appropriate experience, as required for:

i A California registered professional civil engineer;

ii A California registered professional geologist or engineering geologist;

iii A California registered landscape architect;

iv A professional hydrologist registered through the American Institute of Hydrology;

v A certified professional in erosion and sediment control (CPESC) ™ registered through Enviro Cert International, Inc;

vi A certified professional in storm water quality (CPSWQ)™ registered through Enviro Cert International, Inc.; or

vii A certified professional in erosion and sediment control registered through the National Institute for Certification in Engineering Technologies (NICET).

Effective two years after the adoption date of this General Permit, a QSD shall have attended a State Water Board-sponsored or approved QSD training course.

b. The LUP discharger shall ensure that the SWPPP is written and amended, as needed, to address the specific circumstances for each construction site covered by this General Permit prior to commencement of construction activity for any stage.

c. The LUP discharger shall list the name and telephone number of the currently designated Qualified SWPPP Developer(s) in the SWPPP.

d. **Qualified SWPPP Practitioner:** The LUP discharger shall ensure that all elements of any SWPPP for each project will be implemented by a Qualified SWPPP Practitioner (QSP). A QSP is a person responsible for non-storm water and storm water visual observations, sampling and analysis, and for ensuring full compliance with the permit and implementation of all elements of the SWPPP. Effective two years from the date of adoption of this General Permit, a QSP shall be either a QSD or have one of the following certifications:

   i A certified erosion, sediment and storm water inspector registered through Certified Professional in Erosion and Sediment Control, Inc.; or

   ii A certified inspector of sediment and erosion control registered through Certified Inspector of Sediment and Erosion Control, Inc.

   Effective two years after the adoption date of this General Permit, a QSP shall have attended a State Water Board-sponsored or approved QSP training course.

e. The LUP discharger shall ensure that the SWPPP include a list of names of all contractors, subcontractors, and individuals who will be directed by the Qualified SWPPP Practitioner, and who is ultimately responsible for implementation of the SWPPP. This list shall include telephone numbers and work addresses. Specific areas of responsibility of each subcontractor and emergency contact numbers shall also be included.

f. The LUP discharger shall ensure that the SWPPP and each amendment be signed by the Qualified SWPPP Developer. The LUP discharger shall include a listing of the date of initial preparation and the dates of each amendment in the SWPPP.

I. TYPES OF LINEAR PROJECTS

This attachment establishes three types (Type 1, 2 & 3) of complexity for areas within an LUP or project section based on threat to water quality. Project area Types are determined through Attachment A.1.

The Type 1 requirements below establish the baseline requirements for all LUPs subject to this General Permit. Additional requirements for Type 2 and Type 3 LUPs are labeled.

1. Type 1 LUPs*:*

LUP dischargers with areas of a LUP designated as Type 1 shall comply with the requirements in this Attachment. Type 1 LUPs are:

a. Those construction areas where 70 percent or more of the construction activity occurs on a paved surface and where areas disturbed during construction will be returned to preconstruction conditions or equivalent protection established at the end of the construction activities for the day; or

b. Where greater than 30 percent of construction activities occur within the non-paved shoulders or land immediately adjacent to paved surfaces, or where construction occurs on unpaved improved roads, including their shoulders or land immediately adjacent to them where:

   i Areas disturbed during construction will be returned to preconstruction conditions or equivalent protection is established at the end of the construction activities for the day to minimize the potential for erosion and sediment deposition, and

   ii Areas where established vegetation was disturbed during construction will be stabilized and re-vegetated by the end of project. When required, adequate temporary stabilization BMPs will be installed and maintained until vegetation is established to meet minimum cover requirements established in this General Permit for final stabilization.

c. Where the risk determination is as follows:

   i Low sediment risk, low receiving water risk, or

   ii Low sediment risk, medium receiving water risk, or

   iii Medium sediment risk, low receiving water risk

2. Type 2 LUPs:

Type 2 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 2 LUPs have the specified combination of risk:

d. High sediment risk, low receiving water risk, or

e. Medium sediment risk, medium receiving water risk, or

f. Low sediment risk, high receiving water risk

Receiving water risk is either considered “Low” for those areas of the project that are not in close proximity to a sensitive receiving watershed, “Medium” for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, and “High” where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C of this General Permit.

3. Type 3 LUPs:

Type 3 LUPs are determined by the Combined Risk Matrix in Attachment A.1. Type 3 LUPs have the specified combination of risk:

a. High sediment risk, high receiving water risk, or

b. High sediment risk, medium receiving water risk, or

c. Medium sediment risk, high receiving water risk

Receiving water risk is either considered “Medium” for those areas of the project within a sensitive receiving watershed yet outside of the flood plain of a sensitive receiving water body, or “High” where the soil disturbance is within close proximity to a sensitive receiving water body. Project sediment risk is calculated based on the Risk Factor Worksheet in Attachment C.

J. LUP TYPE-SPECIFIC REQUIREMENTS

1. Effluent Standards

a. Narrative – LUP dischargers shall comply with the narrative effluent standards below.

i Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities

established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

ii LUP dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

b. Numeric – LUP Type 1 dischargers are not subject to a numeric effluent standard

c. Numeric –LUP Type 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

d. Numeric – LUP Type 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, LUP Type 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

2. Good Site Management "Housekeeping"

a. LUP dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, the good housekeeping measures shall consist of the following:

i Identify the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

ii Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

iii Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

iv Minimize exposure of construction materials to precipitation (not applicable to materials designed to be outdoors and exposed to the environment).

v Implement BMPs to control the off-site tracking of loose construction and landscape materials.

b. LUP dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

i Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

ii Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

iii Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

iv Cover waste disposal containers at the end of every business day and during a rain event.

v Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

vi Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

vii Implement procedures that effectively address hazardous and non-hazardous spills.

viii Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

(1) Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

(2) Appropriate spill response personnel are assigned and trained.

ix Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

c. LUP dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

i Prevent oil, grease, or fuel from leaking into the ground, storm drains or surface waters.

ii Implement appropriate BMPs whenever equipment or vehicles are fueled, maintained or stored.

iii Clean leaks immediately and disposing of leaked materials properly.

d. LUP dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

i Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

ii Contain fertilizers and other landscape materials when they are not actively being used.

iii Discontinue the application of any erodible landscape material at least 2 days before a forecasted rain event[9] or during periods of precipitation.

iv Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

v Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

e. LUP dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, LUP dischargers shall do the following:

i Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

[9] 50% or greater chance of producing precipitation.

ii Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

iii Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

iv Ensure retention of sampling, visual observation, and inspection records.

v Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

f. LUP dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations.

3. Non-Storm Water Management

a. LUP dischargers shall implement measures to control all non-storm water discharges during construction.

b. LUP dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

c. LUP dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

4. Erosion Control

a. LUP dischargers shall implement effective wind erosion control.

b. LUP dischargers shall provide effective soil cover for inactive[10] areas and all finished slopes, and utility backfill.

[10] Areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days

c. LUP dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

5. Sediment Controls

a. LUP dischargers shall establish and maintain effective perimeter controls as needed, and implement effective BMPs for all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

b. On sites where sediment basins are to be used, LUP dischargers shall, at minimum, design sediment basins according to the guidance provided in CASQA's Construction BMP Handbook.

c. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[11] in accordance with Table 2 below.

Table 2 – Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

d. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent off-site tracking of sediment.

e. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

f. **Additional LUP Type 2 & 3 Requirement:** LUP Type 2 & 3 dischargers shall inspect all immediate access roads. At a minimum daily and prior to any rain event, the discharger shall remove any

[11] Sheet flow length is the length that shallow, low velocity flow travels across a site.

sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

g. **Additional LUP Type 3 Requirement:** The Regional Water Board may require LUP Type 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

6. Run-on and Run-off Controls

a. LUP dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site-shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this Attachment.

b. Run-on and runoff controls are not required for Type 1 LUPs unless the evaluation of quantity and quality of run-on and runoff deems them necessary or visual inspections show that the site requires such controls.

7. Inspection, Maintenance and Repair

a. All inspection, maintenance repair and sampling activities at the discharger's LUP location shall be performed or supervised by a QSP representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

b. LUP dischargers shall conduct visual inspections and observations daily during working hours (not recorded). At least once each 24-hour period during extended storm events, **LUP Type 2 & 3 dischargers** shall conduct visual inspections to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

c. Upon identifying failures or other shortcomings, as directed by the QSP, LUP dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

d. For each pre- and post-rain event inspection required, LUP dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format that includes the information described below.

e. The LUP discharger shall ensure that the checklist remains on-site or with the SWPPP. At a minimum, an inspection checklist should include:

i Inspection date and date the inspection report was written.

ii Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

iii Site information, including stage of construction, activities completed, and approximate area of the site exposed.

iv A description of any BMPs evaluated and any deficiencies noted.

v If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

vi Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

vii Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

viii Photographs taken during the inspection, if any.

ix Inspector's name, title, and signature.

K. STORM WATER POLLUTION PREVENTION PLAN (SWPPP) REQUIREMENTS

1. Objectives

SWPPPs for all LUPs shall be developed and amended or revised by a QSD. The SWPPP shall be designed to address the following objectives:

a. All pollutants and their sources, including sources of sediment, associated with construction activities associated with LUP activity are controlled;

b. All non-storm water discharges are identified and either eliminated, controlled, or treated;

c. BMPs are effective and result in the reduction or elimination of pollutants in storm water discharges and authorized non-storm water discharges from LUPs during construction; and

d. Stabilization BMPs installed to reduce or eliminate pollutants after construction is completed are effective and maintained.

2. SWPPP Implementation Schedule

a. LUPs for which PRDs have been submitted to the State Water Board shall develop a site/project location SWPPP prior to the start of land-disturbing activity in accordance with this Section and shall implement the SWPPP concurrently with commencement of soil-disturbing activities.

b. For an ongoing LUP involving a change in the LRP, the new LRP shall review the existing SWPPP and amend it, if necessary, or develop a new SWPPP within 15 calendar days to conform to the requirements set forth in this General Permit.

3. Availability

The SWPPP shall be available at the construction site during working hours while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone.

L. REGIONAL WATER BOARD AUTHORITIES

1. Regional Water Boards shall administer the provisions of this General Permit. Administration of this General Permit may include, but is not limited to, requesting the submittal of SWPPPs, reviewing SWPPPs, reviewing monitoring and sampling and analysis reports, conducting compliance inspections, gathering site information by any medium including sampling, photo and video documentation, and taking enforcement actions.

2. Regional Water Boards may terminate coverage under this General Permit for dischargers who fail to comply with its requirements or where they determine that an individual NPDES permit is appropriate.

3. Regional Water Boards may issue separate permits for discharges of storm water associated with construction activity to individual dischargers, categories of dischargers, or dischargers in a geographic area. Upon issuance of such permits by a Regional Water Board, dischargers subject to those permits shall no longer be regulated by this General Permit.

4. Regional Water Boards may direct the discharger to reevaluate the LUP Type(s) for the project (or elements/areas of the project) and impose the appropriate level of requirements.

5. Regional Water Boards may terminate coverage under this General Permit for dischargers who negligently or with willful intent incorrectly determine or report their LUP Type (e.g., they determine themselves to be a LUP Type 1 when they are actually a Type 2).

6. Regional Water Boards may review PRDs and reject or accept applications for permit coverage or may require dischargers to submit a Report of Waste Discharge / NPDES permit application for Regional Water Board consideration of individual requirements.

7. Regional Water Boards may impose additional requirements on dischargers to satisfy TMDL implementation requirements or to satisfy provisions in their Basin Plans.

8. Regional Water Boards may require additional Monitoring and Reporting Program Requirements, including sampling and analysis of discharges to sediment-impaired water bodies.

9. Regional Water Boards may require dischargers to retain records for more than the three years required by this General Permit.

10. Based on an LUP's threat to water quality and complexity, the Regional Water Board may determine on a case-by-case basis that an LUP, or a portion of an LUP, is not eligible for the linear project requirements contained in this Attachment, and require that the discharger comply with all standard requirements in this General Permit.

11. The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

M. MONITORING AND REPORTING REQUIREMENTS

Table 3. LUP Summary of Monitoring Requirements

LUP Type	Visual Inspections				Sample Collection		
	Daily Site BMP	Pre-storm Event / Baseline	Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water	Non-Visible (when applicable)
1	X						X
2	X	X	X	X	X		X
3	X	X	X	X	X	X	X

1. Objectives

LUP dischargers shall prepare a monitoring and reporting program (M&RP) prior to the start of construction and immediately implement the program at the start of construction for LUPs. The monitoring program must be implemented at the appropriate level to protect water quality at all times throughout the life of the project. The M&RP must be a part of the SWPPP, included as an appendix or separate SWPPP chapter.

2. M&RP Implementation Schedule

a. LUP dischargers shall implement the requirements of this Section at the time of commencement of construction activity. LUP dischargers are responsible for implementing these requirements until construction activity is complete and the site is stabilized.

b. LUP dischargers shall revise the M&RP when:

i Site conditions or construction activities change such that a change in monitoring is required to comply with the requirements and intent of this General Permit.

ii The Regional Water Board requires the discharger to revise its M&RP based on its review of the document. Revisions may include, but not be limited to, conducting additional site inspections, submitting reports, and certifications. Revisions shall be submitted via postal mail or electronic e-mail.

iii The Regional Water Board may require additional monitoring and reporting program requirements including sampling and analysis of discharges to CWA § 303(d)-listed water bodies. Additional requirements imposed by the Regional Water Board shall be consistent with the overall monitoring effort in the receiving waters.

3. LUP Type 1 Monitoring and Reporting Requirements

a. LUP Type 1 Inspection Requirements

i LUP Type 1 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 1 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 1 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 1 dischargers shall conduct daily visual inspections to verify that:

(1) Appropriate BMPs for storm water and non-storm water are being implemented in areas where active construction is occurring (including staging areas);

(2) Project excavations are closed, with properly protected spoils, and that road surfaces are cleaned of excavated material and construction materials such as chemicals by either removing or storing the material in protective storage containers at the end of every construction day;

(3) Land areas disturbed during construction are returned to pre-construction conditions or an equivalent protection is used at the end of each workday to eliminate or minimize erosion and the possible discharge of sediment or other pollutants during a rain event.

v Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures

are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vi Inspection programs are required for LUP Type 1 projects where temporary and permanent stabilization BMPs are installed and are to be monitored after active construction is completed. Inspection activities shall continue until adequate permanent stabilization is established and, in areas where re-vegetation is chosen, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

b. LUP Type 1 Monitoring Requirements for Non-Visible Pollutants

LUP Type 1 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where the LUP Type 1 discharger believes pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help the LUP Type 1 discharger determine when to collect samples.

(2) The LUP Type 1 discharger is not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 1 dischargers shall collect samples down-gradient from all discharge locations where the visual observations were made triggering the monitoring, and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 1 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 1 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[12]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 1 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 1 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

c. <u>LUP Type 1 Visual Observation Exceptions</u>

i LUP Type 1 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. The Type 1 LUP discharger is not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

[12] Sample collected at a location unaffected by contruction activities.

ii If the LUP Type 1 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

d. Particle Size Analysis for Risk Justification

LUP Type 1 dischargers utilizing justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

4. LUP Type 2 & 3 Monitoring and Reporting Requirements

a. LUP Type 2 & 3 Inspection Requirements

i LUP Type 2 & 3 dischargers shall ensure that all inspections are conducted by trained personnel. The name(s) and contact number(s) of the assigned inspection personnel should be listed in the SWPPP.

ii LUP Type 2 & 3 dischargers shall ensure that all visual inspections are conducted daily during working hours and in conjunction with other daily activities in areas where active construction is occurring.

iii LUP Type 2 & 3 dischargers shall ensure that photographs of the site taken before, during, and after storm events are taken during inspections, and submitted through the State Water Board's SMARTS website once every three rain events.

iv LUP Type 2 & 3 dischargers shall conduct daily visual inspections to verify that appropriate BMPs for storm water and non-storm water are being implemented and in place in areas where active construction is occurring (including staging areas).

v LUP Type 2 & 3 dischargers shall conduct inspections of the construction site prior to anticipated storm events, during extended storm events, and after actual storm events to identify areas contributing to a discharge of storm water associated with construction activity. Pre-storm inspections are to ensure that BMPs are properly installed and maintained; post-storm inspections are to assure that BMPs have functioned adequately. During

extended storm events, inspections shall be required during normal working hours for each 24-hour period.

vi Inspections may be discontinued in non-active construction areas where soil-disturbing activities are completed and final soil stabilization is achieved (e.g., paving is completed, substructures are installed, vegetation meets minimum cover requirements for final stabilization, or other stabilization requirements are met).

vii LUP Type 2 & 3 dischargers shall implement a monitoring program for inspecting projects that require temporary and permanent stabilization BMPs after active construction is complete. Inspections shall ensure that the BMPs are adequate and maintained. Inspection activities shall continue until adequate permanent stabilization is established and, in vegetated areas, until minimum vegetative coverage is established in accordance with Section C.1 of this Attachment.

viii If possible, LUP Type 2 & 3 dischargers shall install a rain gauge on-site at an accessible and secure location with readings made during all storm event inspections. When readings are unavailable, data from the closest rain gauge with publically available data may be used.

ix LUP Type 2 & 3 dischargers shall Include and maintain a log of the inspections conducted in the SWPPP. The log will provide the date and time of the inspection and who conducted the inspection.

b. LUP Type 2 & 3 Storm Water Effluent Monitoring Requirements

Table 4. LUP Type 2 & 3 Effluent Monitoring Requirements

LUP Type	Frequency	Effluent Monitoring
2	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	Turbidity, pH, and non-visible pollutant parameters (if applicable)
3	Minimum of 3 samples per day characterizing discharges associated with construction activity from the project active areas of construction.	turbidity, pH, suspended sediment concentrations (SSC)[13] (only if turbidity NEL exceeded), plus non-visible pollutant parameters (if applicable)

i LUP Type 2 & 3 dischargers shall collect storm water grab samples from sampling locations characterizing discharges associated with

[13] Suspended Sediment Concentration monitoring is required for any Type 3 area that exceeds its turbidity NEL.

activity from the LUP active areas of construction. At a minimum, 3 samples shall be collected per day of discharge.

ii LUP Type 2 & 3 dischargers shall collect samples of stored or contained storm water that is discharged subsequent to a storm event producing precipitation of ½ inch or more at the time of discharge.

iii LUP Type 2 & 3 dischargers shall ensure that storm water grab sample(s) obtained be representative of the flow and characteristics of the discharge.

iv LUP Type 2 & 3 dischargers shall analyze their effluent samples for:

(1) pH and turbidity
(2) Any additional parameter for which monitoring is required by the Regional Water Board.

v LUP Type 3 dischargers that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for turbidity and SSC.

c. LUP Type 2 & 3 Storm Water Effluent Sampling Locations

i LUP Type 2 & 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire disturbed project or area.

ii LUP Type 2 & 3 dischargers may monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to exceedance of NALs or NELs (applicable to Type 3).

iii LUP Type 2 & 3 dischargers shall select analytical test methods from the list provided in Table 5 below.

iv LUP Type 2 & 3 dischargers shall ensure that all storm water sample collection preservation and handling shall be conducted in accordance with the “Storm Water Sample Collection and Handling Instructions” below.

d. LUP Type 3 Receiving Water Monitoring Requirements

i In the event that an LUP Type 3 discharger violates an applicable NEL contained in this General Permit and has a direct discharge to receiving waters, the LUP discharger shall subsequently sample Receiving Waters (RWs) for turbidity, pH (if applicable) and SSC.

ii LUP Type 3 dischargers that meet the project criteria in Appendix 3 of this General Permit and have more than 30 acres of soil disturbance in the project area or project section area designated as Type 3, shall comply with the Bioassessment requirements prior to commencement of construction activity.

iii LUP Type 3 dischargers shall obtain RW samples in accordance with the requirements of the Receiving Water Sampling Locations section (Section M.4.d of this Attachment).

e. LUP Type 3 Receiving Water Sampling Locations

i **Upstream/up-gradient RW samples**: LUP Type 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible to and upstream from the effluent discharge point.

ii **Downstream/down-gradient RW samples**: LUP Type 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible to and downstream from the effluent discharge point.

iii If two or more discharge locations discharge to the same receiving water, LUP Type 3 dischargers may sample the receiving water at a single upstream and downstream location.

f. LUP Type 2 & 3 Monitoring Requirements for Non-Visible Pollutants

LUP Type 2 & 3 dischargers shall implement sampling and analysis requirements to monitor non-visible pollutants associated with (1) construction sites; (2) activities producing pollutants that are not visually detectable in storm water discharges; and (3) activities which could cause or contribute to an exceedance of water quality objectives in the receiving waters.

i Sampling and analysis for non-visible pollutants is only required where LUP Type 2 & 3 dischargers believe pollutants associated with construction activities have the potential to be discharged with storm water runoff due to a spill or in the event there was a breach, malfunction, failure and/or leak of any BMP. Also, failure to implement BMPs may require sample collection.

(1) Visual observations made during the monitoring program described above will help LUP Type 2 & 3 dischargers determine when to collect samples.

(2) LUP Type 2 & 3 dischargers are not required to sample if one of the conditions described above (e.g., breach or spill) occurs and the site is cleaned of material and pollutants and/or BMPs are implemented prior to the next storm event.

ii LUP Type 2 & 3 dischargers shall collect samples down-gradient from the discharge locations where the visual observations were made triggering the monitoring and which can be safely accessed. For sites where sampling and analysis is required, personnel trained in water quality sampling procedures shall collect storm water samples.

iii If sampling for non-visible pollutant parameters is required, LUP Type 2 & 3 dischargers shall ensure that samples be analyzed for parameters indicating the presence of pollutants identified in the pollutant source assessment required in Section J.2.a.i.

iv LUP Type 2 & 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

v LUP Type 2 & 3 dischargers shall ensure that a sufficiently large sample of storm water that has not come into contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample[14]) will be collected for comparison with the discharge sample. Samples shall be collected during the first two hours of discharge from rain events that occur during daylight hours and which generate runoff.

vi LUP Type 2 & 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis. Analyses may include, but are not limited to, indicator parameters such as: pH, specific conductance, dissolved oxygen, conductivity, salinity, and Total Dissolved Solids (TDS).

vii For laboratory analyses, all sampling, sample preservation, and other analyses must be conducted according to test procedures pursuant to 40 C.F.R. Part 136. LUP Type 2 & 3 dischargers shall ensure that field samples are collected and analyzed according to manufacturer specifications of the sampling devices employed. Portable meters shall be calibrated according to manufacturer's specification.

viii LUP Type 2 & 3 dischargers shall ensure that all field and/or analytical data are kept in the SWPPP document.

[14] Sample collected at a location unaffected by construction activities

g. LUP Type 2 & 3 Visual Observation and Sample Collection Exceptions

i LUP Type 2 & 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) to meet the minimum visual observation requirements of this Attachment. Type 2 & 3 LUP dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

(1) During dangerous weather conditions such as flooding and electrical storms;

(2) Outside of scheduled site business hours.

(3) When access to the site is unsafe due to storm events.

ii If the LUP Type 2 or 3 discharger does not collect the required samples or visual observation (inspections) due to these exceptions, an explanation why the sampling or visual observation (inspections) were not conducted shall be included in both the SWPPP and the Annual Report.

h. LUP Type 2 & 3 Storm Water Sample Collection and Handling Instructions

LUP Type 2 & 3 dischargers shall refer to Table 5 below for test Methods, detection Limits, and reporting Units. During storm water sample collection and handling, the LUP Type 2 & 3 discharger shall:

i Identify the parameters required for testing and the number of storm water discharge points that will be sampled. Request the laboratory to provide the appropriate number of sample containers, types of containers, sample container labels, blank chain of custody forms, and sample preservation instructions.

ii Determine how to ship the samples to the laboratory. The testing laboratory should receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory). The options are to either deliver the samples to the laboratory, arrange to have the laboratory pick them up, or ship them overnight to the laboratory.

iii Use only the sample containers provided by the laboratory to collect and store samples. Use of any other type of containers could contaminate your samples.

iv Prevent sample contamination, by not touching, or putting anything into the sample containers before collecting storm water samples.

v Not overfilling sample containers. Overfilling can change the analytical results.

vi Tightly screw the cap of each sample container without stripping the threads of the cap.

vii Complete and attach a label to each sample container. The label shall identify the date and time of sample collection, the person taking the sample, and the sample collection location or discharge point. The label should also identify any sample containers that have been preserved.

viii Carefully pack sample containers into an ice chest or refrigerator to prevent breakage and maintain temperature during shipment. Remember to place frozen ice packs into the shipping container. Samples should be kept as close to 4° C (39° F) as possible until arriving at the laboratory. Do not freeze samples.

ix Complete a Chain of Custody form for each set of samples. The Chain of Custody form shall include the discharger's name, address, and phone number, identification of each sample container and sample collection point, person collecting the samples, the date and time each sample container was filled, and the analysis that is required for each sample container.

x Upon shipping/delivering the sample containers, obtain both the signatures of the persons relinquishing and receiving the sample containers.

xi Designate and train personnel to collect, maintain, and ship samples in accordance with the above sample protocols and good laboratory practices.

xii Refer to the Surface Water Ambient Monitoring Program's (SWAMP) Quality Assurance Management Plan (QAMP) for more information on sampling collection and analysis. See http://www.waterboards.ca.gov/water_issues/programs/swamp/[15]

QAMP Link:
http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

[15] Additional information regarding QAMP can be found at http://mpsl.mlml.calstate.edu/swqacompare.htm.

Table 5. Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Levels	Numeric Effluent Limitation (LUP Type 3)
pH	Field test with calibrated portable instrument	Type 2 & 3	0.2	pH units	Lower = 6.5 upper = 8.5	Lower = 6.0 upper = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Type 2 & 3	1	NTU	250 NTU	500 NTU
SSC	ASTM Method D 3977-97[16]	Type 3 if NEL is exceeded	5	Mg/L	N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[17] fixed-count of 600 org/sample	Type 3 LUPs > 30 acres	N/A	N/A	N/A	N/A

i. LUP Type 2 & 3 Monitoring Methods

i The LUP Type 2 or 3 discharger's project M&RP shall include a description of the following items:

(1) Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

(2) Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program a copy of the Chain of Custody form used when handling and shipping samples.

[16] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394

[17] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

(3) Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section M.4.f above.

ii LUP Type 2 & 3 dischargers shall ensure that all sampling and sample preservation be in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) shall be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. All laboratory analyses shall be conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses shall be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). The LUP discharger shall conduct its own field analysis of pH and may conduct its own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

j. LUP Type 2 & 3 Analytical Methods

LUP Type 2 & 3 dischargers shall refer to Table 5 above for test Methods, detection Limits, and reporting Units.

i **pH**: LUP Type 2 & 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or pH test kit. The LUP discharger shall record pH monitoring results on paper and retain these records in accordance with Section M.4.o, below.

ii **Turbidity**: LUP Type 2 & 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results shall be recorded in the site log book in Nephelometric Turbidity Units (NTU).

iii **Suspended sediment concentration (SSC)**: LUP Type 3 dischargers exceeding their NEL, shall perform SSC analysis using ASTM Method D3977-97.

iv **Bioassessment**: LUP Type 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

k. Watershed Monitoring Option

If an LUP Type 2 or 3 discharger is part of a qualified regional watershed-based monitoring program the LUP Type 2 or 3 discharger may be eligible for relief from the monitoring requirements in this Attachment. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program if it determines that the watershed-based monitoring program will provide information to determine each discharger's compliance with the requirements of this General Permit.

l. Particle Size Analysis for Risk Justification

LUP Type 2 & 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

m. NAL Exceedance Report

i In the event that any effluent sample exceeds an applicable NAL, the Regional Water Boards may require LUP Type 2 & 3 dischargers to submit NAL Exceedance Reports.

ii LUP Type 2 & 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

iii LUP Type 2 & 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the exceedance report is filed.

iv LUP Type 2 & 3 dischargers shall include in the NAL Exceedance Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

(3) Description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

n. NEL Violation Report

i All LUP Type 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

ii In the event that a LUP Type 3 discharger has violated an applicable NEL, the discharger shall submit an NEL Violation Report to the State Water Board no later than 24 hours after the NEL exceedance has been identified.

iii The LUP Type 3 discharger shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity.

iv The LUP Type 3 discharger shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the violation report is filed.

v The LUP Type 3 discharger shall include in the NEL Violation Report:

(1) the analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as "less than the method detection limit"); and
(2) the date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.
(3) Description of the current on-site BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

vi Compliance Storm Exemption:
In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event (see Section F.2.c of this Attachment), the LUP Type 3 discharger shall report the on-site rain gauge and nearby governmental rain gauge readings for verification.

o. Monitoring Records

LUP Type 2 & 3 dischargers shall ensure that records of all storm water monitoring information and copies of all reports (including Annual Reports) required by this General Permit be retained for a period of at least three years. LUP Type 2 & 3 dischargers may retain records off-

site and make them available upon request. These records shall include:

i The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation (rain gauge);

ii The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements;

iii The date and approximate time of analyses;

iv The individual(s) who performed the analyses;

v A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and all chain of custody forms;

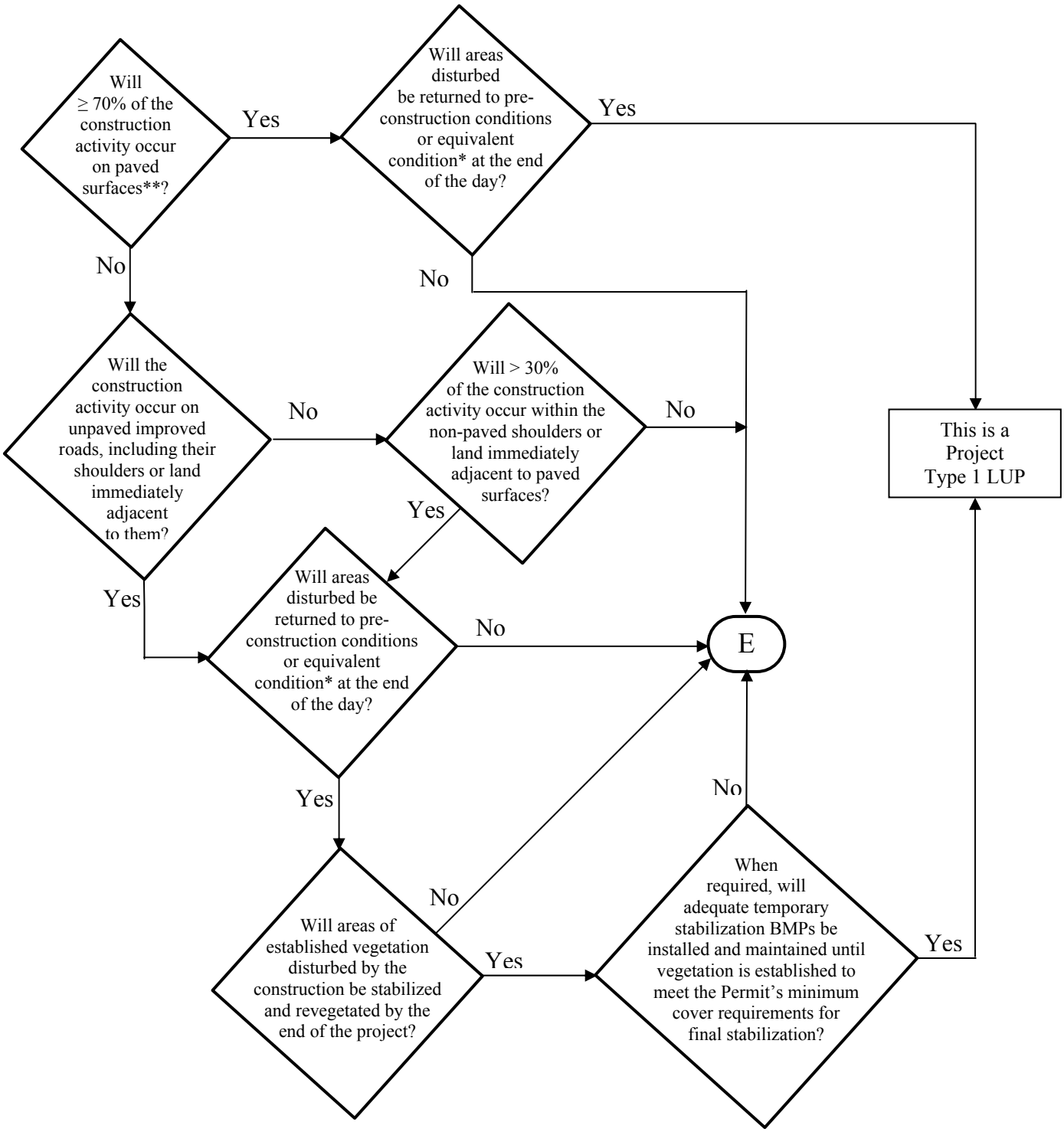
vi Quality assurance/quality control records and results;

vii Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Section M.4.a above);

viii Visual observation and sample collection exception records (see Section M.4.g above); and

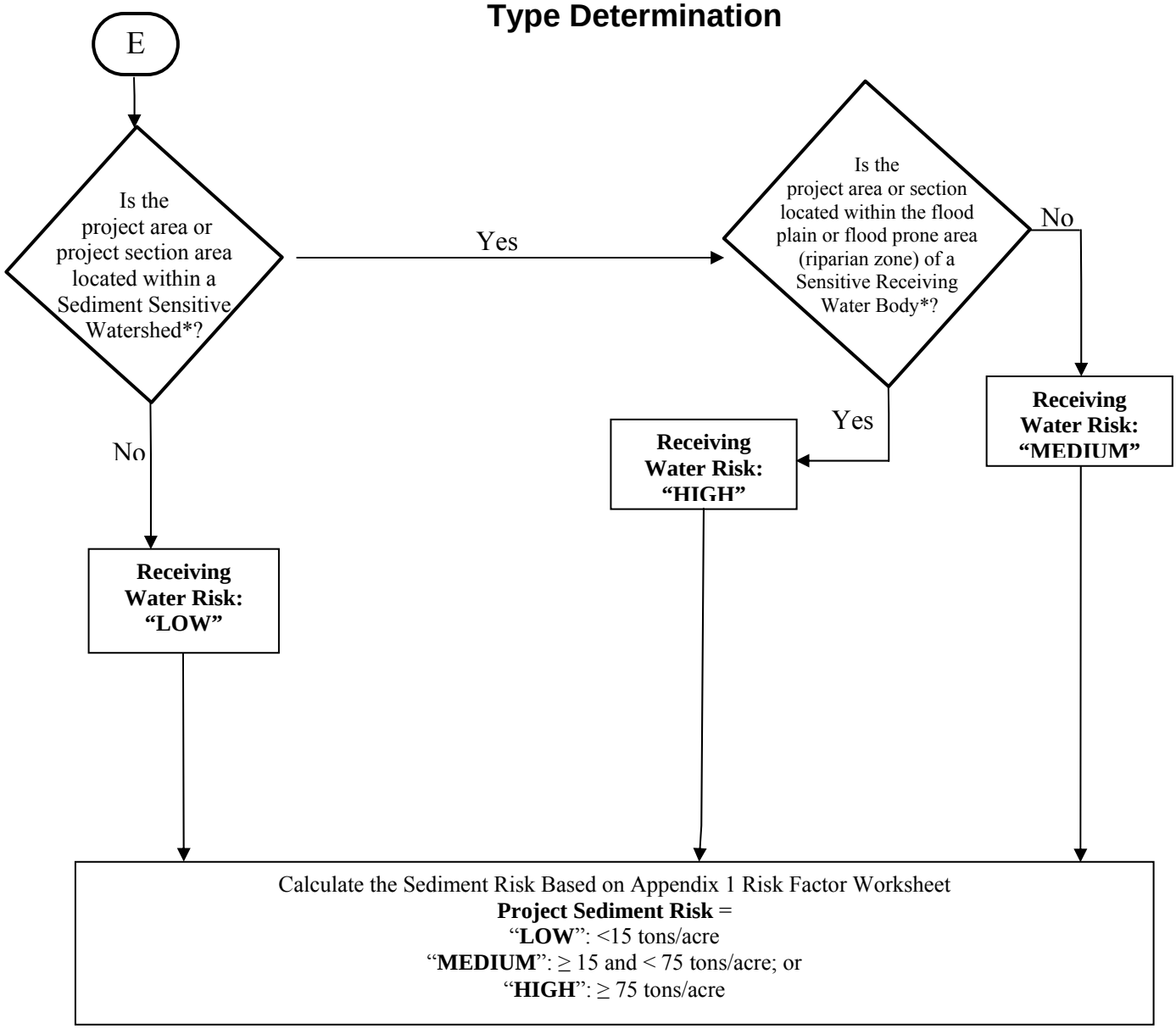
ix The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



*See Definition of Terms
** Or: "Will < 30% of the soil disturbance occur on unpaved surfaces?

ATTACHMENT A.1
LUP Project Area or Project Section Area Type Determination



* See Definition of Terms

PROJECT SEDIMENT RISK

RECEIVING WATER RISK	**LOW**	**MEDIUM**	**HIGH**
LOW	Type 1	Type 1	Type 2
MEDIUM	Type 1	Type 2	Type 3
HIGH	Type 2	Type 3	Type 3

ATTACHMENT A.1
Definition of Terms

1. **Equivalent Condition** – Means disturbed soils such as those from trench excavation are required to be hauled away, backfilled into the trench, and/or covered (e.g., metal plates, pavement, plastic covers over spoil piles) at the end of the construction day.
2. **Linear Construction Activity** – Linear construction activity consists of underground/ overhead facilities that typically include, but are not limited to, any conveyance, pipe or pipeline for the transportation of any gaseous, liquid (including water, wastewater for domestic municipal services), liquescent, or slurry substance; any cable line or wire for the transmission of electrical energy; any cable line or wire for communications (e.g., telephone, telegraph, radio or television messages); and associated ancillary facilities. Construction activities associated with LUPs include, but are not limited to those activities necessary for the installation of underground and overhead linear facilities (e.g., conduits, substructures, pipelines, towers, poles, cables, wires, connectors, switching, regulating and transforming equipment and associated ancillary facilities) and include, but are not limited to, underground utility mark-out, potholing, concrete and asphalt cutting and removal, trenching, excavation, boring and drilling, access road and pole/ tower pad and cable/ wire pull station, substation construction, substructure installation, construction of tower footings and/or foundations, pole and tower installations, pipeline installations, welding, concrete and/or pavement repair or replacement, and stockpile/ borrow locations.
3. **Sediment Sensitive Receiving Water Body –** Defined as a water body segment that is listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or is designated with beneficial uses of SPAWN, MIGRATORY, and COLD.
4. **Sediment Sensitive Watershed –** Defined as a watershed draining into a receiving water body listed on EPA's approved CWA 303(d) list for sedimentation/siltation, turbidity, or a water body designated with beneficial uses of SPAWN, MIGRATORY, and COLD.

ATTACHMENT A.2
PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS FOR LINEAR UNDERGROUND/OVERHEAD PROJECTS TO COMPLY WITH THE CONSTRUCTION GENERAL PERMIT

GENERAL INSTRUCTIONS

Who Must Submit

This permit is effective on July 1, 2010.

The Legally Responsible Person (LRP) for construction activities associated with linear underground/overhead project (LUP) must electronically apply for coverage under this General Permit on or after July 1, 2010. If it is determined that the LUP construction activities require an NPDES permit, the Legally Responsible Person[1] (LRP) shall submit PRDs for this General Permit in accordance with the following:

LUPs associated with Private or Municipal Development Projects

1. For LUPs associated with pre-development and pre-redevelopment construction activities:

   The LRP must obtain coverage[2] under this General Permit for its pre-development and pre-redevelopment construction activities where the total disturbed land area of these construction activities is greater than 1 acre.

2. For LUPs associated with new development and redevelopment construction projects:

   The LRP must obtain coverage under this General Permit for LUP construction activities associated with new development and redevelopment projects where the total disturbed land area of the LUP is greater than 1 acre. Coverage under this permit is not required where the same LUP construction activities are covered by another NPDES permit.

LUPs not associated with private or municipal new development or redevelopment projects:

The LRP must obtain coverage under this General Permit on or after July 1, 2010 for its LUP construction activities where the total disturbed land area is greater than 1 acre.

PRD Submittal Requirements

Prior to the start of construction activities a LRP must submit PRDs and fees to the State Water Board for each LUP.

New and Ongoing LUPs

Dischargers of new LUPs that commence construction activities after the adoption date of this General Permit shall file PRDs prior to the commencement of construction and implement the SWPPP upon the start of construction.

[1] person possessing the title of the land on which the construction activities will occur for the regulated site
[2] obtain coverage means filing PRDs for the project.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Dischargers of ongoing LUPs that are currently covered under State Water Board Order No. 2003-0007 (Small LUP General Permit) shall electronically file Permit Registration Documents no later than July 1, 2010. After July 1, 2010, all NOIs subject to State Water Board Order No. 2003-0007-DWQ will be terminated. All existing dischargers shall be exempt from the risk determination requirements in Attachment A. All existing dischargers are therefore subject to LUP Type 1 requirements regardless of their project's sediment and receiving water risks. However, a Regional Board retains the authority to require an existing discharger to comply with the risk determination requirements in Attachment A.

Where to Apply

The Permit Registration Documents (PRDs) can be found at www.waterboards.ca.gov/water_issues/programs/stormwater/

Fees

The annual fee for storm water permits are established through the State of California Code of Regulations.

When Permit Coverage Commences

To obtain coverage under the General Permit, the LRP must include the complete PRDs and the annual fee. All PRDs deemed incomplete will be rejected with an explanation as to what is required to complete submittal. Upon receipt of complete PRDs and associated fee, each discharger will be sent a waste discharger's identification (WDID) number.

Projects and Activities Not Defined As Construction Activity

1. LUP construction activity does not include routine maintenance projects to maintain original line and grade, hydraulic capacity, or original purpose of the facility. Routine maintenance projects are projects associated with operations and maintenance activities that are conducted on existing lines and facilities and within existing right-of-way, easements, franchise agreements or other legally binding agreements of the discharger. Routine maintenance projects include, but are not limited to projects that are conducted to:

    - Maintain the original purpose of the facility, or hydraulic capacity.
    - Update existing lines[3] and facilities to comply with applicable codes, standards and regulations regardless if such projects result in increased capacity.
    - Repairing leaks.

    Routine maintenance does not include construction of new[4] lines or facilities resulting from compliance with applicable codes, standards and regulations.

[3] Update existing lines includes replacing existing lines with new materials or pipes.
[4] New lines are those that are not associated with existing facilities and are not part of a project to update or replace existing lines.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

Routine maintenance projects do not include those areas of maintenance projects that are outside of an existing right-of-way, franchise, easements, or agreements. When a project must acquire new areas, those areas may be subject to this General Permit based on the area of disturbed land outside the original right-of-way, easement, or agreement.

2. LUP construction activity does not include field activities associated with the planning and design of a project (e.g., activities associated with route selection).

3. Tie-ins conducted immediately adjacent to "energized" or "pressurized" facilities by the discharger are not considered small construction activities where all other LUP construction activities associated with the tie-in are covered by a NOI and SWPPP of a third party or municipal agency.

Calculating Land Disturbance Areas of LUPs

The total land area disturbed for LUPs is the sum of the:

- Surface areas of trenches, laterals and ancillary facilities, plus
- Area of the base of stockpiles on unpaved surfaces, plus
- Surface area of the borrow area, plus
- Areas of paved surfaces constructed for the project, plus
- Areas of new roads constructed or areas of major reconstruction to existing roads (e.g. improvements to two-track surfaces or road widening) for the sole purpose of accessing construction activities or as part of the final project, plus
- Equipment and material storage, staging, and preparation areas (laydown areas) not on paved surfaces, plus
- Soil areas outside the surface area of trenches, laterals and ancillary facilities that will be graded, and/or disturbed by the use of construction equipment, vehicles and machinery during construction activities.

Stockpiling Areas

Stockpiling areas, borrow areas and the removal of soils from a construction site may or may not be included when calculating the area of disturbed soil for a site depending on the following conditions:

- For stockpiling of soils onsite or immediately adjacent to a LUP site and the stockpile is not on a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation.

- The surface area of borrow areas that are onsite or immediately adjacent to a project site are to be included in the disturbed area calculation.

- For soil that is hauled offsite to a location owned or operated by the discharger that is not a paved surface, the area of the base of the stockpile is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

PERMIT REGISTRATION DOCUMENTS (PRDs)
GENERAL INSTRUCTIONS (CONTINUED)

- For soil that is brought to the project from an off-site location owned or operated by the discharger the surface area of the borrow pit is to be included in the disturbed area calculation except when the offsite location is already subject to a separate storm water permit.

- Trench spoils on a paved surface that are either returned to the trench or excavation or hauled away from the project daily for disposal or reuse will not be included in the disturbed area calculation.

If you have any questions concerning submittal of PRDs, please call the State Water Board at (866) 563-3107.

ATTACHMENT B
PERMIT REGISTRATION DOCUMENTS (PRDs) TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH CONSTRUCTION ACTIVITY

GENERAL INSTRUCTIONS

A. All Linear Construction Projects shall comply with the PRD requirements in Attachment A.2 of this Order.

B. Who Must Submit

Discharges of storm water associated with construction that results in the disturbance of one acre or more of land must apply for coverage under the General Construction Storm Water Permit (General Permit). Any construction activity that is a part of a larger common plan of development or sale must also be permitted, regardless of size. (For example, if 0.5 acre of a 20-acre subdivision is disturbed by the construction activities of discharger A and the remaining 19.5 acres is to be developed by discharger B, discharger A must obtain a General Storm Water Permit for the 0.5 acre project).

Other discharges from construction activities that are covered under this General Permit can be found in the General Permit Section II.B.

It is the LRP's responsibility to obtain coverage under this General Permit by electronically submitting complete PRDs (Permit Registration Documents).

In all cases, the proper procedures for submitting the PRDs must be completed before construction can commence.

C. Construction Activity Not Covered By This General Permit

Discharges from construction that are not covered under this General Permit can be found in the General Permit Sections II.A &B..

D. Annual Fees and Fee Calculation

Annual fees are calculated based upon the total area of land to be disturbed not the total size of the acreage owned. However, the calculation includes all acres to be disturbed during the duration of the project. For example, if 10 acres are scheduled to be disturbed the first year and 10 in each subsequent year for 5 years, the annual fees would be based upon 50 acres of disturbance. The State Water Board will evaluate adding acreage to an existing Permit Waste Discharge Identification (WDID) number on a case-by-case basis. In general, any acreage to be considered must be contiguous to the permitted land area and the existing

SWPPP must be appropriate for the construction activity and topography of the acreage under consideration. As acreage is built out and stabilized or sold, the Change of Information (COI) form enables the applicant to remove those acres from inclusion in the annual fee calculation. Checks should be made payable to: State Water Board.

The Annual fees are established through regulations adopted by the State Water Board. The total annual fee is the current base fee plus applicable surcharges for all construction sites submitting an NOI, based on the total acreage to be disturbed during the life of the project. Annual fees are subject to change by regulation.

Dischargers that apply for and satisfy the Small Construction Erosivity Wavier requirements shall pay a fee of $200.00 plus an applicable surcharge, see the General Permit Section II.B.7.

E. When to Apply

LRP's proposing to conduct construction activities subject to this General Permit must submit their PRDs prior to the commencement of construction activity.

F. Requirements for Completing Permit Registration Documents (PRDs)

All dischargers required to comply with this General Permit shall electronically submit the required PRDs for their type of construction as defined below.

G. Standard PRD Requirements (All Dischargers)

1. Notice of Intent
2. Risk Assessment (Standard or Site-Specific)
3. Site Map
4. SWPPP
5. Annual Fee
6. Certification

H. Additional PRD Requirements Related to Construction Type

1. Discharger in unincorporated areas of the State (not covered under an adopted Phase I or II SUSMP requirements) and that are not a linear project shall also submit a completed:
   a. Post-Construction Water Balance Calculator (Appendix 2).

2. Dischargers who are proposing to implement ATS shall submit:
   a. Complete ATS Plan in accordance with Attachment F at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation.

b. Certification proof that design done by a professional in accordance with Attachment F.

3. Dischargers who are proposing an alternate Risk Justification:
   a. Particle Size Analysis.

I. Exceptions to Standard PRD Requirements

Construction sites with an R value less than 5 as determined in the Risk Assessment are not required to submit a SWPPP.

J. Description of PRDs

1. Notice of Intent (NOI)

2. Site Map(s) Includes:
   a. The project's surrounding area (vicinity)
   b. Site layout
   c. Construction site boundaries
   d. Drainage areas
   e. Discharge locations
   f. Sampling locations
   g. Areas of soil disturbance (temporary or permanent)
   h. Active areas of soil disturbance (cut or fill)
   i. Locations of all runoff BMPs
   j. Locations of all erosion control BMPs
   k. Locations of all sediment control BMPs
   l. ATS location (if applicable)
   m. Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
   n. Locations of all post-construction BMPs
   o. Locations of storage areas for waste, vehicles, service, loading/unloading of materials, access (entrance/exits) points to construction site, fueling, and water storage, water transfer for dust control and compaction practices

3. **SWPPPs**
   A site-specific SWPPP shall be developed by each discharger and shall be submitted with the PRDs.

4. **Risk Assessment**
   All dischargers shall use the Risk Assessment procedure as describe in the General Permit Appendix 1.

   a. The Standard Risk Assessment includes utilization of the following:
      i. Receiving water Risk Assessment interactive map

ii. EPA Rainfall Erosivity Factor Calculator Website
iii. Sediment Risk interactive map
iv. Sediment sensitive water bodies list

b. The Site-Specific Risk Assessment includes the completion of the hand calculated R value Risk Calculator

5. **Post-Construction Water Balance Calculator**
All dischargers subject to this requirement shall complete the Water Balance Calculator (in Appendix 2) in accordance with the instructions.

6. **ATS Design Document and Certification**
All dischargers using ATS must submit electronically their system design (as well as any supporting documentation) and proof that the system was designed by a qualified ATS design professional (See Attachment F).

To obtain coverage under the General Permit PRDs must be included and completed. If any of the required items are missing, the PRD submittal is considered incomplete and will be rejected. Upon receipt of a complete PRD submittal, the State Water Board will process the application package in the order received and assign a (WDID) number.

Questions?

If you have any questions on completing the PRDs please email stormwater@waterboards.ca.gov or call (866) 563-3107.

ATTACHMENT C
RISK LEVEL 1 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 1 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk Level 1 dischargers are not subject to a numeric effluent standard.

B. Good Site Management "Housekeeping"

1. Risk Level 1 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 1 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 1 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 1 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 1 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 1 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 1 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 1 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

C. Non-Storm Water Management

1. Risk Level 1 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 1 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 1 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 1 dischargers shall implement effective wind erosion control.

2. Risk Level 1 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 1 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 1 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 1 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

F. Run-on and Runoff Controls

Risk Level 1 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 1 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee trained to do the task(s) appropriately, but shall ensure adequate deployment.

2. Risk Level 1 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.

storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 1 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 1 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 1 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector’s name, title, and signature.

H. Rain Event Action Plan

Not required for Risk Level 1 dischargers.

I. Risk Level 1 Monitoring and Reporting Requirements

Table 1- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
1	X	X		X	X		

1. **Construction Site Monitoring Program Requirements**

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Programs to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

   a. To demonstrate that the site is in compliance with the Discharge Prohibitions;

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges; and

d. To determine whether BMPs included in the SWPPP are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 1 - Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 1 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 1 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 1 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 1 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 1 dischargers shall visually observe (inspect):

i. All storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. All BMPs to identify whether they have been properly implemented in accordance with the SWPPP. If needed, the discharger shall implement appropriate corrective actions.

iii. Any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in e.i and e.iii above, Risk Level 1 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 1 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 1 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 1 – Visual Observation Exemptions**

a. Risk Level 1 dischargers shall be prepared to conduct visual observation (inspections) until the minimum requirements of Section I.3 above are completed. Risk Level 1 dischargers are not required to conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required visual observations (inspections) are collected due to these exceptions, Risk Level 1 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the visual observations (inspections) were not conducted.

5. **Risk Level 1 – Monitoring Methods**

Risk Level 1 dischargers shall include a description of the visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures in the CSMP.

6. **Risk Level 1 – Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

i. Risk Level 1 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 1 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 1 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 1 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

7. **Risk Level 1 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 1 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 1 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 1 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 1 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 1 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the

presence of pollutants identified in the pollutant source assessment required (Risk Level 1 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 1 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 1 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[2]

h. Risk Level 1 dischargers shall keep all field /or analytical data in the SWPPP document.

8. **Risk Level 1 – Particle Size Analysis for Project Risk Justification**

Risk Level 1 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

9. **Risk Level 1 – Records**

Risk Level 1 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 1 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

[2] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, and the analytical techniques or methods used.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.6 above).

i. Visual observation and sample collection exception records (see Section I.4 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

ATTACHMENT D
RISK LEVEL 2 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 2 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric – Risk level 2 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 2 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 2 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 2 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protect stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly.

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 2 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 2 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain all fertilizers and other landscape materials when they are not actively being used.

   c. Discontinue the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Apply erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stack erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 2 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 2 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 2 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 2 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 2 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 2 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 2 dischargers shall implement effective wind erosion control.

2. Risk Level 2 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Risk Level 2 dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 2 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 2 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage.
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

5. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 2 Requirement:** Risk Level 2 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

F. Run-on and Run-off Controls

Risk Level 2 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 2 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 2 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 2 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 2 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 2 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

   a. Inspection date and date the inspection report was written.

   b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

   c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

   d. A description of any BMPs evaluated and any deficiencies noted.

   e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

   f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

   g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

   h. Photographs taken during the inspection, if any.

   i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any

likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The discharger shall ensure a QSP obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

    a. Site Address
    b. Calculated Risk Level (2 or 3)
    c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number
    d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
    e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number

4. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP include in the REAP, at a minimum, the following project phase information:

    a. Activities associated with each construction phase
    b. Trades active on the construction site during each construction phase
    c. Trade contractor information
    d. Suggested actions for each project phase

5. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

    a. Site Address
    b. Calculated Risk Level (2 or 3)
    c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number

d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number
f. Trades active on site during Inactive Construction
g. Trade contractor information
h. Suggested actions for inactive construction sites

6. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 2 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 2 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
2	X	X	X	X	X	X	

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Programs in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 2 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 2 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 2 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 2 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 2 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 2 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i and c.iii above, Risk Level 2 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 2 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 2 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 2 – Water Quality Sampling and Analysis**

a. Risk Level 2 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 2 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 2 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 2 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

5. **Risk Level 2 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 2 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 2 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 2 dischargers shall ensure that storm water discharge collected and observed represent[4] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 2 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 2 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 2 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 “Storm Water Sample Collection and Handling Instructions” below.

6. **Risk Level 2 – Visual Observation and Sample Collection Exemptions**

a. Risk Level 2 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk

[4] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment-laden water even if most water flowing through the fence is clear.

Level 2 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

i. During dangerous weather conditions such as flooding and electrical storms.

ii. Outside of scheduled site business hours.

b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 2 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 2 – Storm Water Sample Collection and Handling Instructions**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. Risk Level 2 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

c. Risk Level 2 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[5]

8. **Risk Level 2 – Monitoring Methods**

a. Risk Level 2 dischargers shall include a description of the following items in the CSMP:

i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample

[5] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf.
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml.

collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

b. Risk Level 2 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 2 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services. Risk Level 2 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 2 – Analytical Methods**

a. Risk Level 2 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 2 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 2 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 2 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

10. **Risk Level 2 - Non-Storm Water Discharge Monitoring Requirements**

    a. Visual Monitoring Requirements:

        i. Risk Level 2 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

        ii. Risk Level 2 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

        iii. Risk Level 2 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 2 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to reduce or prevent pollutants from contacting non-storm water discharges.

    b. Effluent Sampling Locations:

        i. Risk Level 2 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

        ii. Risk Level 2 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

        iii. Risk Level 2 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs.

11. **Risk Level 2 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 2 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 2 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 2 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 2 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 2 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 2 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 2 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 2 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[6]

h. Risk Level 2 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 2 – Watershed Monitoring Option**

Risk Level 2 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program

[6] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 2 – Particle Size Analysis for Project Risk Justification**

Risk Level 2 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 2 – Records**

Risk Level 2 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 2 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections;

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 2 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 2 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 2 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity.

c. Risk Level 2 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 2 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

Table 3 – Risk Level 2 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level
pH	Field test with calibrated portable instrument	Risk Level 2 Discharges	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 2 Discharges other than ATS	1	NTU	250 NTU
		For ATS discharges	1	NTU	N/A

ATTACHMENT E
RISK LEVEL 3 REQUIREMENTS

A. Effluent Standards

[These requirements are the same as those in the General Permit order.]

1. Narrative – Risk Level 3 dischargers shall comply with the narrative effluent standards listed below:

   a. Storm water discharges and authorized non-storm water discharges regulated by this General Permit shall not contain a hazardous substance equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

   b. Dischargers shall minimize or prevent pollutants in storm water discharges and authorized non-storm water discharges through the use of controls, structures, and management practices that achieve BAT for toxic and non-conventional pollutants and BCT for conventional pollutants.

2. Numeric –Risk Level 3 dischargers are subject to a pH NAL of 6.5-8.5, and a turbidity NAL of 250 NTU. In addition, Risk Level 3 dischargers are subject to a pH NEL of 6.0-9.0 and a turbidity NEL of 500 NTU.

B. Good Site Management "Housekeeping"

1. Risk Level 3 dischargers shall implement good site management (i.e., "housekeeping") measures for construction materials that could potentially be a threat to water quality if discharged. At a minimum, Risk Level 3 dischargers shall implement the following good housekeeping measures:

   a. Conduct an inventory of the products used and/or expected to be used and the end products that are produced and/or expected to be produced. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

   b. Cover and berm loose stockpiled construction materials that are not actively being used (i.e. soil, spoils, aggregate, fly-ash, stucco, hydrated lime, etc.).

c. Store chemicals in watertight containers (with appropriate secondary containment to prevent any spillage or leakage) or in a storage shed (completely enclosed).

d. Minimize exposure of construction materials to precipitation. This does not include materials and equipment that are designed to be outdoors and exposed to environmental conditions (i.e. poles, equipment pads, cabinets, conductors, insulators, bricks, etc.).

e. Implement BMPs to prevent the off-site tracking of loose construction and landscape materials.

2. Risk Level 3 dischargers shall implement good housekeeping measures for waste management, which, at a minimum, shall consist of the following:

a. Prevent disposal of any rinse or wash waters or materials on impervious or pervious site surfaces or into the storm drain system.

b. Ensure the containment of sanitation facilities (e.g., portable toilets) to prevent discharges of pollutants to the storm water drainage system or receiving water.

c. Clean or replace sanitation facilities and inspecting them regularly for leaks and spills.

d. Cover waste disposal containers at the end of every business day and during a rain event.

e. Prevent discharges from waste disposal containers to the storm water drainage system or receiving water.

f. Contain and securely protecting stockpiled waste material from wind and rain at all times unless actively being used.

g. Implement procedures that effectively address hazardous and non-hazardous spills.

h. Develop a spill response and implementation element of the SWPPP prior to commencement of construction activities. The SWPPP shall require that:

i. Equipment and materials for cleanup of spills shall be available on site and that spills and leaks shall be cleaned up immediately and disposed of properly; and

ii. Appropriate spill response personnel are assigned and trained.

i. Ensure the containment of concrete washout areas and other washout areas that may contain additional pollutants so there is no discharge into the underlying soil and onto the surrounding areas.

3. Risk Level 3 dischargers shall implement good housekeeping for vehicle storage and maintenance, which, at a minimum, shall consist of the following:

   a. Prevent oil, grease, or fuel to leak in to the ground, storm drains or surface waters.

   b. Place all equipment or vehicles, which are to be fueled, maintained and stored in a designated area fitted with appropriate BMPs.

   c. Clean leaks immediately and disposing of leaked materials properly.

4. Risk Level 3 dischargers shall implement good housekeeping for landscape materials, which, at a minimum, shall consist of the following:

   a. Contain stockpiled materials such as mulches and topsoil when they are not actively being used.

   b. Contain fertilizers and other landscape materials when they are not actively being used.

   c. Discontinuing the application of any erodible landscape material within 2 days before a forecasted rain event or during periods of precipitation.

   d. Applying erodible landscape material at quantities and application rates according to manufacture recommendations or based on written specifications by knowledgeable and experienced field personnel.

   e. Stacking erodible landscape material on pallets and covering or storing such materials when not being used or applied.

5. Risk Level 3 dischargers shall conduct an assessment and create a list of potential pollutant sources and identify any areas of the site where additional BMPs are necessary to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges. This potential pollutant list shall be kept with the SWPPP and shall identify

all non-visible pollutants which are known, or should be known, to occur on the construction site. At a minimum, when developing BMPs, Risk Level 3 dischargers shall do the following:

a. Consider the quantity, physical characteristics (e.g., liquid, powder, solid), and locations of each potential pollutant source handled, produced, stored, recycled, or disposed of at the site.

b. Consider the degree to which pollutants associated with those materials may be exposed to and mobilized by contact with storm water.

c. Consider the direct and indirect pathways that pollutants may be exposed to storm water or authorized non-storm water discharges. This shall include an assessment of past spills or leaks, non-storm water discharges, and discharges from adjoining areas.

d. Ensure retention of sampling, visual observation, and inspection records.

e. Ensure effectiveness of existing BMPs to reduce or prevent pollutants in storm water discharges and authorized non-storm water discharges.

6. Risk Level 3 dischargers shall implement good housekeeping measures on the construction site to control the air deposition of site materials and from site operations. Such particulates can include, but are not limited to, sediment, nutrients, trash, metals, bacteria, oil and grease and organics.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall document all housekeeping BMPs in the SWPPP and REAP(s) in accordance with the nature and phase of the construction project. Construction phases at traditional land development projects include Grading and Land Development Phase, Streets and Utilities, or Vertical Construction for traditional land development projects.

C. Non-Storm Water Management

1. Risk Level 3 dischargers shall implement measures to control all non-storm water discharges during construction.

2. Risk Level 3 dischargers shall wash vehicles in such a manner as to prevent non-storm water discharges to surface waters or MS4 drainage systems.

3. Risk Level 3 dischargers shall clean streets in such a manner as to prevent unauthorized non-storm water discharges from reaching surface water or MS4 drainage systems.

D. Erosion Control

1. Risk Level 3 dischargers shall implement effective wind erosion control.

2. Risk Level 3 dischargers shall provide effective soil cover for inactive[1] areas and all finished slopes, open space, utility backfill, and completed lots.

3. Dischargers shall limit the use of plastic materials when more sustainable, environmentally friendly alternatives exist. Where plastic materials are deemed necessary, the discharger shall consider the use of plastic materials resistant to solar degradation.

E. Sediment Controls

1. Risk Level 3 dischargers shall establish and maintain effective perimeter controls and stabilize all construction entrances and exits to sufficiently control erosion and sediment discharges from the site.

2. On sites where sediment basins are to be used, Risk Level 3 dischargers shall, at minimum, design sediment basins according to the method provided in CASQA's Construction BMP Guidance Handbook.

3. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall implement appropriate erosion control BMPs (runoff control and soil stabilization) in conjunction with sediment control BMPs for areas under active[2] construction.

4. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall apply linear sediment controls along the toe of the slope, face of the slope, and at the grade breaks of exposed slopes to comply with sheet flow lengths[3] in accordance with Table 1.

[1] Inactive areas of construction are areas of construction activity that have been disturbed and are not scheduled to be re-disturbed for at least 14 days.
[2] Active areas of construction are areas undergoing land surface disturbance. This includes construction activity during the preliminary stage, mass grading stage, streets and utilities stage and the vertical construction stage
[3] Sheet flow length is the length that shallow, low velocity flow travels across a site.

Table 1 - Critical Slope/Sheet Flow Length Combinations

Slope Percentage	Sheet flow length not to exceed
0-25%	20 feet
25-50%	15 feet
Over 50%	10 feet

5. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that construction activity traffic to and from the project is limited to entrances and exits that employ effective controls to prevent offsite tracking of sediment.

6. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall ensure that all storm drain inlets and perimeter controls, runoff control BMPs, and pollutant controls at entrances and exits (e.g. tire washoff locations) are maintained and protected from activities that reduce their effectiveness.

7. **Additional Risk Level 3 Requirement:** Risk Level 3 dischargers shall inspect on a daily basis all immediate access roads daily. At a minimum daily (when necessary) and prior to any rain event, the discharger shall remove any sediment or other construction activity-related materials that are deposited on the roads (by vacuuming or sweeping).

8. **Additional Risk Level 3 Requirement:** The Regional Water Board may require Risk Level 3 dischargers to implement additional site-specific sediment control requirements if the implementation of the other requirements in this section are not adequately protecting the receiving waters.

F. Run-on and Run-off Controls

Risk Level 3 dischargers shall effectively manage all run-on, all runoff within the site and all runoff that discharges off the site. Run-on from off site shall be directed away from all disturbed areas or shall collectively be in compliance with the effluent limitations in this General Permit.

G. Inspection, Maintenance and Repair

1. Risk Level 3 dischargers shall ensure that all inspection, maintenance repair and sampling activities at the project location shall be performed or supervised by a Qualified SWPPP Practitioner (QSP) representing the discharger. The QSP may delegate any or all of these activities to an employee appropriately trained to do the task(s).

2. Risk Level 3 dischargers shall perform weekly inspections and observations, and at least once each 24-hour period during extended storm events, to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Inspectors shall be the QSP or be trained by the QSP.

3. Upon identifying failures or other shortcomings, as directed by the QSP, Risk Level 3 dischargers shall begin implementing repairs or design changes to BMPs within 72 hours of identification and complete the changes as soon as possible.

4. For each inspection required, Risk Level 3 dischargers shall complete an inspection checklist, using a form provided by the State Water Board or Regional Water Board or in an alternative format.

5. Risk Level 3 dischargers shall ensure that checklists shall remain onsite with the SWPPP and at a minimum, shall include:

    a. Inspection date and date the inspection report was written.

    b. Weather information, including presence or absence of precipitation, estimate of beginning of qualifying storm event, duration of event, time elapsed since last storm, and approximate amount of rainfall in inches.

    c. Site information, including stage of construction, activities completed, and approximate area of the site exposed.

    d. A description of any BMPs evaluated and any deficiencies noted.

    e. If the construction site is safely accessible during inclement weather, list the observations of all BMPs: erosion controls, sediment controls, chemical and waste controls, and non-storm water controls. Otherwise, list the results of visual inspections at all relevant outfalls, discharge points, downstream locations and any projected maintenance activities.

    f. Report the presence of noticeable odors or of any visible sheen on the surface of any discharges.

    g. Any corrective actions required, including any necessary changes to the SWPPP and the associated implementation dates.

    h. Photographs taken during the inspection, if any.

i. Inspector's name, title, and signature.

H. Rain Event Action Plan

1. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop a Rain Event Action Plan (REAP) 48 hours prior to any likely precipitation event. A likely precipitation event is any weather pattern that is forecast to have a 50% or greater probability of producing precipitation in the project area. The QSP shall obtain a printed copy of precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

2. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP develop the REAPs for all phases of construction (i.e., Grading and Land Development, Streets and Utilities, Vertical Construction, Final Landscaping and Site Stabilization).

3. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP ensure that the REAP include, at a minimum, the following site information:

   a. Site Address.
   b. Calculated Risk Level (2 or 3).
   c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
   d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
   e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.

4. **Additional Risk Level 3 Requirement:** The QSP shall include in the REAP, at a minimum, the following project phase information:

   a. Activities associated with each construction phase.
   b. Trades active on the construction site during each construction phase.
   c. Trade contractor information.
   d. Suggested actions for each project phase.

5. **Additional Risk Level 3 Requirement:** The QSP shall develop additional REAPs for project sites where construction activities are indefinitely halted or postponed (Inactive Construction). At a minimum, Inactive Construction REAPs must include:

a. Site Address.
b. Calculated Risk Level (2 or 3).
c. Site Storm Water Manager Information including the name, company, and 24-hour emergency telephone number.
d. Erosion and Sediment Control Provider information including the name, company, and 24-hour emergency telephone number.
e. Storm Water Sampling Agent information including the name, company, and 24-hour emergency telephone number.
f. Trades active on site during Inactive Construction.
g. Trade contractor information.
h. Suggested actions for inactive construction sites.

6. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP begin implementation and make the REAP available onsite no later than 24 hours prior to the likely precipitation event.

7. **Additional Risk Level 3 Requirement:** The discharger shall ensure a QSP maintain onsite a paper copy of each REAP onsite in compliance with the record retention requirements of the Special Provisions in this General Permit.

I. Risk Level 3 Monitoring and Reporting Requirements

Table 2- Summary of Monitoring Requirements

Risk Level	Visual Inspections					Sample Collection	
	Quarterly Non-storm Water Discharge	Pre-storm Event		Daily Storm BMP	Post Storm	Storm Water Discharge	Receiving Water
		Baseline	REAP				
3	X	X	X	X	X	X	X[4]

1. Construction Site Monitoring Program Requirements

   a. Pursuant to Water Code Sections 13383 and 13267, all dischargers subject to this General Permit shall develop and implement a written site-specific Construction Site Monitoring Program (CSMP) in accordance with the requirements of this Section. The CSMP shall include all monitoring procedures and instructions, location maps, forms, and checklists as required in this section. The CSMP shall be developed prior to the commencement of construction activities, and revised as necessary to reflect project revisions. The CSMP shall be a part of the Storm Water Pollution Prevention Plan (SWPPP), included as an appendix or separate SWPPP chapter.

   b. Existing dischargers registered under the State Water Board Order No. 99-08-DWQ shall make and implement necessary revisions to their Monitoring Program to reflect the changes in this General Permit in a timely manner, but no later than July 1, 2010. Existing dischargers shall continue to implement their existing Monitoring Program in compliance with State Water Board Order No. 99-08-DWQ until the necessary revisions are completed according to the schedule above.

   c. When a change of ownership occurs for all or any portion of the construction site prior to completion or final stabilization, the new discharger shall comply with these requirements as of the date the ownership change occurs.

2. **Objectives**

   The CSMP shall be developed and implemented to address the following objectives:

[4] When NEL exceeded

a. To demonstrate that the site is in compliance with the Discharge Prohibitions and applicable Numeric Action Levels (NALs)/Numeric Effluent Limitations (NELs) of this General Permit.

b. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives.

c. To determine whether immediate corrective actions, additional Best Management Practice (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in storm water discharges and authorized non-storm water discharges.

d. To determine whether BMPs included in the SWPPP/Rain Event Action Plan (REAP) are effective in preventing or reducing pollutants in storm water discharges and authorized non-storm water discharges.

3. **Risk Level 3 – Visual Monitoring (Inspection) Requirements for Qualifying Rain Events**

a. Risk Level 3 dischargers shall visually observe (inspect) storm water discharges at all discharge locations within two business days (48 hours) after each qualifying rain event.

b. Risk Level 3 dischargers shall visually observe (inspect) the discharge of stored or contained storm water that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Stored or contained storm water that will likely discharge after operating hours due to anticipated precipitation shall be observed prior to the discharge during operating hours.

c. Risk Level 3 dischargers shall conduct visual observations (inspections) during business hours only.

d. Risk Level 3 dischargers shall record the time, date and rain gauge reading of all qualifying rain events.

e. Within 2 business days (48 hours) prior to each qualifying rain event, Risk Level 3 dischargers shall visually observe (inspect):

i. all storm water drainage areas to identify any spills, leaks, or uncontrolled pollutant sources. If needed, the discharger shall implement appropriate corrective actions.

ii. all BMPs to identify whether they have been properly implemented in accordance with the SWPPP/REAP. If needed, the discharger shall implement appropriate corrective actions.

iii. any storm water storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

f. For the visual observations (inspections) described in c.i. and c.iii above, Risk Level 3 dischargers shall observe the presence or absence of floating and suspended materials, a sheen on the surface, discolorations, turbidity, odors, and source(s) of any observed pollutants.

g. Within two business days (48 hours) after each qualifying rain event, Risk Level 3 dischargers shall conduct post rain event visual observations (inspections) to (1) identify whether BMPs were adequately designed, implemented, and effective, and (2) identify additional BMPs and revise the SWPPP accordingly.

h. Risk Level 3 dischargers shall maintain on-site records of all visual observations (inspections), personnel performing the observations, observation dates, weather conditions, locations observed, and corrective actions taken in response to the observations.

4. **Risk Level 3 – Water Quality Sampling and Analysis**

a. Risk Level 3 dischargers shall collect storm water grab samples from sampling locations, as defined in Section I.5. The storm water grab sample(s) obtained shall be representative of the flow and characteristics of the discharge.

b. At minimum, Risk Level 3 dischargers shall collect 3 samples per day of the qualifying event.

c. Risk Level 3 dischargers shall ensure that the grab samples collected of stored or contained storm water are from discharges subsequent to a qualifying rain event (producing precipitation of ½ inch or more at the time of discharge).

<u>Storm Water Effluent Monitoring Requirements</u>

d. Risk Level 3 dischargers shall analyze their effluent samples for:

i. pH and turbidity.

ii. Any additional parameters for which monitoring is required by the Regional Water Board.

e. Risk 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

f. Risk Level 3 discharger sites that have violated the turbidity daily average NEL shall analyze subsequent effluent samples for all the parameters specified in Section I.4.e, above, and Suspended Sediment Concentration (SSC).

Receiving Water Monitoring Requirements

g. In the event that a Risk Level 3 discharger violates an NEL contained in this General Permit and has a direct discharge into receiving waters, the Risk Level 3 discharger shall subsequently sample receiving waters (RWs) for all parameter(s) required in Section I.4.e above for the duration of coverage under this General Permit.

h. Risk Level 3 dischargers disturbing 30 acres or more of the landscape and with direct discharges into receiving waters shall conduct or participate in benthic macroinvertebrate bioassessment of RWs prior to commencement of construction activity (See Appendix 3).

i. Risk Level 3 dischargers shall obtain RW samples in accordance with the Receiving Water sampling location section (Section I.5), below.

5. **Risk Level 3 – Storm Water Discharge Water Quality Sampling Locations**

Effluent Sampling Locations

a. Risk Level 3 dischargers shall perform sampling and analysis of storm water discharges to characterize discharges associated with construction activity from the entire project disturbed area.

b. Risk Level 3 dischargers shall collect effluent samples at all discharge points where storm water is discharged off-site.

c. Risk Level 3 dischargers shall ensure that storm water discharge collected and observed represent[5] the effluent in each drainage area based on visual observation of the water and upstream conditions.

d. Risk Level 3 dischargers shall monitor and report site run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

e. Risk Level 3 dischargers who deploy an ATS on their site, or a portion on their site, shall collect ATS effluent samples and measurements from the discharge pipe or another location representative of the nature of the discharge.

f. Risk Level 3 dischargers shall select analytical test methods from the list provided in Table 3 below.

g. All storm water sample collection preservation and handling shall be conducted in accordance with Section I.7 "Storm Water Sample Collection and Handling Instructions" below.

Receiving Water Sampling Locations

h. **Upstream/up-gradient RW samples**: Risk Level 3 dischargers shall obtain any required upstream/up-gradient receiving water samples from a representative and accessible location as close as possible and upstream from the effluent discharge point.

i. **Downstream/down-gradient RW samples**: Risk Level 3 dischargers shall obtain any required downstream/down-gradient receiving water samples from a representative and accessible location as close as possible and downstream from the effluent discharge point.

j. If two or more discharge locations discharge to the same receiving water, Risk Level 3 dischargers may sample the receiving water at a single upstream and downstream location.

[5] For example, if there has been concrete work recently in an area, or drywall scrap is exposed to the rain, a pH sample shall be taken of drainage from the relevant work area. Similarly, if sediment-laden water is flowing through some parts of a silt fence, samples shall be taken of the sediment laden water even if most water flowing through the fence is clear.

6. **Risk Level 3 – Visual Observation and Sample Collection Exemptions**

   a. Risk Level 3 dischargers shall be prepared to collect samples and conduct visual observation (inspections) until the minimum requirements of Sections I.3 and I.4 above are completed. Risk Level 3 dischargers are not required to physically collect samples or conduct visual observation (inspections) under the following conditions:

      i. During dangerous weather conditions such as flooding and electrical storms.

      ii. Outside of scheduled site business hours.

   b. If no required samples or visual observation (inspections) are collected due to these exceptions, Risk Level 3 dischargers shall include an explanation in their SWPPP and in the Annual Report documenting why the sampling or visual observation (inspections) were not conducted.

7. **Risk Level 3 – Storm Water Sample Collection and Handling Instructions**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

   b. Risk Level 3 dischargers shall ensure that testing laboratories will receive samples within 48 hours of the physical sampling (unless otherwise required by the laboratory), and shall use only the sample containers provided by the laboratory to collect and store samples.

   c. Risk Level 3 dischargers shall designate and train personnel to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring Program's (SWAMP) 2008 Quality Assurance Program Plan (QAPrP).[6]

[6] Additional information regarding SWAMP's QAPrP and QAMP can be found at http://www.waterboards.ca.gov/water_issues/programs/swamp/.
QAPrP:http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/qapp/swamp_qapp_master090108a.pdf
QAMP: http://www.waterboards.ca.gov/water_issues/programs/swamp/qamp.shtml

8. **Risk Level 3 – Monitoring Methods**

   a. Risk Level 3 dischargers shall include a description of the following items in the CSMP:

      i. Visual observation locations, visual observation procedures, and visual observation follow-up and tracking procedures.

      ii. Sampling locations, and sample collection and handling procedures. This shall include detailed procedures for sample collection, storage, preservation, and shipping to the testing lab to assure that consistent quality control and quality assurance is maintained. Dischargers shall attach to the monitoring program an example Chain of Custody form used when handling and shipping samples.

      iii. Identification of the analytical methods and related method detection limits (if applicable) for each parameter required in Section I.4 above.

   b. Risk Level 3 dischargers shall ensure that all sampling and sample preservation are in accordance with the current edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). All monitoring instruments and equipment (including a discharger's own field instruments for measuring pH and turbidity) should be calibrated and maintained in accordance with manufacturers' specifications to ensure accurate measurements. Risk Level 3 dischargers shall ensure that all laboratory analyses are conducted according to test procedures under 40 CFR Part 136, unless other test procedures have been specified in this General Permit or by the Regional Water Board. With the exception of field analysis conducted by the discharger for turbidity and pH, all analyses should be sent to and conducted at a laboratory certified for such analyses by the State Department of Health Services (SSC exception). Risk Level 3 dischargers shall conduct their own field analysis of pH and may conduct their own field analysis of turbidity if the discharger has sufficient capability (qualified and trained employees, properly calibrated and maintained field instruments, etc.) to adequately perform the field analysis.

9. **Risk Level 3 – Analytical Methods**

   a. Risk Level 3 dischargers shall refer to Table 3 below for test methods, detection limits, and reporting units.

b. **pH**: Risk Level 3 dischargers shall perform pH analysis on-site with a calibrated pH meter or a pH test kit. Risk Level 3 dischargers shall record pH monitoring results on paper and retain these records in accordance with Section I.14, below.

c. **Turbidity**: Risk Level 3 dischargers shall perform turbidity analysis using a calibrated turbidity meter (turbidimeter), either on-site or at an accredited lab. Acceptable test methods include Standard Method 2130 or USEPA Method 180.1. The results will be recorded in the site log book in Nephelometric Turbidity Units (NTU).

d. **Suspended sediment concentration (SSC)**: Risk Level 3 dischargers shall perform SSC analysis using ASTM Method D3977-97.

e. **Bioassessment**: Risk Level 3 dischargers shall perform bioassessment sampling and analysis according to Appendix 3 of this General Permit.

10. **Risk Level 3 - Non-Storm Water Discharge Monitoring Requirements**

a. Visual Monitoring Requirements:

i. Risk Level 3 dischargers shall visually observe (inspect) each drainage area for the presence of (or indications of prior) unauthorized and authorized non-storm water discharges and their sources.

ii. Risk Level 3 dischargers shall conduct one visual observation (inspection) quarterly in each of the following periods: January-March, April-June, July-September, and October-December. Visual observation (inspections) are only required during daylight hours (sunrise to sunset).

iii. Risk Level 3 dischargers shall ensure that visual observations (inspections) document the presence or evidence of any non-storm water discharge (authorized or unauthorized), pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.), and source. Risk Level 3 dischargers shall maintain on-site records indicating the personnel performing the visual observation (inspections), the dates and approximate time each drainage area and non-storm water discharge was observed, and the response taken to eliminate unauthorized non-storm water discharges and to

reduce or prevent pollutants from contacting non-storm water discharges.

b. Effluent Sampling Locations:

i. Risk Level 3 dischargers shall sample effluent at all discharge points where non-storm water and/or authorized non-storm water is discharged off-site.

ii. Risk Level 3 dischargers shall send all non-storm water sample analyses to a laboratory certified for such analyses by the State Department of Health Services.

iii. Risk Level 3 dischargers shall monitor and report run-on from surrounding areas if there is reason to believe run-on may contribute to an exceedance of NALs or NELs.

11. **Risk Level 3 – Non-Visible Pollutant Monitoring Requirements**

a. Risk Level 3 dischargers shall collect one or more samples during any breach, malfunction, leakage, or spill observed during a visual inspection which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water.

b. Risk Level 3 dischargers shall ensure that water samples are large enough to characterize the site conditions.

c. Risk Level 3 dischargers shall collect samples at all discharge locations that can be safely accessed.

d. Risk Level 3 dischargers shall collect samples during the first two hours of discharge from rain events that occur during business hours and which generate runoff.

e. Risk Level 3 dischargers shall analyze samples for all non-visible pollutant parameters (if applicable) - parameters indicating the presence of pollutants identified in the pollutant source assessment required (Risk Level 3 dischargers shall modify their CSMPs to address these additional parameters in accordance with any updated SWPPP pollutant source assessment).

f. Risk Level 3 dischargers shall collect a sample of storm water that has not come in contact with the disturbed soil or the materials stored or used on-site (uncontaminated sample) for comparison with the discharge sample.

g. Risk Level 3 dischargers shall compare the uncontaminated sample to the samples of discharge using field analysis or through laboratory analysis.[7]

h. Risk Level 3 dischargers shall keep all field /or analytical data in the SWPPP document.

12. **Risk Level 3 – Watershed Monitoring Option**

Risk Level 3 dischargers who are part of a qualified regional watershed-based monitoring program may be eligible for relief from the requirements in Sections I.5. The Regional Water Board may approve proposals to substitute an acceptable watershed-based monitoring program by determining if the watershed-based monitoring program will provide substantially similar monitoring information in evaluating discharger compliance with the requirements of this General Permit.

13. **Risk Level 3 – Particle Size Analysis for Project Risk Justification**

Risk Level 3 dischargers justifying an alternative project risk shall report a soil particle size analysis used to determine the RUSLE K-Factor. ASTM D-422 (Standard Test Method for Particle-Size Analysis of Soils), as revised, shall be used to determine the percentages of sand, very fine sand, silt, and clay on the site.

14. **Risk Level 3 – Records**

Risk Level 3 dischargers shall retain records of all storm water monitoring information and copies of all reports (including Annual Reports) for a period of at least three years. Risk Level 3 dischargers shall retain all records on-site while construction is ongoing. These records include:

a. The date, place, time of facility inspections, sampling, visual observation (inspections), and/or measurements, including precipitation.

b. The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and or measurements.

c. The date and approximate time of analyses.

[7] For laboratory analysis, all sampling, sample preservation, and analyses must be conducted according to test procedures under 40 CFR Part 136. Field discharge samples shall be collected and analyzed according to the specifications of the manufacturer of the sampling devices employed.

d. The individual(s) who performed the analyses.

e. A summary of all analytical results from the last three years, the method detection limits and reporting units, the analytical techniques or methods used, and the chain of custody forms.

f. Rain gauge readings from site inspections.

g. Quality assurance/quality control records and results.

h. Non-storm water discharge inspections and visual observation (inspections) and storm water discharge visual observation records (see Sections I.3 and I.10 above).

i. Visual observation and sample collection exception records (see Section I.6 above).

j. The records of any corrective actions and follow-up activities that resulted from analytical results, visual observation (inspections), or inspections.

15. **Risk Level 3 – NAL Exceedance Report**

a. In the event that any effluent sample exceeds an applicable NAL, Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 10 days after the conclusion of the storm event. The Regional Boards have the authority to require the submittal of an NAL Exceedance Report.

b. Risk Level 3 dischargers shall certify each NAL Exceedance Report in accordance with the Special Provisions for Construction Activity In this General Permit.

c. Risk Level 3 dischargers shall retain an electronic or paper copy of each NAL Exceedance Report for a minimum of three years after the date the annual report is filed.

d. Risk Level 3 dischargers shall include in the NAL Exceedance Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”).

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation.

iii. A description of the current BMPs associated with the effluent sample that exceeded the NAL and the proposed corrective actions taken.

16. **Risk Level 3 – NEL Violation Report**

a. Risk Level 3 dischargers shall electronically submit all storm event sampling results to the State Water Board no later than 5 days after the conclusion of the storm event.

b. In the event that a discharger has violated an applicable NEL, Risk Level 3 dischargers shall submit an NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

c. Risk Level 3 dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

d. Risk Level 3 dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

e. Risk Level 3 dischargers shall include in the NEL Violation Report:

i. The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);

ii. The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

iii. A Description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

f. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, Risk level 3 discharger shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

17. **Risk Level 3 – Bioassessment**

a. Risk Level 3 dischargers with a total project-related ground disturbance exceeding 30 acres shall:

i. Conduct bioassessment monitoring, as described in Appendix 3.

ii. Include the collection and reporting of specified in stream biological data and physical habitat.

iii. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).[8]

b. Risk Level 3 dischargers qualifying for bioassessment, where construction commences out of an index period for the site location shall:

i. Receive Regional Board approval for the sampling exception.

ii. Conduct bioassessment monitoring, as described in Appendix 3.

iii. Include the collection and reporting of specified instream biological data and physical habitat.

iv. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP).

OR

v. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.

vi. Send a copy of the check to the Regional Water Board office for the site's region.

vii. Invest $**7,500.00 X The number of samples required** into the SWAMP program as compensation (upon regional board approval).

[8] http://www.waterboards.ca.gov/water_issues/programs/swamp/.

Table 3 – Risk Level 3 Test Methods, Detection Limits, Reporting Units and Applicable NALs/NELs

Parameter	Test Method / Protocol	Discharge Type	Min. Detection Limit	Reporting Units	Numeric Action Level	Numeric Effluent Limitation
pH	Field test with calibrated portable instrument	Risk Level 3 Discharges	0.2	pH units	lower NAL = 6.5 upper NAL = 8.5	lower NEL = 6.0 upper NEL = 9.0
Turbidity	EPA 0180.1 and/or field test with calibrated portable instrument	Risk Level 3 Discharges other than ATS	1	NTU	250 NTU	500 NTU
		For ATS discharges	1	NTU	N/A	10 NTU for Daily Weighted Average & 20 NTU for Any Single Sample
SSC	ASTM Method D 3977-97[9]	Risk Level 3 (if NEL exceeded)	5	mg/L	N/A	N/A
Bioassessment	(STE) Level I of (SAFIT),[10] fixed-count of 600 org/sample	Risk Level 3 projects> 30 acres	N/A	N/A	N/A	N/A

[9] ASTM, 1999, Standard Test Method for Determining Sediment Concentration in Water Samples: American Society of Testing and Materials, D 3977-97, Vol. 11.02, pp. 389-394.

[10] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

ATTACHMENT F:
Active Treatment System (ATS) Requirements

Table 1 – Numeric Effluent Limitations, Numeric Action Levels, Test Methods, Detection Limits, and Reporting Units

Parameter	Test Method	Discharge Type	Min. Detection Limit	Units	Numeric Action Level	Numeric Effluent Limitation
Turbidity	EPA 0180.1 and/or field test with a calibrated portable instrument	For ATS discharges	1	NTU	N/A	10 NTU for Daily Flow-Weighted Average & 20 NTU for Any Single Sample

A. Dischargers choosing to implement an Active Treatment System (ATS) on their site shall comply with all of the requirements in this Attachment.

B. The discharger shall maintain a paper copy of each ATS specification onsite in compliance with the record retention requirements in the Special Provisions of this General Permit.

C. ATS Design, Operation and Submittals

1. The ATS shall be designed and approved by a Certified Professional in Erosion and Sediment Control (CPESC), a Certified Professional in Storm Water Quality (CPSWQ); a California registered civil engineer; or any other California registered engineer.

2. The discharger shall ensure that the ATS is designed in a manner to preclude the accidental discharge of settled floc[1] during floc pumping or related operations.

3. The discharger shall design outlets to dissipate energy from concentrated flows.

4. The discharger shall install and operate an ATS by assigning a lead person (or project manager) who has either a minimum of five years construction storm

[1] Floc is defined as a clump of solids formed by the chemical action in ATS systems.

water experience or who is a licensed contractors specifically holding a California Class A Contractors license.[2]

5. The discharger shall prepare an ATS Plan that combines the site-specific data and treatment system information required to safely and efficiently operate an ATS. The ATS Plan shall be electronically submitted to the State Water Board at least 14 days prior to the planned operation of the ATS and a paper copy shall be available onsite during ATS operation. At a minimum, the ATS Plan shall include:

   a. ATS Operation and Maintenance Manual for All Equipment.

   b. ATS Monitoring, Sampling & Reporting Plan, including Quality Assurance/Quality Control (QA/QC).

   c. ATS Health and Safety Plan.

   d. ATS Spill Prevention Plan.

6. The ATS shall be designed to capture and treat (within a 72-hour period) a volume equivalent to the runoff from a 10-year, 24-hour storm event using a watershed runoff coefficient of 1.0.

D. Treatment – Chemical Coagulation/Flocculation

1. Jar tests shall be conducted using water samples selected to represent typical site conditions and in accordance with ASTM D2035-08 (2003).

2. The discharger shall conduct, at minimum, six site-specific jar tests (per polymer with one test serving as a control) for each project to determine the proper polymer and dosage levels for their ATS.

3. Single field jar tests may also be conducted during a project if conditions warrant, for example if construction activities disturb changing types of soils, which consequently cause change in storm water and runoff characteristics.

E. Residual Chemical and Toxicity Requirements

1. The discharger shall utilize a residual chemical test method that has a method detection limit (MDL) of 10% or less than the maximum allowable threshold

[2] Business and Professions Code Division 3, Chapter 9, Article 4, Class A Contractor: A general engineering contractor is a contractor whose principal contracting business is in connection with fixed works requiring specialized engineering knowledge and skill. [http://www.cslb.ca.gov/General-Information/library/licensing-classifications.asp].

concentration[3] (MATC) for the specific coagulant in use and for the most sensitive species of the chemical used.

2. The discharger shall utilize a residual chemical test method that produces a result within one hour of sampling.

3. The discharger shall have a California State certified laboratory validate the selected residual chemical test. Specifically the lab will review the test protocol, test parameters, and the detection limit of the coagulant. The discharger shall electronically submit this documentation as part of the ATS Plan.

4. If the discharger cannot utilize a residual chemical test method that meets the requirements above, the discharger shall operate the ATS in Batch Treatment[4] mode.

5. A discharger planning to operate in Batch Treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge[5]. All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS) Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[6]

   b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas* (fathead minnow). Acute toxicity for *Oncorhynchus mykiss* (Rainbow Trout) may be used as a substitute for testing fathead minnows.

   c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.

   d. The discharger shall electronically report all acute toxicity testing.

[3] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. A typical MATC would be:
The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

[4] Batch Treatment mode is defined as holding or recirculating the treated water in a holding basin or tank(s) until treatment is complete or the basin or storage tank(s) is full.

[5] This requirement only requires that the test be initiated prior to discharge.

[6] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.

F. Filtration

1. The ATS shall include a filtration step between the coagulant treatment train and the effluent discharge. This is commonly provided by sand, bag, or cartridge filters, which are sized to capture suspended material that might pass through the clarifier tanks.

2. Differential pressure measurements shall be taken to monitor filter loading and confirm that the final filter stage is functioning properly.

G. Residuals Management

1. Sediment shall be removed from the storage or treatment cells as necessary to ensure that the cells maintain their required water storage (i.e., volume) capability.

2. Handling and disposal of all solids generated during ATS operations shall be done in accordance with all local, state, and federal laws and regulations.

H. ATS Instrumentation

1. The ATS shall be equipped with instrumentation that automatically measures and records effluent water quality data and flow rate.

2. The minimum data recorded shall be consistent with the Monitoring and Reporting requirements below, and shall include:

    a. Influent Turbidity

    b. Effluent Turbidity

    c. Influent pH

    d. Effluent pH

    e. Residual Chemical

    f. Effluent Flow rate

    g. Effluent Flow volume

3. Systems shall be equipped with a data recording system, such as data loggers or webserver-based systems, which records each measurement on a frequency no longer than once every 15 minutes.

4. Cumulative flow volume shall be recorded daily. The data recording system shall have the capacity to record a minimum of seven days continuous data.

5. Instrumentation systems shall be interfaced with system control to provide auto shutoff or recirculation in the event that effluent measurements exceed turbidity or pH.

6. The system shall also assure that upon system upset, power failure, or other catastrophic event, the ATS will default to a recirculation mode or safe shut down.

7. Instrumentation (flow meters, probes, valves, streaming current detectors, controlling computers, etc.) shall be installed and maintained per manufacturer's recommendations, which shall be included in the QA/QC plan.

8. The QA/QC plan shall also specify calibration procedures and frequencies, instrument method detection limit or sensitivity verification, laboratory duplicate procedures, and other pertinent procedures.

9. The instrumentation system shall include a method for controlling coagulant dose, to prevent potential overdosing. Available technologies include flow/turbidity proportional metering, periodic jar testing and metering pump adjustment, and ionic charge measurement controlling the metering pump.

I. ATS Effluent Discharge

1. ATS effluent shall comply with all provisions and prohibitions in this General Permit, specifically the NELs.

2. NELs for discharges from an ATS:

   a. Turbidity of all ATS discharges shall be less than 10 NTU for daily flow-weighted average of all samples and 20 NTU for any single sample.

   b. Residual Chemical shall be < 10% of MATC[7] for the most sensitive species of the chemical used.

3. If an analytical effluent sampling result is outside the range of pH NELs (i.e., is below the lower NEL for pH or exceeds the upper NEL for pH) or exceeds the turbidity NEL (as listed in Table 1), the discharger is in violation of this General

[7] The Maximum Allowable Threshold Concentration (MATC) is the allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity testing conducted by an independent, third-party laboratory. The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Permit and shall electronically file the results in violation within 24-hours of obtaining the results.

4. If ATS effluent is authorized to discharge into a sanitary sewer system, the discharger shall comply with any pre-treatment requirements applicable for that system. The discharger shall include any specific criteria required by the municipality in the ATS Plan.

5. Compliance Storm Event:

   Discharges of storm water from ATS shall comply with applicable NELs (above) unless the storm event causing the discharges is determined after the fact to be equal to or larger than the Compliance Storm Event (expressed in inches of rainfall). The Compliance Storm Event for ATS discharges is the 10 year, 24 hour storm, as determined using these maps:

   http://www.wrcc.dri.edu/pcpnfreq/nca10y24.gif
   http://www.wrcc.dri.edu/pcpnfreq/sca10y24.gif

   This exemption is dependent on the submission of rain gauge data verifying the storm event is equal to or larger than the Compliance Storm.

J. Operation and Maintenance Plan

1. Each Project shall have a site-specific Operation and Maintenance (O&M) Manual covering the procedures required to install, operate and maintain the ATS.[8]

2. The O&M Manual shall only be used in conjunction with appropriate project-specific design specifications that describe the system configuration and operating parameters.

3. The O&M Manual shall have operating manuals for specific pumps, generators, control systems,and other equipment.

K. Sampling and Reporting Quality Assurance/ Quality Check (QA/QC) Plan

4. A project-specific QA/QC Plan shall be developed for each project. The QA/QC Plan shall include at a minimum:

   a. Calibration – Calibration methods and frequencies for all system and field instruments shall be specified.

[8] The manual is typically in a modular format covering generalized procedures for each component that is utilized in a particular system.

b. Method Detection Limits (MDLs) – The methods for determining MDLs shall be specified for each residual coagulant measurement method. Acceptable minimum MDLs for each method, specific to individual coagulants, shall be specified.

c. Laboratory Duplicates – Requirements for monthly laboratory duplicates for residual coagulant analysis shall be specified.

L. Personnel Training

1. Operators shall have training specific to using an ATS and liquid coagulants for storm water discharges in California.

2. The training shall be in the form of a formal class with a certificate and requirements for testing and certificate renewal.

3. Training shall include a minimum of eight hours classroom and 32 hours field training. The course shall cover the following topics:

   a. Coagulation Basics –Chemistry and physical processes

   b. ATS System Design and Operating Principles

   c. ATS Control Systems

   d. Coagulant Selection – Jar testing, dose determination, etc.

   e. Aquatic Safety/Toxicity of Coagulants, proper handling and safety

   f. Monitoring, Sampling, and Analysis

   g. Reporting and Recordkeeping

   h. Emergency Response

M. Active Treatment System (ATS) Monitoring Requirements

Any discharger who deploys an ATS on their site shall conduct the following:

1. Visual Monitoring

   a. A designated responsible person shall be on site daily at all times during treatment operations.

b. Daily on-site visual monitoring of the system for proper performance shall be conducted and recorded in the project data log.

   i. The log shall include the name and phone number of the person responsible for system operation and monitoring.

   ii. The log shall include documentation of the responsible person's training.

2. Operational and Compliance Monitoring

   a. Flow shall be continuously monitored and recorded at not greater than 15-minute intervals for total volume treated and discharged.

   b. Influent and effluent pH must be continuously monitored and recorded at not greater than 15-minute intervals.

   c. Influent and effluent turbidity (expressed in NTU) must be continuously monitored and recorded at not greater than 15-minute intervals.

   d. The type and amount of chemical used for pH adjustment, if any, shall be monitored and recorded.

   e. Dose rate of chemical used in the ATS system (expressed in mg/L) shall be monitored and reported 15-minutes after startup and every 8 hours of operation.

   f. Laboratory duplicates – monthly laboratory duplicates for residual coagulant analysis must be performed and records shall be maintained onsite.

   g. Effluent shall be monitored and recorded for residual chemical/additive levels.

   h. If a residual chemical/additive test does not exist and the ATS is operating in a batch treatment mode of operation refer to the toxicity monitoring requirements below.

3. Toxicity Monitoring

   A discharger operating in batch treatment mode shall perform toxicity testing in accordance with the following:

   a. The discharger shall initiate acute toxicity testing on effluent samples representing effluent from each batch prior to discharge.[9] All bioassays shall be sent to a laboratory certified by the Department of Health Services (DHS)

[9] This requirement only requires that the test be initiated prior to discharge.

Environmental Laboratory Accreditation Program (ELAP). The required field of testing number for Whole Effluent Toxicity (WET) testing is E113.[10]

b. Acute toxicity tests shall be conducted with the following species and protocols. The methods to be used in the acute toxicity testing shall be those outlined for a 96-hour acute test in "Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms, USEPA-841-R-02-012" for Fathead minnow, *Pimephales promelas or* Rainbow trout *Oncorhynchus mykiss* may be used as a substitute for fathead minnow.

c. All toxicity tests shall meet quality assurance criteria and test acceptability criteria in the most recent versions of the EPA test method for WET testing.[11]

4. Reporting and Recordkeeping

At a minimum, every 30 days a LRP representing the discharger shall access the State Water Boards Storm Water Mulit-Application and Report Tracking system (SMARTS) and electronically upload field data from the ATS. Records must be kept for three years after the project is completed .

5. Non-compliance Reporting

a. Any indications of toxicity or other violations of water quality objectives shall be reported to the appropriate regulatory agency as required by this General Permit.

b. Upon any measurements that exceed water quality standards, the system operator shall immediately notify his supervisor or other responsible parties, who shall notify the Regional Water Board.

c. If any monitoring data exceeds any applicable NEL in this General Permit, the discharger shall electronically submit a NEL Violation Report to the State Water Board within 24 hours after the NEL exceedance has been identified.

i. ATS dischargers shall certify each NEL Violation Report in accordance with the Special Provisions for Construction Activity in this General Permit.

ii. ATS dischargers shall retain an electronic or paper copy of each NEL Violation Report for a minimum of three years after the date the annual report is filed.

iii. ATS dischargers shall include in the NEL Violation Report:

[10] http://www.dhs.ca.gov/ps/ls/elap/pdf/FOT_Desc.pdf.
[11] http://www.epa.gov/waterscience/methods/wet/.

(1) The analytical method(s), method reporting unit(s), and method detection limit(s) of each analytical parameter (analytical results that are less than the method detection limit shall be reported as “less than the method detection limit”);

(2) The date, place, time of sampling, visual observation (inspections), and/or measurements, including precipitation; and

(3) A description of the current onsite BMPs, and the proposed corrective actions taken to manage the NEL exceedance.

iv. Compliance Storm Exemption - In the event that an applicable NEL has been exceeded during a storm event equal to or larger than the Compliance Storm Event, ATS dischargers shall report the on-site rain gauge reading and nearby governmental rain gauge readings for verification.

Risk Determination Worksheet

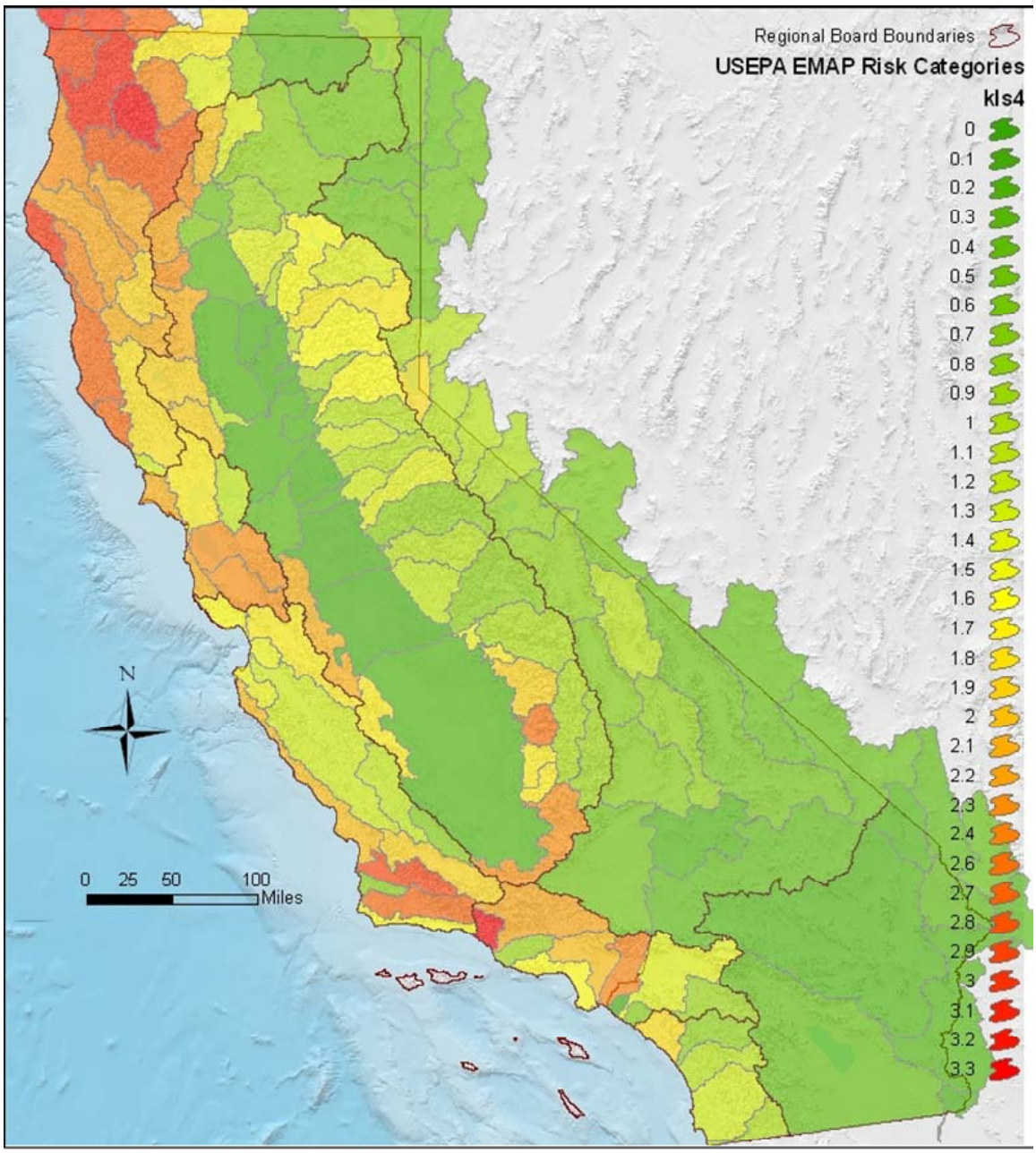
Step 1 Determine Sediment Risk via one of the options listed:
1. GIS Map Method - EPA Rainfall Erosivity Calculator & GIS map
2. Individual Method - EPA Rainfall Erosivity Calculator & Individual Data

Step 2 Determine Receiving Water Risk via one of the options listed:
1. GIS map of Sediment Sensitive Watersheds provided (in development)
2. List of Sediment Sensitive Watersheds provided

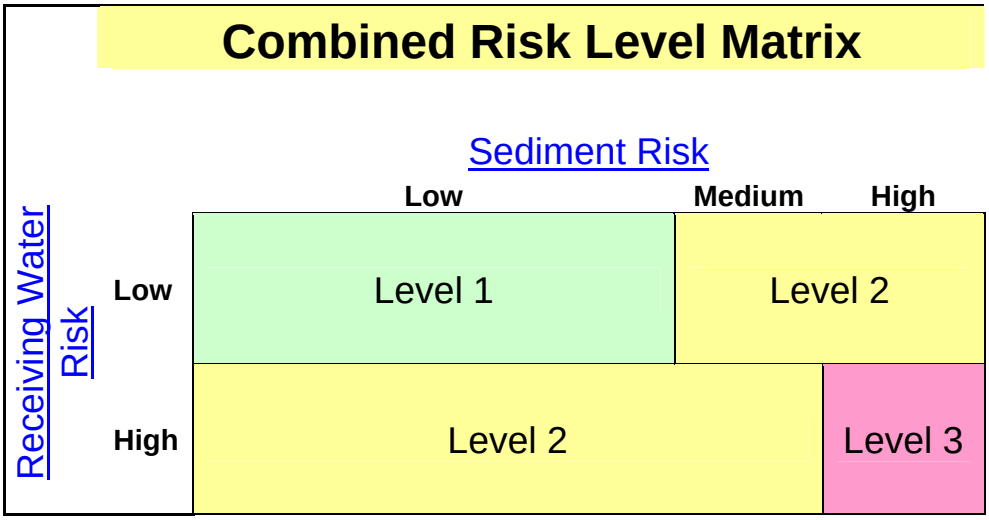
Step 3 Determine Combined Risk Level

Sediment Risk Factor Worksheet	Entry
A) R Factor	
Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site. http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm	
R Factor Value	0
B) K Factor (weighted average, by area, for all site soils)	
The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted. Site-specific K factor guidance	
K Factor Value	0
C) LS Factor (weighted average, by area, for all slopes)	
The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction. LS Table	
LS Factor Value	0
Watershed Erosion Estimate (=RxKxLS) in tons/acre	0
Site Sediment Risk Factor Low Sediment Risk: < 15 tons/acre Medium Sediment Risk: >=15 and <75 tons/acre High Sediment Risk: >= 75 tons/acre	**Low**

For the GIS Map Method, the R factor for the project is calculated using the online calculator at (see cell to right). The product of K and LS are shown on the figure below. To determine soil loss in tons per acre, multiply the R factor times the value for K times LS from the map.
http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm



Receiving Water (RW) Risk Factor Worksheet	Entry	Score
A. Watershed Characteristics	**yes/no**	
A.1. Does the disturbed area discharge (either directly or indirectly) to a **303(d)-listed waterbody impaired by sediment**? (For help with impaired waterbodies please check the attached worksheet or visit the link below) or has a **USEPA approved TMDL implementation plan for sediment**?: 2006 Approved Sediment-impared WBs Worksheet http://www.waterboards.ca.gov/water_issues/programs/tmdl/303d_lists2006_epa.shtml **OR**	**Yes**	**High**
A.2. Does the disturbed area discharge to a waterbody with designated beneficial uses of SPAWN & COLD & MIGRATORY? http://www.ice.ucdavis.edu/geowbs/asp/wbguse.asp		



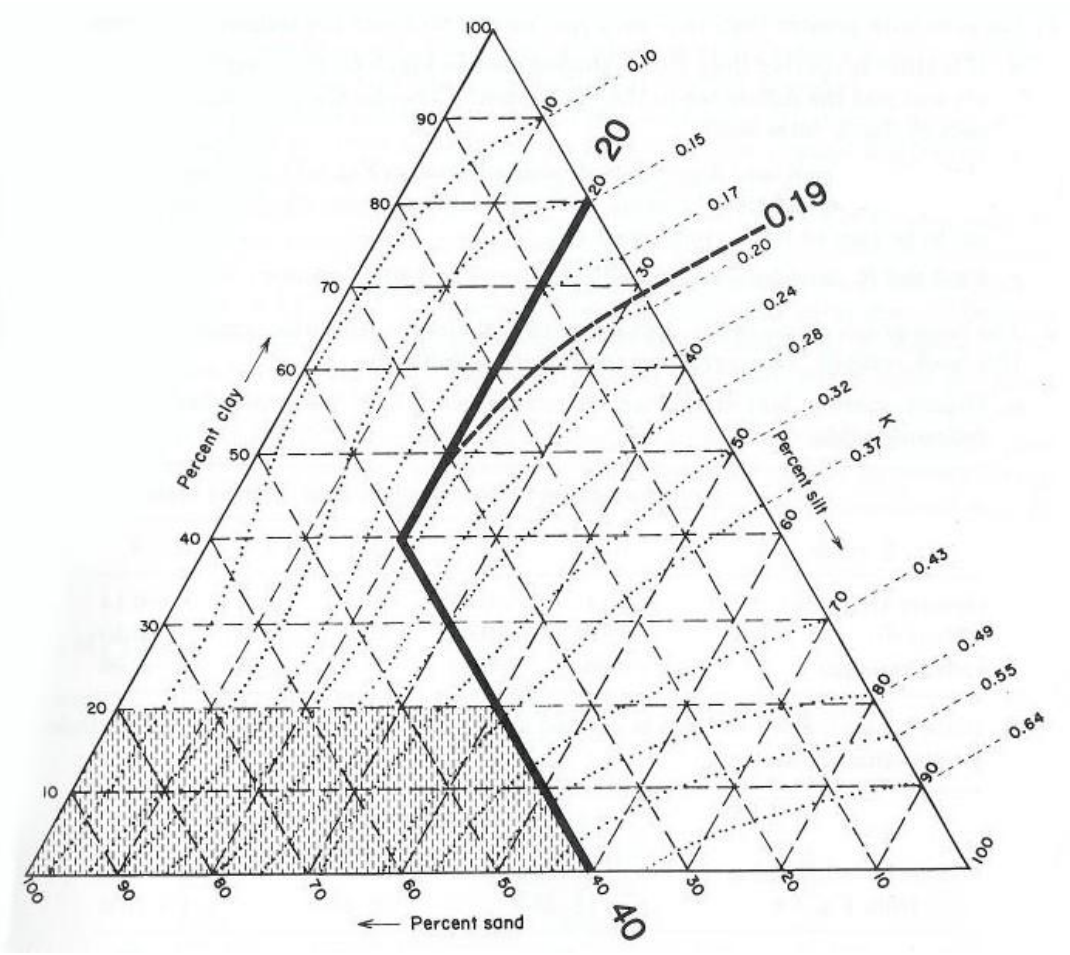
Project Sediment Risk: **Low**

Project RW Risk: **High**

Project Combined Risk: **Level 2**

Soil Erodibility Factor (K)

The K factor can be determined by using the nomograph method, which requires that a particle size analysis (ASTM D-422) be done to determine the percentages of sand, very fine sand, silt and clay. Use the figure below to determine appropriate K value.



Erickson triangular nomograph used to estimate soil erodibility (K) factor.
The figure above is the USDA nomograph used to determine the K factor for a soil, based on its texture (% silt plus very fine sand, % sand, % organic matter, soil structure, and permeability).
Nomograph from Erickson 1977 as referenced in Goldman et. al., 1986.

	Average Watershed Slope (%)														
Sheet Flow Length (ft)	**0.2**	**0.5**	**1.0**	**2.0**	**3.0**	**4.0**	**5.0**	**6.0**	**8.0**	**10.0**	**12.0**	**14.0**	**16.0**	**20.0**	
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41	
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56	
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67	
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76	
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84	
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24	
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10	
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86	
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57	
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85	
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04	
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16	
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23	1
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24	1
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94	1
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35	2
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57	2

LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

APPENDIX 2:
Post-Construction Water Balance Performance Standard Spreadsheet

The discharger shall submit with their Notice of Intent (NOI) the following information to demonstrate compliance with the New and Re-Development Water Balance Performance Standard.

Map Instructions

The discharger must submit a small-scale topographic map of the site to show the existing contour elevations, pre- and post-construction drainage divides, and the total length of stream in each watershed area. Recommended scales include 1 in. = 20 ft., 1 in. = 30 ft., 1 in. = 40 ft., or 1 in = 50 ft. The suggested contour interval is usually 1 to 5 feet, depending upon the slope of the terrain. The contour interval may be increased on steep slopes. Other contour intervals and scales may be appropriate given the magnitude of land disturbance.

Spreadsheet Instructions

The intent of the spreadsheet is to help dischargers calculate the project-related increase in runoff volume and select impervious area and runoff reduction credits to reduce the project-related increase in runoff volume to pre-project levels.

The discharger has the option of using the spreadsheet (**Appendix 2.1)** or a more sophisticated, watershed process-based model (e.g. Storm Water Management Model, Hydrological Simulation Program Fortran) to determine the project-related increase in runoff volume.

In* Appendix 4.1**, ***you must complete the worksheet for each land use/soil type combination for each project sub-watershed.

Steps 1 through 9 pertain specifically to the Runoff Volume Calculator:

Step 1: Enter the county where the project is located in cell H3.

Step 2: Enter the soil type in cell H6.

Step 3: Enter the existing pervious (dominant) land use type in cell H7.

Step 4: Enter the proposed pervious (dominant) land use type in cell H8.

Step 5: Enter the total project site area in cell H11 or J11.

Step 6: Enter the sub-watershed area in cell H12 or J12.

Step 7: Enter the existing rooftop area in cell H17 or J17, the existing non-rooftop impervious area in cell H18 or J18, the proposed rooftop area in cell H19 or J19, and the proposed non-rooftop impervious area in cell H20 or J20

Step 8: Work through each of the impervious area reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Step 9: Work through each of the impervious volume reduction credits and claim credits where applicable. Volume that cannot be addressed using non-structural practices must be captured in structural practices and approved by the Regional Water Board.

Non-structural Practices Available for Crediting

- ***Porous Pavement***
- ***Tree Planting***
- ***Downspout Disconnection***
- ***Impervious Area Disconnection***
- ***Green Roof***
- ***Stream Buffer***
- ***Vegetated Swales***
- ***Rain Barrels and Cisterns***
- ***Landscaping Soil Quality***

Post-Construction Water Balance Calculator

User may make changes from any cell that is orange or brown in color (similar to the cells to the immediate right). Cells in green are calculated for you.

(Step 1a) If you know the 85th percentile storm event for your location enter it in the box below

(Step 1b) If you can not answer 1a then select the county where the project is located (click on the cell to the right for drop-down): This will determine the average 85th percentile 24 hr. storm event for your site, which will appear under precipitation to left.

SACRAMENTO

(Step 1c) If you would like a more percise value select the location closest to your site. If you do not recgonize any of these locations, leave this drop-down menu at location. The average value for the County will be used.

SACRAMENTO FAA ARPT

Project Information

Project Name:	***Optional***
Waste Discharge Identification (WDID):	***Optional***
Date:	***Optional***
Sub Drainage Area Name (from map):	***Optional***

Runoff Calculations

(Step 2) Indicate the Soil Type (dropdown menu to right): ***Group C Soils*** — **Low infiltration. Sandy clay loam. Infiltration rate 0.05 to 0.15 inch/hr when wet.**

(Step 3) Indicate the existing **dominant** non-built land Use Type (dropdown menu to right): ***Wood & Grass: <50% ground cover***

(Step 4) Indicate the proposed **dominant** non-built land Use Type (dropdown menu to right): ***Lawn, Grass, or Pasture covering more than 75% of the open space***

Runoff Curve Numbers

Existing Pervious Runoff Curve Number	**82**
Proposed Development Pervious Runoff Curve Number	**74**

Design Storm

Based on the County you indicated above, we have included the 85 percentile average 24 hr event - P85 (in)^ for your area.	**0.62**	**in**
The Amount of rainfall needed for runoff to occur (Existing runoff curve number -P from existing RCN (in)^)	**0.44**	**In**
P used for calculations (in) (the greater of the above two criteria)	**0.62**	**In**

^Available at www.cabmphandbooks.com

Pre-Project Runoff Volume (cu ft)	**247**	**Cu.Ft.**
Project-Related Runoff Volume Increase w/o credits (cu ft)	**0**	**Cu.Ft.**
Project-Related Volume Increase with Credits (cu ft)	**0**	**Cu.Ft.**

You have achieved your minimum requirements

	Complete Either Sq Ft	Acres	Acres
(Step 5) Total Project Site Area:		**5.00**	**5.00**
(Step 6) Sub-watershed Area:		**5.00**	**5.00**
Percent of total project :		**100%**	

(Step 7) Sub-watershed Conditions	Complete Either Sq Ft	Acres	Calculated Acres
Sub-watershed Area (acres)			**5.00**
Existing Rooftop Impervious Coverage		**0**	**0.00**
Existing Non-Rooftop Impervious Coverage		**0**	**0.00**
Proposed Rooftop Impervious Coverage		**0**	**0.00**
Proposed Non-Rooftop Impervious Coverage		**0**	**0.00**

Credits	Acres	Square Feet
Porous Pavement	**0.00**	**0**
Tree Planting	**0.00**	**0**
Downspout Disconnection	**0.00**	**0**
Impervious Area Disconnection	**0.00**	**0**
Green Roof	**0.00**	**0**
Stream Buffer	**0.00**	**0**
Vegetated Swales	**0.00**	**0**
Subtotal	**0.00**	**0**
Subtotal Runoff Volume Reduction Credit	**0 Cu. Ft.**	

(Step 9) Impervious Volume Reduction Credits	Volume (cubic feet)
Rain Barrels/Cisterns	**0 Cu. Ft.**
Soil Quality	**0 Cu. Ft.**
Subtotal Runoff Volume Reduction	**0 Cu. Ft.**
Total Runoff Volume Reduction Credit	**0 Cu. Ft.**

Porous Pavement Credit Worksheet

Please fill out a porous pavement credit worksheet for each project sub-watershed.

For the PROPOSED Development:

Proposed Porous Pavement	Runoff Reduction*	Fill in either Acres or SqFt		Equivalent Acres
		In SqFt.	In Acres	
Area of **Brick without Grout** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Brick without Grout** on more than 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.30			0.00
Area of **Cobbles** less than 12 inches deep and over soil	0.60			0.00
Area of **Reinforced Grass Pavement** on less than 12 inches of base with at least 20% void space over soil	0.45			0.00
Area of **Reinforced Grass Pavement** on at least 12 inches of base with at least 20% void space over soil	0.90			0.00
Area of **Porous Gravel Pavement** on less than 12 inches of base with at least 20% void space over soil	0.38			0.00
Area of **Porous Gravel Pavement** on at least 12 inches of base with at least 20% void space over soil	0.75			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with less than 4 inches of gravel base (washed stone)	0.40			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 4 to 8 inches of gravel base (washed stone)	0.60			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 8 to 12 inches of gravel base (washed stone)	0.80			0.00
Area of **Poured Porous Concrete or Asphalt Pavement** with 12 or more inches of gravel base (washed stone)	1.00			0.00

*=1-Rv**

Return to Calculator

**Using Site Design Techniques to meet Development Standards for Stormwater Quality (BASMAA 2003)

**NCDENR Stormwater BMP Manual (2007)

Tree Planting Credit Worksheet

Please fill out a tree canopy credit worksheet for each project sub-watershed.

Tree Canopy Credit Criteria	Number of Trees Planted	Credit (acres)
Number of proposed evergreen trees to be planted (credit = number of trees x 0.005)*	0	0.00
Number of proposed deciduous trees to be planted (credit = number of trees x 0.0025)*		0.00
	Square feet Under Canopy	
Square feet under an existing tree canopy, that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is LESS than 12 in diameter.		0.00
Square feet under an existing tree canopy that will remain on the property, with an average diameter at 4.5 ft above grade (i.e., diameter at breast height or DBH) is 12 in diameter or GREATER.		0.00
Please describe below how the project will ensure that these trees will be maintained.		

0

Return to Calculator

* credit amount based on credits from Stormwater Quality Design Manual for the Sacramento and South Placer Regions

Downspout Disconnection Credit Worksheet

Please fill out a downspout disconnection credit worksheet for each project subwatershed. If you answer yes to all questions, all rooftop area draining to each downspout will be subtracted from your proposed rooftop impervious coverage.

Downspout Disconnection Credit Criteria		
Do downspouts and any extensions extend at least six feet from a basement and two feet from a crawl space or concrete slab?	○ Yes	◉ No
Is the area of rooftop connecting to each disconnected downspout 600 square feet or less?	○ Yes	◉ No
Is the roof runoff from the design storm event fully contained in a raised bed or planter box or does it drain as sheet flow to a landscaped area large enough to contain the roof runoff from the design storm event?	○ Yes	◉ No
The Stream Buffer and/or Vegetated Swale credits **will not** be taken in this sub-watershed area?	○ Yes	◉ No

Percentage of existing	0.00	Acres	of rooftop surface has disconnected downspouts	
Percentage of the proposed	0.00	Acres	of rooftop surface has disconnected downspouts	50

Return to Calculator

Impervious Area Disconnection Credit Worksheet

Please fill out an impervious area disconnection credit worksheet for each project sub-watershed. If you answer yes to all questions, all non-rooftop impervious surface area will be subtracted from your proposed non-rooftop impervious coverage.

Non-Rooftop Disconnection Credit Criteria	Response
Is the maximum contributing impervious flow path length less than 75 feet or, if equal or greater than 75 feet, is a storage device (e.g. French drain, bioretention area, gravel trench) implemented to achieve the required disconnection length?	◉ Yes ○ No
Is the impervious area to any one discharge location less than 5,000 square feet?	◉ Yes ○ No
The Stream Buffer credit **will not** be taken in this sub-watershed area?	◉ Yes ○ No

Percentage of existing	0.00	Acres non-rooftop surface area disconnected	
Percentage of the proposed	0.00	Acres non-rooftop surface area disconnected	70

Return to Calculator

Green Roof Credit Worksheet

Please fill out a greenroof credit worksheet for each project sub-watershed. If you answer yes to all questions, 70% of the greenroof area will be subtracted from your proposed rooftop impervious coverage.

Green Roof Credit Criteria				Response
Is the roof slope less than 15% or does it have a grid to hold the substrate in place until it forms a thick vegetation mat?				◉ Yes ○ No
Has a professional engineer assessed the necessary load reserves and designed a roof structure to meet state and local codes?				◉ Yes ○ No
Is the irrigation needed for plant establishment and/or to sustain the green roof during extended dry periods, is the source from stored, recycled, reclaimed, or reused water?				◉ Yes ○ No
Percentage of existing	0.00	Acres	rooftop surface area in greenroof	
Percentage of the proposed	0.00	Acres	rooftop surface area in greenroof	

Return to Calculator

Stream Buffer Credit Worksheet

Please fill out a stream buffer credit worksheet for each project sub-watershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout and/or Impervious Area Disconnection credits.

Stream Buffer Credit Criteria				Response
Does runoff enter the floodprone width* or within 500 feet (whichever is larger) of a stream channel as sheet flow**?				○ Yes ◉ No
Is the contributing overland slope 5% or less, or if greater than 5%, is a level spreader used?				○ Yes ◉ No
Is the buffer area protected from vehicle or other traffic barriers to reduce compaction?				○ Yes ◉ No
Will the stream buffer be maintained in an ungraded and uncompacted condition and will the vegetation be maintained in a natural condition?				○ Yes ◉ No
Percentage of existing	0.00	Acres	impervious surface area draining into a stream buffer:	
Percentage of the proposed	0.00	Acres	impervious surface area that will drain into a stream buffer:	
Please describe below how the project will ensure that the buffer areas will remain in ungraded and uncompacted condition and that the vegetation will be maintained in a natural condition.				

Return to Calculator

* floodprone width is the width at twice the bankfull depth.
** the maximum contributing length shall be 75 feet for impervious area

Vegetated Swale Credit Worksheet

Please fill out a vegetated swale worksheet for each project subwatershed. If you answer yes to all questions, you may subtract all impervious surface draining to each stream buffer that has not been addressed using the Downspout Disconnection credit.

Vegetated Swale Credit Criteria

Have all vegetated swales been designed in accordance with Treatment Control BMP 30 (TC-30 - Vegetated Swale) from the California Stormwater BMP Handbook, New Development and Redevelopment (available at www.cabmphandbooks.com)?	○ Yes ◉ No
Is the maximum flow velocity for runoff from the design storm event less than or equal to 1.0 foot per second?	○ Yes ◉ No

Percentage of existing	0.00	Acres of impervious area draining to a vegetated swale	
Percentage of the proposed	0.00	Acres of impervious area draining to a vegetated swale	

Return to Calculator

Rain Barrel/Cistern Credit Worksheet

Please fill out a rain barrel/cistern worksheet for each project sub-watershed.

Rain Barrel/Cistern Credit Criteria	Response
Total number of rain barrel(s)/cisterns	
Average capacity of rain barrel(s)/cistern(s) (in gallons)	
Total capacity rain barrel(s)/cistern(s) (in cu ft) [1]	0

[1] accounts for 10% loss

Return to Calculator

Please fill out a soil quality worksheet for each project sub-watershed.

	Response
Will the landscaped area be lined with an impervious membrane?	
Will the soils used for landscaping meet the ideal bulk densities listed in Table 1 below? [1]	○ Yes ◉ No
If you answered yes to the question above, and you know the area-weighted bulk density within the top 12 inches for soils used for landscaping (in g/cm^3)* , fill in the cell to the right and skip to cell G11. If not select from the drop-down menu in G10.	1.3
If you answered yes to the question above, but you do not know the exact bulk density, which of the soil types in the drop down menu to the right best describes the top 12 inches for soils used for landscaping (in g/cm^3).	Sandy loams, loams
What is the average depth of your landscaped soil media meeting the above criteria (inches)?	12
What is the total area of the landscaped areas meeting the above criteria (in acres)?	2.97

Return to Calculator

Table 1

Sands, loamy sands	<1.6
Sandy loams, loams	<1.4
Sandy clay loams, loams, clay loams	<1.4
Silts, silt loams	<1.3
Silt loams, silty clay loams	<1.1
Sandy clays, silty clays, some clay loams (35-45% clay)	<1.1
Clays (>45% clay)	<1.1

Porosity (%) 50.94%

Mineral grains in many soils are mainly quartz and feldspar, so 2.65 a good average for particle density. To determine percent porosity, use the formula: Porosity (%) = (1-Bulk Density/2.65) X 100

[1] USDA NRCS. "Soil Quality Urban Technical Note No.2-Urban Soil Compaction". March 2000. http://soils.usda.gov/sqi/management/files/sq_utn_2.pdf

* To determine how to calculate density see: http://www.globe.gov/tctg/bulkden.pdf?sectionID=94

APPENDIX 3
Bioassessment Monitoring Guidelines

Bioassessment monitoring is required for projects that meet all of the following criteria:

1. The project is rated Risk Level 3 or LUP Type 3
2. The project directly discharges runoff to a freshwater wadeable stream (or streams) that is either: (a) listed by the State Water Board or USEPA as impaired due to sediment, and/or (b) tributary to any downstream water body that is listed for sediment; and/or have the beneficial use SPAWN & COLD & MIGRATORY
3. Total project-related ground disturbance exceeds 30 acres.

For all such projects, the discharger shall conduct bioassessment monitoring, as described in this section, to assess the effect of the project on the biological integrity of receiving waters.
Bioassessment shall include:

1. The collection and reporting of specified instream biological data
2. The collection and reporting of specified instream physical habitat data

<u>Bioassessment Exception</u>
If a site qualifies for bioassessment, but construction commences out of an index period for the site location, the discharger shall:

1. Receive Regional Water Board approval for the sampling exception
2. Make a check payable to: Cal State Chico Foundation (SWAMP Bank Account) or San Jose State Foundation (SWAMP Bank Account) and include the WDID# on the check for the amount calculated for the exempted project.
3. Send a copy of the check to the Regional Water Board office for the site's region
4. Invest **7,500.00 X The number of samples required** into the SWAMP program as compensation (upon Regional Water Board approval).
5. Conduct bioassessment monitoring, as described in Appendix 4
6. Include the collection and reporting of specified instream biological data and physical habitat
7. Use the bioassessment sample collection and Quality Assurance & Quality Control (QA/QC) protocols developed by the State of California's Surface Water Ambient Monitoring Program (SWAMP)

<u>Site Locations and Frequency</u>
Macroinvertebrate samples shall be collected both before ground disturbance is initiated and after the project is completed. The "after" sample(s) shall be collected after at least one winter season resulting in surface runoff has transpired after project-related ground disturbance has ceased. "Before" and "after" samples shall be collected both upstream and downstream of the project's

discharge. Upstream samples should be taken immediately before the sites outfall and downstream samples should be taken immediately after the outfall (when safe to collect the samples). Samples should be collected for each freshwater wadeable stream that is listed as impaired due to sediment, or tributary to a water body that is listed for sediment. Habitat assessment data shall be collected concurrently with all required macroinvertebrate samples.

Index Period (Timing of Sample Collection)
Macroinvertebrate sampling shall be conducted during the time of year (i.e., the "index period") most appropriate for bioassessment sampling, depending on ecoregion. This map is posted on the State Water Board's Website: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml

Field Methods for Macroinvertebrate Collections
In collecting macroinvertebrate samples, the discharger shall use the "Reachwide Benthos (Multi-habitat) Procedure" specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007).[1]

Physical - Habitat Assessment Methods
The discharger shall conduct, concurrently with all required macroinvertebrate collections, the "Full" suite of physical habitat characterization measurements as specified in *Standard Operating Procedures for Collecting Benthic Macroinvertebrate Samples and Associated Physical and Chemical Data for Ambient Bioassessments in California* (Ode 2007), and as summarized in the Surface Water Ambient Monitoring Program's *Stream Habitat Characterization Form — Full Version*.

Laboratory Methods
Macroinvertebrates shall be identified and classified according to the Standard Taxonomic Effort (STE) Level I of the Southwestern Association of Freshwater Invertebrate Taxonomists (SAFIT),[2] and using a fixed-count of 600 organisms per sample.

Quality Assurance
The discharger or its consultant(s) shall have and follow a quality assurance (QA) plan that covers the required bioassessment monitoring. The QA plan shall include, or be supplemented to include, a specific requirement for external QA checks (i.e., verification of taxonomic identifications and correction of data where

[1] This document is available on the Internet at: ~~http://www.swrcb.ca.gov/swamp/docs/phab_sopr6.pdf~~. http://swamp.mpsl.mlml.calstate.edu/wp-content/uploads/2009/04/swamp_sop_bioassessment_collection_020107.pdf.

[2] The current SAFIT STEs (28 November 2006) list requirements for both the Level I and Level II taxonomic effort, and are located at: ~~http://www.swrcb.ca.gov/swamp/docs/safit/ste_list.pdf~~ http://www.safit.org/Docs/ste_list.pdf. When new editions are published by SAFIT, they will supersede all previous editions. All editions will be posted at the State Water Board's SWAMP website.

errors are identified). External QA checks shall be performed on one of the discharger's macroinvertebrate samples collected per calendar year, or ten percent of the samples per year (whichever is greater). QA samples shall be randomly selected. The external QA checks shall be paid for by the discharger, and performed by the California Department of Fish and Game's Aquatic Bioassessment Laboratory. An alternate laboratory with equivalent or better expertise and performance may be used if approved in writing by State Water Board staff.

Sample Preservation and Archiving

The original sample material shall be stored in 70 percent ethanol and retained by the discharger until: 1) all QA analyses specified herein and in the relevant QA plan are completed; and 2) any data corrections and/or re-analyses recommended by the external QA laboratory have been implemented. The remaining subsampled material shall be stored in 70 percent ethanol and retained until completeness checks have been performed according to the relevant QA plan. The identified organisms shall be stored in 70 percent ethanol, in separate glass vials for each final ID taxon. (For example, a sample with 45 identified taxa would be archived in a minimum of 45 vials, each containing all individuals of the identified taxon.) Each of the vials containing identified organisms shall be labeled with taxonomic information (i.e., taxon name, organism count) and collection information (i.e., site name/site code, waterbody name, date collected, method of collection). The identified organisms shall be archived (i.e., retained) by the discharger for a period of not less than three years from the date that all QA steps are completed, and shall be checked at least once per year and "topped off" with ethanol to prevent desiccation. The identified organisms shall be relinquished to the State Water Board upon request by any State Water Board staff.

Data Submittal

The macroinvertebrate results (i.e., taxonomic identifications consistent with the specified SAFIT STEs, and number of organisms within each taxa) shall be submitted to the State Water Board in electronic format. The State Water Board's Surface Water Ambient Monitoring Program (SWAMP) is currently developing standardized formats for reporting bioassessment data. All bioassessment data collected after those formats become available shall be submitted using the SWAMP formats. Until those formats are available, the biological data shall be submitted in MS-Excel (or equivalent) format.[3]

The physical/habitat data shall be reported using the standard format titled *SWAMP Stream Habitat Characterization Form — Full Version*.[4]

[3] Any version of Excel, 2000 or later, may be used.
[4] Available at: http://www.waterboards.ca.gov/water_issues/programs/swamp/docs/reports/fieldforms_fullversion052908.pdf

Invasive Species Prevention

In conducting the required bioassessment monitoring, the discharger and its consultants shall take precautions to prevent the introduction or spread of aquatic invasive species. At minimum, the discharger and its consultants shall follow the recommendations of the California Department of Fish and Game to minimize the introduction or spread of the New Zealand mudsnail.[5]

[5] Instructions for controlling the spread of NZ mudsnails, including decontamination methods, can be found at: http://www.dfg.ca.gov/invasives/mudsnail/
More information on AIS More information on AIS
http://www.waterboards.ca.gov/water_issues/programs/swamp/ais/

Appendix 4 Sediment TMDLs

Implemented Sediment TMDLs in California. Construction was listed as a source in all fo these TMDLs in relation to road construction. Although construction was mentioned as a source, it was not given a specific allocation amount. The closest allocation amount would be for the road activity management WLA. **Implementation Phase** – Adoption process by the Regional Board, the State Water Resources Control Board, the Office of Administrative Law, and the US Environmental Protection Agency completed and TMDL being implemented.

A. Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.albionfinaltmdl	R	Albion River	Sedimentation	Road Construction	2001	43 acres	See A (table 6)

B Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelR-middle.mainSed.temp	R	Middle Main Eel River and Tributaries (from Dos Rios to the South Fork)	Sedimentation Road	Construction	2005-2006 521	mi^2	100

C Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.EelRsouth.sed.temp	R	South Fork Eel River	Sedimentation	Road Construction	12 1999	See chart	473

D Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.bigfinaltmdl	R Big	River	Sedimentation	Road Construction	12 2001	181 mi^2 watershed drainage	TMDL = loading capacity = nonpoint sources + background =

							393 t mi2 yr

E Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelR-lower.Sed.temp-121807-signed	R	Lower Eel River	Sedimentation	Road Construction	12 2007	300 square-mile watershed	898

F Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres**	**WLA** tons mi^2 yr
1 R1.epa.EelR-middle.Sed.temp-	R	Middle Fork Eel River	Sedimentation	Road Construction	12 2003	753 mi^2 (approx. 482,000 acres)	82

G Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** Mi^2	**WLA** tons mi^2 yr
1 R1.epa.EelRnorth-Sed.temp.final-121807-signed	R	North Fork Eel River	Sedimentation	Road Construction	12 30 2002	289 (180,020 acres)	20

H Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** Mi^2	**WLA** tons mi^2 yr
1 R1.epa.EelR-upper.mainSed.temp-	R	Upper Main Eel River and Tributaries (including Tomki Creek, Outlet Creek and Lake Pillsbury)	Sedimentation	Road Construction	12 29 2004	688 (approx. 440,384 acres)	14

I Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres	WLA tons mi^2 yr
1 R1.epa.gualalafinaltmdl	R	Gualala River	Sedimentation	Road Construction	Not sure	300 (191,145 acres)	7

J Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.Mad-sed.turbidity	R	Mad River	Sedimentation	Road Construction	12 21 2007	480	174

K Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.mattole.sediment	R	Mattole River	Sedimentation	Road Construction	12 30 2003	296	27 or 520+27 = 547

L Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.navarro.sed.temp	R	Navarro River	Sedimentation	Road Construction	Not sure	315 (201,600 acres).	50

M Region	Type	Name	Pollutant Stressor	Potential Sources	TMDL Completion Date	Watershed Acres mi^2	WLA tons mi^2 yr
1 R1.epa.noyo.sediment	R	Noyo River	Sedimentation	Road Construction	12 16 1999	113 (72,323 acres)	68 (three areas measured) Table 16 in the TMDL

N Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.RedwoodCk.sed	Cr	Redwood Creek	Sedimentation	Road Construction	12 30 1998	278	1900 Total allocation

O Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA – Roads** tons mi^2 yr
1 R1.epa.tenmile.sed	R	Ten Mile River	Sedimentation	Road Construction	2000	120	9

P Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA management** tons mi^2 yr
1 R1.epa.trinity.sed	R	Trinity River	Sedimentation	Road Construction	12 20 2001	2000 of 3000 covered in this TMDL	See rows below
1	Cr	Horse Linto Creek	Sedimentation	Road Construction	12 20 2001	64	528
1	Cr	Mill creek and Tish Tang	Sedimentation	Road Construction	12 20 2001	39	210
1	Cr	Willow Creek	Sedimentation	Road Construction	12 20 2001	43	94
1	Cr	Campbell Creek and Supply Creek	Sedimentation	Road Construction	12 20 2001	11	1961
1	Cr	Lower Mainstem and Coon Creek	Sedimentation	Road Construction	12 20 2001	32	63
1 R		Reference Subwatershed [1]	Sedimentation	Road Construction	12 20 2001	434	24
1	Cr	Canyon Creek	Sedimentation	Road	12 20 2001	64	326

				Construction			
1 R		Upper Tributaries[2]	Sedimentation	Road Construction	12 20 2001	72	67
1 R		Middle Tributaries[3]	Sedimentation	Road Construction	12 20 2001	54	53
1 R		Lower Tributaries[4]	Sedimentation	Road Construction	12 20 2001	96	55
1	Cr	Weaver and Rush Creeks	Sedimentation	Road Construction	12 20 2001	72	169
1 Cr		Deadwood Creek Hoadley Gulch Poker Bar	Sedimentation	Road Construction	12 20 2001	47	68
1	L	Lewiston Lake	Sedimentation	Road Construction	12 20 2001	25	49
1 Cr		Grassvalley Creek	Sedimentation	Road Construction	12 20 2001	37	44
1	Cr	Indian Creek	Sedimentation	Road Construction	12 20 2001	34	81
1	Cr	Reading and Browns Creek	Sedimentation	Road Construction	12 20 2001	104	66
1 Cr		Reference Subwatersheds[5]	Sedimentation	Road Construction	12 20 2001	235	281
1	L, Cr	Westside tributaries[6]	Sedimentation	Road Construction	12 20 2001	93	105
1 R,	Cr, G	Upper trinity[7]	Sedimentation	Road Construction	12 20 2001	161	690
1 R,	Cr, G	East Fork Tributaries[8]	Sedimentation	Road Construction	12 20 2001	115	65
1	R, L	Eastside Tributaries[9]	Sedimentation	Road Construction	12 20 2001	89	60

1 New River, Big French, Manzanita, North Fork, East Fork, North Fork
2 Dutch, Soldier, Oregon gulch, Conner Creek
3 Big Bar, Prairie Creek, Little French Creek
4 Swede, Italian, Canadian, Cedar Flat, Mill, McDonald, Hennessy, Quimby, Hawkins, Sharber
5 Stuarts Fork, Swift Creek, Coffee Creek
6 Stuart Arm, Stoney Creek, Mule Creek, East Fork, Stuart Fork, West Side Trinity Lake, Hatchet Creek, Buckeye Creek,
7 Upper Trinity River, Tangle Blue, Sunflower, Graves, Bear Upper Trinity Mainstream, Ramshorn Creek, Ripple Creek, Minnehaha Creek, Snowslide Gulch, Scorpion Creek
8 East Fork Trinity, Cedar Creek, Squirrel Gulch

9 East Side Tributaries, Trinity Lake

Q Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.trinity.so.sed	R, Cr	South Fork Trinity River and Hayfork Creek	Sedimentation	Road Construction	12 1998	Not given, 19 miles long	33 (road total)

R Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
1 R1.epa.vanduzen.sed	R, Cr	Van Duzen River and Yager Creek	Sedimentation	Various	12 16 1999	429	1353 total allocation
1		Upper Basin	Sedimentation	Road Construction			7
1		Middle Basin	Sedimentation	Road Construction			22
1		Lower Basin	Sedimentation	Road Construction			20

S Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.blackwood.sed Cr		Blackwood Creek (Placer County)	Bedded Sediment	Various	9 2007	11	17272 total

T Region	**Type**	**Name**	**Pollutant Stressor**	**Potential Sources**	**TMDL Completion Date**	**Watershed Acres** mi^2	**WLA** tons mi^2 yr
6 R6.SquawCk.sed R		Squaw Creek (Placer County)	Sedimentation /controllable sources	Various – basin plan amendment	4 13 2006	8.2	10,900

Adopted TMDLs for Construction Sediment Sources

Region	Type	Name	Pollutant Stressor	Potential Sources	**TMDL Completion Date**	**Watershed Area** mi^2	Waste load Allocation tons mi^2 yr
8 R		Newport Bay San Diego Creek Watershed	Sedimentation	Construction Land Development	1999 2.24	(1432 acres)	125,000 tons per Year (no more than 13,000 tons per year from construction sites)

Appendix 4 Non Sediment TMDLs

Region 1 Lost River-DIN and CBOD

Region 1 Source: Cal Trans Construction TMDL Completion Date: 12 30 2008 TMDL Type: River, Lake Watershed Area= 2996 mi^2	**Pollutant Stressors/WLA**	
	Dissolved inorganic nitrogen (DIN) (metric tons/yr)	**Carbonaceous biochemical oxygen demand (CBOD) (metric tons/yr)**
Lost River from the Oregon border to Tule Lake	.1 .2	
Tule Lake Refuge	.1	.2
Lower Klamath Refuge	.1	.2

Region 2 San Francisco Bay-Mercury

Region 2 Source:Non-Urban Stormwater Runoff TMDL Type: Bay	**Name**	**Pollutant Stressor/WLA**	**TMDL Completion Date**
	San Francisco Bay	Mercury 25 kg/year	08 09 2006

Region 4 Machado Lake Nutrients - Resolution No. 2008-006 (Effective Date - March 11, 2009)

General Construction Stormwater Permit WLAs	Years After Effective Date	Total Phosphorus (mg/L)	Total Nitrogen (TKN + NO3-N + NO2-N) (mg/L)
Interim WLAs[1]	At Effective Date	1.25	3.50
Interim WLAs[2] 5	years	1.25	2.45
Final WLAs[2]	9.5 years	0.10	1.00

[1] The compliance points for effective date interim WLAs are measured in the lake.
[2] No compliance points are specified for general construction stormwater permits for the year 5 interim WLAs and final WLAs

Region 4 Ballona Creek-Metals and Selenium – Resolution No. 2007-015 (Effective Date October 29, 2008)

Wet Weather WLAs

Region 4 Source: NPDES General Construction TMDL Completion Date: 10 29 2008 TMDL Type: Creek	Copper (Cu)		Lead (Pb)		Selenium (Se)		Zinc (Zn)	
	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre	g/day	g/day/acre
Ballona Creek	4.94E-07 x Daily storm volume (L)	2.20E-10 x Daily storm volume (L)	1.62E-06 x Daily storm volume (L)	7.20E-10 x Daily storm volume (L)	1.37E-07 x Daily storm volume (L)	6.10E-11 x Daily storm volume (L)	3.27E-06 x Daily storm volume (L)	1.45E-09 x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.
Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Los Angeles River and Tributaries-Metals– Resolution No. 2007-014
(Effective Date October 29, 2008)

Wet Weather WLAs

	Cadmium (Cd)		Copper (Cu)		Lead (Pb)		Zinc (Zn)	
	kg/day g/day/acre		kg/day g/day/acre		kg/day g/day/acre		kg/day g/day/acre	
5.9x10	$^{-11}$ x Daily storm volume (L)	$7.6x10^{-12}$ x Daily storm volume (L)	$3.2x10^{-10}$ x Daily storm volume (L)	$4.2x10^{-11}$ x Daily storm volume (L)	$1.2x10^{-9}$ x Daily storm volume (L)	$1.5x10^{-10}$ x Daily storm volume (L)	$3.01x10^{-9}$ x Daily storm volume (L)	$3.9x10^{-10}$ x Daily storm volume (L)

Wet-weather WLA Implementation

- Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the final waste load allocations assigned to construction storm water permittees.
- Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL.
- General construction storm water permittees will be considered in compliance with final waste load allocations if they implement these Regional Board approved BMPs. All permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with final waste load allocations.

Dry-weather WLAs

A waste load allocation of zero is assigned to all general construction storm water permits during dry weather.

Dry-weather WLA Implementation

Non-storm water flows authorized by the General Permit for Storm Water Discharges Associated with Construction Activity (Water Quality Order No. 99-08 DWQ), or any successor order, are exempt from the dry-weather waste load allocation equal to zero as

long as they comply with the provisions of sections C.3 and A.9 of the Order No. 99-08 DWQ, which state that these authorized non-storm discharges shall be:

(1) infeasible to eliminate
(2) comply with BMPs as described in the Storm Water Pollution Prevention Plan prepared by the permittee, and
(3) not cause or contribute to a violation of water quality standards, or comparable provisions in any successor order.

Unauthorized non-storm water flows are already prohibited by Order No. 99-08 DWQ.

Region 4 Calleguas Creek Metals TMDL – Resolution No. 2006-012
(Effective Date - March 26, 2007)

Interim Limits and Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Interim limits and waste load allocations are applied to receiving water.

A. Interim Limits

Constituents	Calleguas and Conejo Creek			Revolon Slough		
	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)	Dry CMC (ug/L)	Dry CCC (ug/L)	Wet CMC (ug/L)
Copper*	23	19	204	23	19	204
Nickel	15	13	(a)	15	13	(a)
Selenium	(b)	(b)	(b)	14	13	(a)

(a) The current loads do not exceed the TMDL under wet conditions; interim limits are not required.
(b) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.
(c) Attainment of interim limits will be evaluated in consideration of background loading data, if available.

B. Final WLAs for Total Recoverable Copper, Nickel, and Selenium

Dry-Weather WLAs in Water Column

Flow Range	Calleguas and Conejo Creek			Revolon Slough		
	Low Flow	Average Flow	Elevated Flow	Low Flow	Average Flow	Elevated Flow
Copper1 (lbs/day)	0.04*WER - 0.02	0.12*WER - 0.02	0.18*WER - 0.03	0.03*WER - 0.01	0.06*WER - 0.03	0.13*WER - 0.02
Nickel (lbs/day)	0.100	0.120	0.440	0.050	0.069	0.116
Selenium (lbs/day)	(a)	(a)	(a)	0.004	0.003	0.004

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Wet-Weather WLAs in Water Column

Constituent	Calleguas Creek	Revolon Slough
Copper[1] (lbs/day)	(0.00054*Q^2*0.032*Q - 0.17)*WER - 0.06	(0.0002*Q2+0.0005*Q)*WER
Nickel[2] (lbs/day)	0.014*Q^2+0.82*Q	0.027*Q^2+0.47*Q
Selenium[2] (lbs/day)	(a)	0.027*Q^2+0.47*Q

[1] If site-specific WERs are approved by the Regional Board, TMDL waste load allocations shall be implemented in accordance with the approved WERs using the equations set forth above. Regardless of the final WERs, total copper loading shall not exceed current loading.

[2] Current loads do not exceed loading capacity during wet weather. Sum of all loads cannot exceed loads presented in the table

(a) Selenium allocations have not been developed for this reach as it is not on the 303(d) list.

Q: Daily storm volume.

Interim Limits and Final WLAs for Mercury in Suspended Sediment

Flow Range	Calleguas Creek		Revolon Slough	
	Interim (lbs/yr)	Final (lbs/yr)	Interim (lbs/yr)	Final (lbs/yr)
0-15,000 MGY	3.3	0.4	1.7	0.1
15,000-25,000 MGY	10.5	1.6	4	0.7
Above 25,000 MGY	64.6	9.3	10.2	1.8

MGY: million gallons per year.

In accordance with current practice, a group concentration-based WLA has been developed for all permitted stormwater discharges, including municipal separate storm sewer systems (MS4s), Caltrans, general industrial and construction stormwater permits, and Naval Air Weapons Station Point Mugu. Dischargers will have a required 25%, 50% and 100% reduction in the difference between the current loadings and the load allocations at 5, 10 and 15 years after the effective date, respectively. Achievement of required reductions will be evaluated based on progress towards BMP implementation as outlined in the urban water quality management plans (UWQMPs). If the interim reductions are not met, the dischargers will submit a report to the Executive Officer detailing why the reductions were not met and the steps that will be taken to meet the required reductions.

Region 4 Calleguas Creek-OC Pesticides, PCBs, and Siltation (Resolution 2005-010)
Effective Date - March 24, 2006

Interim Requirements

Region 4 Calleguas Creek	**Pollutant Stressor**	**WLA Daily Max (µg/L)**	**WLA Monthly Ave (µg/L)**
Source: Minor NPDES point sources/WDRs			
TMDL Completion Date: 3 24 2006	Chlordane 1.2		0.59
TMDL Type:Creek	4,4-DDD 1.7		0.84
	4,4-DDE 1.2		0.59
	4,4-DDT 1.2		0.59
	Dieldrin 0.28		0.14
	PCB's 0.34		0.17
	Toxaphene 0.33		0.16

Region 4 Calleguas Creek-Calleguas Creek Toxicicity (Resolution 2005-009)
Effective Date - March 24, 2006

Minor sources include NPDES permittees other than POTWs and MS4s, discharging to the Calleguas Creek Watershed. A wasteload of 1.0 TUc is allocated to the minor point sources discharging to the Calleguas Creek Watershed. Additionally, the following wasteloads for chlorpyrifos and diazinon are established. Final WLAs apply as of March 24, 2006.

Chlorpyrifos WLAs, ug/L
Final WLA
(4 day)
0.014
Diazinon WLAs, ug/L
Final WLA
Acute and Chronic
0.10

Region 4 Calleguas Creek-Salts (Resolution 2007-016)
Effective Date – December 2, 2008

Final Dry Weather Pollutant WLA (mg/L)					
Region 4 Calleaguas Creek Source Permitted Stormwater Dischargers TMDL Completion Date: 12 2 2008 TMDL Type:Creek	**Critical Condition Flow Rate (mgd)**	**Chloride (lb/day)**	**TDS (lb/day)**	**Sulfate (lb/day)**	**Boron (lb/day)**
Simi	1.39	1738 9849 289	7 12		
Las Posas	0.13	157 887 261 N/A			
Conejo	1.26	1576 8931 262	7 N/A		
Camarillo	0.06	72	406 119 N/A		
Pleasant Valley (Calleguas)	0.12	150 850 250 N/A			
Pleasant Valley (Revolon)	0.25	314	1778	523	2
Dry Weather Interim Pollutant WLA (mg/L)					
	Chloride (mg/L)	**TDS (mg/L)**		**Sulfate (mg/L)**	**Boron (mg/L)**

Simi 230.0		1720.0	1289.0	1.3
Las Posas	230	1720	1289	1.3
Conejo 230		1720	1289	1.3
Camarillo 230		1720	1289	1.3
Pleasant Valley (Calleguas)	230	1720	1289	1.3
Pleasant Valley (Revolon)	230	1720	1289	1.3

- Dry- weather waste load allocations apply in the receiving water at the base of each subwatershed. Dry weather allocations apply when instream flow rates are below the 86th percentile flow and there has been no measurable precipitation in the previous 24 hours.
- Because wet weather flows transport a large mass of salts at low concentrations, these dischargers meet water quality objectives during wet weather. No wet weather allocations are assigned.

Ballona Creek Toxic Pollutants (Resolution No. 2005-008)
Effective Date - January 11, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Cadmium	Copper	Lead	Silver	Zinc
0.1	3 4 0.1			13

Organics per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	DDTs	Total PCBs	Total PAHs
0.04	0.14	2	350

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the

effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 Marina Del Rey Harbor Toxic Pollutants TMDL (Resolution No. 2005-012)
Effective Date March 22, 2006

Each storm water permittee enrolled under the general construction or industrial storm water permits will receive an individual waste load allocation on a per acre basis, based on the acreage of their facility.

Metals per Acre WLAs for Individual General Construction or Industrial Storm Water Permittees (g/yr/ac)

Copper	Lead	Zinc
2.3	3.1	10

Organics per acre WLAs for Individual General Construction or Industrial Storm Water Permittees (mg/yr/ac)

Chlordane	Total PCBs
0.03	1.5

Waste load allocations will be incorporated into the State Board general permit upon renewal or into a watershed specific general construction storm water permit developed by the Regional Board.

Within seven years of the effective date of the TMDL, the construction industry will submit the results of BMP effectiveness studies to determine BMPs that will achieve compliance with the waste load allocations assigned to construction storm water permittees. Regional Board staff will bring the recommended BMPs before the Regional Board for consideration within eight years of the effective date of the TMDL. General construction storm water permittees will be considered in compliance with waste load allocations if they implement these Regional Board approved BMPs.

All general construction permittees must implement the approved BMPs within nine years of the effective date of the TMDL. If no effectiveness studies are conducted and no BMPs are approved by the Regional Board within eight years of the effective date of

the TMDL, each general construction storm water permit holder will be subject to site-specific BMPs and monitoring requirements to demonstrate compliance with waste load allocations.

Region 4 San Gabriel River and Tributaries-Metals and Selenium (EPA-established TMDL – Effective date: 3/26/07)

Wet-weather allocations

Waterbody	Copper	Lead	Zinc
San Gabriel River Reach 2*		0.8 kg/d	
Coyote Creek**	0.513 kg/d	2.07 kg/d	3.0 kg/d

*Mass-based allocations are based on a flow of 260 cfs (daily storm volume = 6.4×10^8 liters)

**Mass-based allocations are based on a flow of 156 cfs (daily storm volume = 3.8×10^8 liters)

Dry-weather allocations

The dry-weather copper waste load allocation for general construction storm water permittees that discharge to San Gabriel Reach 1, Coyote Creek, and the Estuary is zero.

The dry-weather selenium allocation for general construction storm water permittees that discharge to San Jose Creek Reach 1 and Reach 2 is 5 µg/L (total recoverable metals).

Region 4 Upper Santa Clara River Chloride TMDL Adopted by Resolution No 2006-016 Effective Date June 12, 2008

"Other NPDES dischargers" have a chloride WLA equal to 100 mg/L.

This TMDL was revised by Resolution No 2008-012, which, when it becomes effective, includes the following conditional WLAs for "Other minor NPDES discharges":

Reach	Concentration-based Conditional WLA for Chloride (mg/L)*
6	150 (12-month Average), 230 (Daily Maximum)
5	150 (12-month Average), 230 (Daily Maximum)
4B	117 (3-month Average), 230 (Daily Maximum)

*The conditional WLAs for chloride for all point sources shall apply only when chloride load reductions and/or chloride export projects are in operation by the Santa Clarita Valley Sanitation District according to the implementation plan for the TMDL. If these conditions are not met, WLAs shall be based on existing water quality objectives for chloride of 100 mg/L.

Region 4 The Harbor Beaches of Ventura County-Bacteria (Adopted by Resolution No. 2007-017)
Effective Date – December 18, 2008

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the Channel Islands Harbor subwatershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean limits.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Los Angeles Harbor Bacteria TMDL (Adopted by Resolution No. 2004-001)
Effective Date – March 10, 2005

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Ballona Creek Bacteria TMDL (Adopted by Resolution No. 2006-011)
Effective Date – April 27, 2007

Current and future enrollees in the Statewide Construction Activity Storm Water General Permit in the watershed are assigned WLAs of zero (0) days of allowable exceedances of the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Resolution No. 03-009 Los Angeles River and Tributaries-Nutrients

Minor Point Sources
Waste loads are allocated to minor point sources enrolled under NPDES or WDR permits including but not limited to Tapia WRP, Whittier Narrows WRP, Los Angeles Zoo WRP, industrial and construction stormwater, and municipal storm water and urban runoff from municipal separate storm sewer systems (MS4s)

Region 4 Minor Point Sources for NPDES/WDR Permits TMDL Effective Date: 3 23 2004 TMDL Type: River	Pollutant Stressor/WLA				
	Total Ammonia (NH_3)		**Nitrate-nitrogen (NO_3-N)**	**Nitrite-nitrogen (NO_2-N)**	**NO_3-N + NO_3-N**
	1 Hr Ave mg/l	30 Day Ave mg/l	30 Day Ave mg/l		30 Day Ave mg/l
LA River Above Los Angeles-Glendale WRP (LAG)	4.7 1.6 8.0			1.0	8.0
LA River Below LAG	8.7	2.4	8.0	1.0	8.0
Los Angeles Tributaries 10.1		2.3	8.0	1.0	8.0

Malibu Creek Attachment A to Resolution No. 2004-019R-Bacteria

Effective date: 1 24 2006. The WLAs for permittees under the NPDES General Stormwater Construction Permit are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Region 4 Marina del Rey Harbor, Mothers' Beach and Back Basins
Attachment A to Resolution No. 2003-012-Bacteria

Effective date: 3 18 2004. Discharges from general construction storm water permits are not expected to be a significant source of bacteria. Therefore, the WLAs for these discharges are zero (0) days of allowable exceedances for the single sample limits and the rolling 30-day geometric mean. Any future enrollees under a general NPDES permit, general industrial storm water permit or general construction storm water permit within the MdR Watershed will also be subject to a WLA of zero days of allowable exceedances.

Single Sample Limits are:
a. Total coliform density shall not exceed 10,000/100 ml.
b. Fecal coliform density shall not exceed 400/100 ml.
c. Enterococcus density shall not exceed 104/100 ml.
d. Total coliform density shall not exceed 1,000/100 ml, if the ratio of fecal-to-total coliform exceeds 0.1.

Rolling 30-day Geometric Mean Limits are:
a. Total coliform density shall not exceed 1,000/100 ml.
b. Fecal coliform density shall not exceed 200/100 ml.
c. Enterococcus density shall not exceed 35/100 ml.

Santa Clara River Nutrients TMDL (Adopted by Resolution No. 2003-011
Effective Date - March 23, 2004

Concentration-based wasteloads are allocated to municipal, industrial and construction stormwater sources regulated under NPDES permits. For stormwater permittees discharging into Reach 7, the thirty-day WLA for ammonia as nitrogen is 1.75 mg/L and the one-hour WLA for ammonia as nitrogen is 5.2 mg/L; the thirty-day average WLA for nitrate plus nitrite as nitrogen is 6.8 mg/L. For stormwater permittees discharging into Reach 3, the thirty-day WLA for ammonia as nitrogen is 2.0 mg/L and the one-hour WLA for ammonia as nitrogen is 4.2 mg/L; the thirty-day average WLA for nitrate plus nitrite nitrogen is 8.1 mg/L.

Region 8 RESOLUTION NO. R8-2007- 0024

Total Maximum Daily Loads (TMDLs) for San Diego Creek,
Upper and Lower Newport Bay, Orange County, California

Region 8 NPDES Construction Permit TMDL Completion Date: 1 24 1995 TMDL Type: River. Cr, Bay	Organochlorine Compounds							
	Total DDT		**Chlordane**		**Total PCBs**		**Toxaphene**	
	g/day	g/yr	g/day	g/yr	g/day	g/yr	g/day	g/yr
San Diego Creek	.27	99.8	**.18***	**64.3***	**.09***	**31.5***	.004 1.5	
Upper Newport Bay	.11	40.3 .06		23.4 .06		23.2	**X**	**X**
Lower Newport Bay	.04	14.9	.02 8.6 .17	60.7			**X**	**X**

*Red= Informational WLA only, not for enforcement purposes

Organochlorine Compounds TMDLs Implementation Tasks and Schedule

Regional Board staff shall develop a SWPPP Improvement Program that identifies the Regional Board's expectations with respect to the content of SWPPPs, including documentation regarding the selection and implementation of BMPs, and a sampling and analysis plan. The Improvement Program shall include specific guidance regarding the development and implementation of monitoring plans, including the constituents to be monitored, sampling frequency and analytical protocols. The SWPPP Improvement Program shall be completed by (*the date of OAL approval of this BPA*). ***No later than two months*** from completion of the Improvement Program, Board staff shall assure that the requirements of the Program are communicated to interested parties, including dischargers with existing authorizations under the General Construction Permit. Existing, authorized dischargers shall revise their project SWPPPs as needed to address the Program requirements as soon as possible but ***no later than (three months of completion of the SWPPP Improvement Program)***. Applicable SWPPPs that do not adequately address the Program requirements shall be considered inadequate and enforcement by the Regional Board shall proceed accordingly. The Caltrans and Orange County MS4 permits shall be revised as needed to assure that the permittees communicate the Regional Board's SWPPP expectations, based on the SWPPP Improvement Program, with the Standard Conditions of Approval.

APPENDIX 5:
Glossary

Active Areas of Construction
All areas subject to land surface disturbance activities related to the project including, but not limited to, project staging areas, immediate access areas and storage areas. All previously active areas are still considered active areas until final stabilization is complete. [The construction activity Phases used in this General Permit are the Preliminary Phase, Grading and Land Development Phase, Streets and Utilities Phase, and the Vertical Construction Phase.]

Active Treatment System (ATS)
A treatment system that employs chemical coagulation, chemical flocculation, or electrocoagulation to aid in the reduction of turbidity caused by fine suspended sediment.

Acute Toxicity Test
A chemical stimulus severe enough to rapidly induce a negative effect; in aquatic toxicity tests, an effect observed within 96 hours or less is considered acute.

Air Deposition
Airborne particulates from construction activities.

Approved Signatory
A person who has been authorized by the Legally Responsible Person to sign, certify, and electronically submit Permit Registration Documents, Notices of Termination, and any other documents, reports, or information required by the General Permit, the State or Regional Water Board, or U.S. EPA. The Approved Signatory must be one of the following:

1. For a corporation or limited liability company: a responsible corporate officer. For the purpose of this section, a responsible corporate officer means: (a) a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation or limited liability company; or (b) the manager of the facility if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. For a partnership or sole proprietorship: a general partner or the proprietor, respectively;

3. For a municipality, State, Federal, or other public agency: a principal executive officer, ranking elected official, city manager, council president, or any other authorized public employee with managerial responsibility over the

construction or land disturbance project (including, but not limited to, project manager, project superintendent, or resident engineer);

4. For the military: any military officer or Department of Defense civilian, acting in an equivalent capacity to a military officer, who has been designated;

5. For a public university: an authorized university official;

6. For an individual: the individual, because the individual acts as both the Legally Responsible Person and the Approved Signatory; or

7. For any type of entity not listed above (e.g. trusts, estates, receivers): an authorized person with managerial authority over the construction or land disturbance project.

Beneficial Uses
As defined in the California Water Code, beneficial uses of the waters of the state that may be protected against quality degradation include, but are not limited to, domestic, municipal, agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.

Best Available Technology Economically Achievable (BAT)
As defined by USEPA, BAT is a technology-based standard established by the Clean Water Act (CWA) as the most appropriate means available on a national basis for controlling the direct discharge of toxic and nonconventional pollutants to navigable waters. The BAT effluent limitations guidelines, in general, represent the best existing performance of treatment technologies that are economically achievable within an industrial point source category or subcategory.

Best Conventional Pollutant Control Technology (BCT)
As defined by USEPA, BCT is a technology-based standard for the discharge from existing industrial point sources of conventional pollutants including biochemical oxygen demand (BOD), total suspended sediment (TSS), fecal coliform, pH, oil and grease.

Best Professional Judgment (BPJ)
The method used by permit writers to develop technology-based NPDES permit conditions on a case-by-case basis using all reasonably available and relevant data.

Best Management Practices (BMPs)
BMPs are scheduling of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the discharge of pollutants. BMPs also include treatment requirements, operating procedures,

and practices to control site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

Chain of Custody (COC)
Form used to track sample handling as samples progress from sample collection to the analytical laboratory. The COC is then used to track the resulting analytical data from the laboratory to the client. COC forms can be obtained from an analytical laboratory upon request.

Coagulation
The clumping of particles in a discharge to settle out impurities, often induced by chemicals such as lime, alum, and iron salts.

Common Plan of Development
Generally a contiguous area where multiple, distinct construction activities may be taking place at different times under one plan. A plan is generally defined as any piece of documentation or physical demarcation that indicates that construction activities may occur on a common plot. Such documentation could consist of a tract map, parcel map, demolition plans, grading plans or contract documents. Any of these documents could delineate the boundaries of a common plan area. However, broad planning documents, such as land use master plans, conceptual master plans, or broad-based CEQA or NEPA documents that identify potential projects for an agency or facility are not considered common plans of development.

Daily Average Discharge
The discharge of a pollutant measured during any 24-hour period that reasonably represents a calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged during the day. For pollutants with limitations expressed in other units of measurement (e.g., concentration) the daily discharge is calculated as the average measurement of the pollutant throughout the day (40 CFR 122.2). In the case of pH, the pH must first be converted from a log scale.

Debris
Litter, rubble, discarded refuse, and remains of destroyed inorganic anthropogenic waste.

Direct Discharge
A discharge that is routed directly to waters of the United States by means of a pipe, channel, or ditch (including a municipal storm sewer system), or through surface runoff.

Discharger
The Legally Responsible Person (see definition) or entity subject to this General Permit.

Dose Rate (for ATS)
In exposure assessment, dose (e.g. of a chemical) per time unit (e.g. mg/day), sometimes also called dosage.

Drainage Area
The area of land that drains water, sediment, pollutants, and dissolved materials to a common outlet.

Effluent
Any discharge of water by a discharger either to the receiving water or beyond the property boundary controlled by the discharger.

Effluent Limitation
Any numeric or narrative restriction imposed on quantities, discharge rates, and concentrations of pollutants which are discharged from point sources into waters of the United States, the waters of the contiguous zone, or the ocean.

Erosion
The process, by which soil particles are detached and transported by the actions of wind, water, or gravity.

Erosion Control BMPs
Vegetation, such as grasses and wildflowers, and other materials, such as straw, fiber, stabilizing emulsion, protective blankets, etc., placed to stabilize areas of disturbed soils, reduce loss of soil due to the action of water or wind, and prevent water pollution.

Field Measurements
Testing procedures performed in the field with portable field-testing kits or meters.

Final Stabilization
All soil disturbing activities at each individual parcel within the site have been completed in a manner consistent with the requirements in this General Permit.

First Order Stream
Stream with no tributaries.

Flocculants
Substances that interact with suspended particles and bind them together to form flocs.

Good Housekeeping BMPs
BMPs designed to reduce or eliminate the addition of pollutants to construction site runoff through analysis of pollutant sources, implementation of proper handling/disposal practices, employee education, and other actions.

Grading Phase (part of the Grading and Land Development Phase)
Includes reconfiguring the topography and slope including; alluvium removals; canyon cleanouts; rock undercuts; keyway excavations; land form grading; and stockpiling of select material for capping operations.

Hydromodification
Hydromodification is the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. Hydromodification can cause excessive erosion and/or sedimentation rates, causing excessive turbidity, channel aggradation and/or degradation.

Identified Organisms
Organisms within a sub-sample that is specifically identified and counted.

Inactive Areas of Construction
Areas of construction activity that are not active and those that have been active and are not scheduled to be re-disturbed for at least 14 days.

Index Period
The period of time during which bioassessment samples must be collected to produce results suitable for assessing the biological integrity of streams and rivers. Instream communities naturally vary over the course of a year,and sampling during the index period ensures that samples are collected during a time frame when communities are stable so that year-to-year consistency is obtained. The index period approach provides a cost-effective alternative to year-round sampling. Furthermore, sampling within the appropriate index period will yield results that are comparable to the assessment thresholds or criteria for a given region, which are established for the same index period. Because index periods differ for different parts of the state, it is essential to know the index period for your area.

K Factor
The soil erodibility factor used in the Revised Universal Soil Loss Equation (RUSLE). It represents the combination of detachability of the soil, runoff potential of the soil, and the transportability of the sediment eroded from the soil.

Legally Responsible Person
The Legally Responsible Person (LRP) will typically be the project proponent. The categories of persons or entities that are eligible to serve as the LRP are set forth below. For any construction or land disturbance project where multiple persons or entities are eligible to serve as the LRP, those persons or entities

shall select a single LRP. In exceptional circumstances, a person or entity that qualifies as the LRP may provide written authorization to another person or entity to serve as the LRP. In such a circumstance, the person or entity that provides the authorization retains all responsibility for compliance with the General Permit. Except as provided in category 2(d), a contractor who does not satisfy the requirements of any of the categories below is not qualified to be an LRP.

The following persons or entities may serve as an LRP:

1. A person, company, agency, or other entity that possesses a real property interest (including, but not limited to, fee simple ownership, easement, leasehold, or other rights of way) in the land upon which the construction or land disturbance activities will occur for the regulated site.

2. In addition to the above, the following persons or entities may also serve as an LRP:

    a. For linear underground/overhead projects, the utility company, municipality, or other public or private company or agency that owns or operates the LUP;

    b. For land controlled by an estate or similar entity, the person who has day-to-day control over the land (including, but not limited to, a bankruptcy trustee, receiver, or conservator);

    c. For pollution investigation and remediation projects, any potentially responsible party that has received permission to conduct the project from the holder of a real property interest in the land; or

    d. For U.S. Army Corp of Engineers projects, the U.S. Army Corps of Engineers may provide written authorization to its bonded contractor to serve as the LRP, provided, however, that the U.S. Army Corps of Engineers is also responsible for compliance with the general permit, as authorized by the Clean Water Act or the Federal Facilities Compliance Act.

Likely Precipitation Event
Any weather pattern that is forecasted to have a 50% or greater chance of producing precipitation in the project area. The discharger shall obtain likely precipitation forecast information from the National Weather Service Forecast Office (e.g., by entering the zip code of the project's location at http://www.srh.noaa.gov/forecast).

Maximum Allowable Threshold Concentration (MATC)
The allowable concentration of residual, or dissolved, coagulant/flocculant in effluent. The MATC shall be coagulant/flocculant-specific, and based on toxicity

testing conducted by an independent, third-party laboratory. A typical MATC would be:

The MATC is equal to the geometric mean of the NOEC (No Observed Effect Concentration) and LOEC (Lowest Observed Effect Concentration) Acute and Chronic toxicity results for most sensitive species determined for the specific coagulant. The most sensitive species test shall be used to determine the MATC.

Natural Channel Evolution
The physical trend in channel adjustments following a disturbance that causes the river to have more energy and degrade or aggrade more sediment. Channels have been observed to pass through 5 to 9 evolution types. Once they pass though the suite of evolution stages, they will rest in a new state of equilibrium.

Non-Storm Water Discharges
Discharges are discharges that do not originate from precipitation events. They can include, but are not limited to, discharges of process water, air conditioner condensate, non-contact cooling water, vehicle wash water, sanitary wastes, concrete washout water, paint wash water, irrigation water, or pipe testing water.

Non-Visible Pollutants
Pollutants associated with a specific site or activity that can have a negative impact on water quality, but cannot be seen though observation (ex: chlorine). Such pollutants being discharged are not authorized.

Numeric Action Level (NAL)
Level is used as a warning to evaluate if best management practices are effective and take necessary corrective actions. Not an effluent limit.

Original Sample Material
The material (i.e., macroinvertebrates, organic material, gravel, etc.) remaining after the subsample has been removed for identification.

pH
Unit universally used to express the intensity of the acid or alkaline condition of a water sample. The pH of natural waters tends to range between 6 and 9, with neutral being 7. Extremes of pH can have deleterious effects on aquatic systems.

Post-Construction BMPs
Structural and non-structural controls which detain, retain, or filter the release of pollutants to receiving waters after final stabilization is attained.

Preliminary Phase (Pre-Construction Phase - Part of the Grading and Land Development Phase)
Construction stage including rough grading and/or disking, clearing and grubbing operations, or any soil disturbance prior to mass grading.

Project

Qualified SWPPP Developer
Individual who is authorized to develop and revise SWPPPs.

Qualified SWPPP Practitioner
Individual assigned responsibility for non-storm water and storm water visual observations, sampling and analysis, and responsibility to ensure full compliance with the permit and implementation of all elements of the SWPPP, including the preparation of the annual compliance evaluation and the elimination of all unauthorized discharges.

Qualifying Rain Event
Any event that produces 0.5 inches or more precipitation with a 48 hour or greater period between rain events.

R Factor
Erosivity factor used in the Revised Universal Soil Loss Equation (RUSLE). The R factor represents the erosivity of the climate at a particular location. An average annual value of R is determined from historical weather records using erosivity values determined for individual storms. The erosivity of an individual storm is computed as the product of the storm's total energy, which is closely related to storm amount, and the storm's maximum 30-minute intensity.

Rain Event Action Plan (REAP)
Written document, specific for each rain event, that when implemented is designed to protect all exposed portions of the site within 48 hours of any likely precipitation event.

Remaining Sub sampled Material
The material (e.g., organic material, gravel, etc.) that remains after the organisms to be identified have been removed from the subsample for identification. (Generally, no macroinvertebrates are present in the remaining subsampled material, but the sample needs to be checked and verified using a complete Quality Assurance (QA) plan)

Routine Maintenance
Activities intended to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Runoff Control BMPs
Measures used to divert runon from offsite and runoff within the site.

Run-on
Discharges that originate offsite and flow onto the property of a separate project site.

Revised Universal Soil Loss Equation (RUSLE)
Empirical model that calculates average annual soil loss as a function of rainfall and runoff erosivity, soil erodibility, topography, erosion controls, and sediment controls.

Sampling and Analysis Plan
Document that describes how the samples will be collected, under what conditions, where and when the samples will be collected, what the sample will be tested for, what test methods and detection limits will be used, and what methods/procedures will be maintained to ensure the integrity of the sample during collection, storage, shipping and testing (i.e., quality assurance/quality control protocols).

Sediment
Solid particulate matter, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, gravity, or ice and has come to rest on the earth's surface either above or below sea level.

Sedimentation
Process of deposition of suspended matter carried by water, wastewater, or other liquids, by gravity. It is usually accomplished by reducing the velocity of the liquid below the point at which it can transport the suspended material.

Sediment Control BMPs
Practices that trap soil particles after they have been eroded by rain, flowing water, or wind. They include those practices that intercept and slow or detain the flow of storm water to allow sediment to settle and be trapped (e.g., silt fence, sediment basin, fiber rolls, etc.).

Settleable Solids (SS)
Solid material that can be settled within a water column during a specified time frame. It is typically tested by placing a water sample into an Imhoff settling cone and then allowing the solids to settle by gravity for a given length of time. Results are reported either as a volume (mL/L) or a mass (mg/L) concentration.

Sheet Flow
Flow of water that occurs overland in areas where there are no defined channels where the water spreads out over a large area at a uniform depth.

Site

Soil Amendment
Any material that is added to the soil to change its chemical properties, engineering properties, or erosion resistance that could become mobilized by storm water.

Streets and Utilities Phase
Construction stage including excavation and street paving, lot grading, curbs, gutters and sidewalks, public utilities, public water facilities including fire hydrants, public sanitary sewer systems, storm sewer system and/or other drainage improvements.

Structural Controls
Any structural facility designed and constructed to mitigate the adverse impacts of storm water and urban runoff pollution

Suspended Sediment Concentration (SSC)
The measure of the concentration of suspended solid material in a water sample by measuring the dry weight of all of the solid material from a known volume of a collected water sample. Results are reported in mg/L.

Total Suspended Solids (TSS)
The measure of the suspended solids in a water sample includes inorganic substances, such as soil particles and organic substances, such as algae, aquatic plant/animal waste, particles related to industrial/sewage waste, etc. The TSS test measures the concentration of suspended solids in water by measuring the dry weight of a solid material contained in a known volume of a sub-sample of a collected water sample. Results are reported in mg/L.

Toxicity
The adverse response(s) of organisms to chemicals or physical agents ranging from mortality to physiological responses such as impaired reproduction or growth anomalies.

Turbidity
The cloudiness of water quantified by the degree to which light traveling through a water column is scattered by the suspended organic and inorganic particles it contains. The turbidity test is reported in Nephelometric Turbidity Units (NTU) or Jackson Turbidity Units (JTU).

Vertical Construction Phase
The Build out of structures from foundations to roofing, including rough landscaping.

Waters of the United States
Generally refers to surface waters, as defined by the federal Environmental Protection Agency in 40 C.F.R. § 122.2.[1]

Water Quality Objectives (WQO)
Water quality objectives are defined in the California Water Code as limits or levels of water quality constituents or characteristics, which are established for the reasonable protection of beneficial uses of water or the prevention of nuisance within a specific area.

[1] The application of the definition of "waters of the United States" may be difficult to determine; there are currently several judicial decisions that create some confusion. If a landowner is unsure whether the discharge must be covered by this General Permit, the landowner may wish to seek legal advice.

APPENDIX 6:
Acronym List

ASBS	Areas of Special Biological Significance
ASTM	American Society of Testing and Materials; Standard Test Method for Particle-Size Analysis of Soils
ATS	Active Treatment System
BASMAA	Bay Area Storm water Management Agencies Association
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BPJ	Best Professional Judgment
CAFO	Confined Animal Feeding Operation
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGP	NPDES General Permit for Storm Water Discharges Associated with Construction Activities
CIWQS	California Integrated Water Quality System
CKD	Cement Kiln Dust
COC	Chain of Custody
CPESC	Certified Professional in Erosion and Sediment Control
CPSWQ	Certified Professional in Storm Water Quality
CSMP	Construction Site Monitoring Program
CTB	Cement Treated Base
CTR	California Toxics Rule
CWA	Clean Water Act
CWC	California Water Code
CWP	Center for Watershed Protection
DADMAC	Diallyldimethyl-ammonium chloride
DDNR	Delaware Department of Natural Resources
DFG	Department of Fish and Game
DHS	Department of Health Services
DWQ	Division of Water Quality
EC	Electrical Conductivity
ELAP	Environmental Laboratory Accreditation Program
EPA	Environmental Protection Agency
ESA	Environmentally Sensitive Area
ESC	Erosion and Sediment Control
HSPF	Hydrologic Simulation Program Fortran
JTU	Jackson Turbidity Units
LID	Low Impact Development
LOEC	Lowest Observed Effect Concentration
LRP	Legally Responsible Person
LUP	Linear Underground/Overhead Projects

MATC	Maximum Allowable Threshold Concentration
MDL	Method Detection Limits
MRR	Monitoring and Reporting Requirements
MS4	Municipal Separate Storm Sewer System
MUSLE	Modified Universal Soil Loss Equation
NAL	Numeric Action Level
NEL	Numeric Effluent Limitation
NICET	National Institute for Certification in Engineering Technologies
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observed Effect Concentration
NOI	Notice of Intent
NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NTR	National Toxics Rule
NTU	Nephelometric Turbidity Units
O&M	Operation and Maintenance
PAC	Polyaluminum chloride
PAM	Polyacrylamide
PASS	Polyaluminum chloride Silica/sulfate
POC	Pollutants of Concern
PoP	Probability of Precipitation
POTW	Publicly Owned Treatment Works
PRDs	Permit Registration Documents
PWS	Planning Watershed
QAMP	Quality Assurance Management Plan
QA/QC	Quality Assurance/Quality Control
REAP	Rain Event Action Plan
Regional Board	Regional Water Quality Control Board
ROWD	Report of Waste Discharge
RUSLE	Revised Universal Soil Loss Equation
RW	Receiving Water
SMARTS	Storm water Multi Application Reporting and Tracking System
SS	Settleable Solids
SSC	Suspended Sediment Concentration
SUSMP	Standard Urban Storm Water Mitigation Plan
SW	Storm Water
SWARM	Storm Water Annual Report Module
SWAMP	Surface Water Ambient Monitoring Program
SWMM	Storm Water Management Model
SWMP	Storm Water Management Program
SWPPP	Storm Water Pollution Prevention Plan
TC	Treatment Control
TDS	Total Dissolved Solids

TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
USACOE	U.S. Army Corps of Engineers
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WDID	Waste Discharge Identification Number
WDR	Waste Discharge Requirements
WLA	Waste Load Allocation
WET	Whole Effluent Toxicity
WRCC	Western Regional Climate Center
WQBEL	Water Quality Based Effluent Limitation
WQO	Water Quality Objective
WQS	Water Quality Standard

APPENDIX 7:
State and Regional Water Resources Control Board Contacts

NORTH COAST REGION (1)
5550 Skylane Blvd, Ste. A
Santa Rose, CA 95403
(707) 576-2220 FAX: (707)523-0135

SAN FRANCISCO BAY REGION (2)
1515 Clay Street, Ste. 1400
Oakland, CA 94612
(510) 622-2300 FAX: (510) 622-2640

CENTRAL COAST REGION (3)
895 Aerovista Place, Ste 101
San Luis Obispo, CA 93401
(805) 549-3147 FAX: (805) 543-0397

LOS ANGELES REGION (4)
320 W. 4th Street, Ste. 200
Los Angeles, CA 90013
(213) 576-6600 FAX: (213) 576-6640

CENTRAL VALLEY REGION (5S)
11020 Sun Center Dr., #200
Rancho Cordova, CA 95670-6114
(916) 464-3291 FAX: (916) 464-4645

FRESNO BRANCH OFFICE (5F)
1685 E St.
Fresno, CA 93706
(559) 445-5116 FAX: (559) 445-5910

REDDING BRANCH OFFICE (5R)
415 Knollcrest Drive, Ste. 100
Redding, CA 96002
(530) 224-4845 FAX: (530) 224-4857

LAHONTAN REGION (6 SLT)
2501 Lake Tahoe Blvd.
South Lake Tahoe, CA 96150
(530) 542-5400 FAX: (530) 544-2271

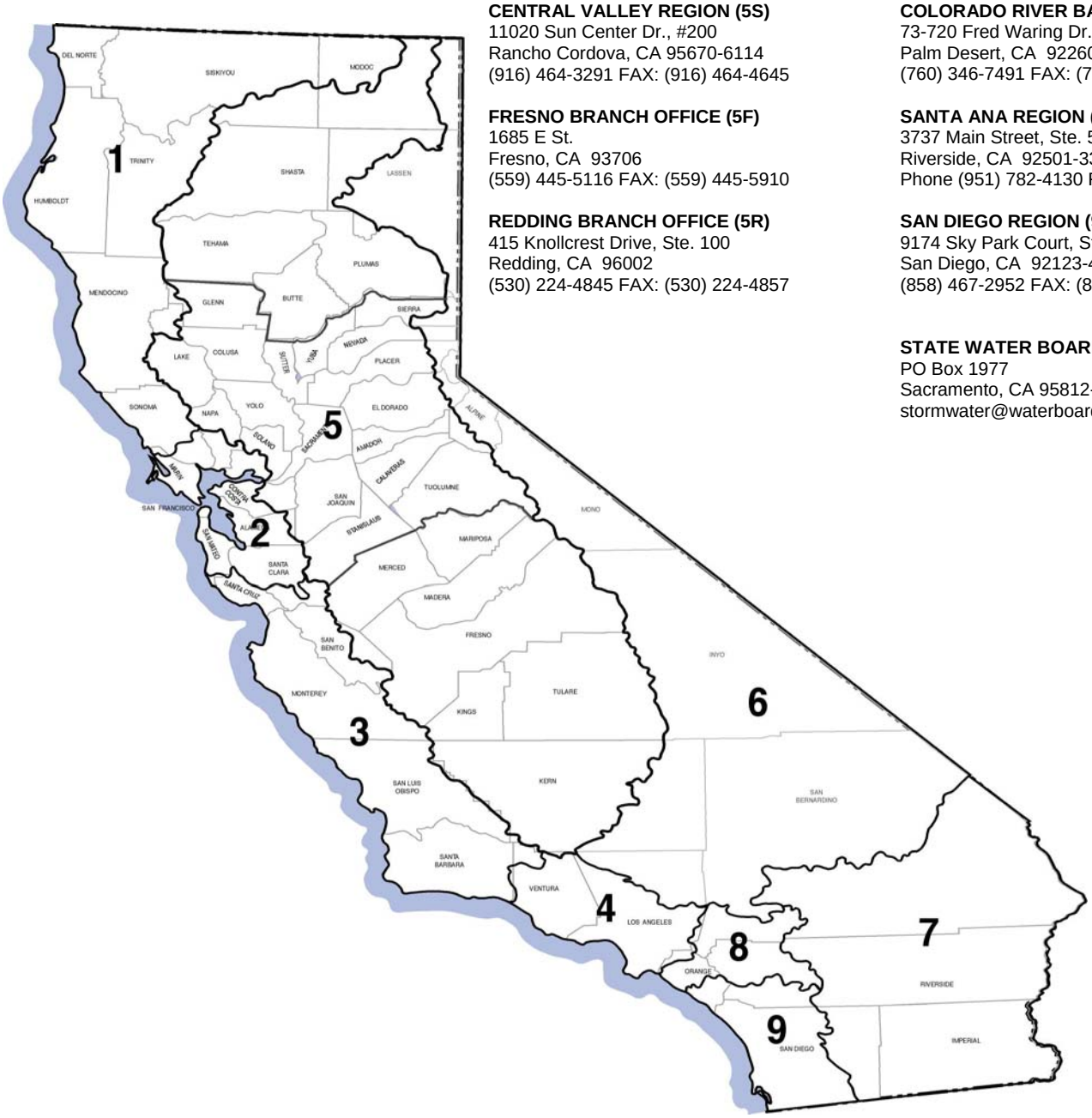
VICTORVILLE OFFICE (6V)
14440 Civic Drive, Ste. 200
Victorville, CA 92392-2383
(760) 241-6583 FAX: (760) 241-7308

COLORADO RIVER BASIN REGION (7)
73-720 Fred Waring Dr., Ste. 100
Palm Desert, CA 92260
(760) 346-7491 FAX: (760) 341-6820

SANTA ANA REGION (8)
3737 Main Street, Ste. 500
Riverside, CA 92501-3339
Phone (951) 782-4130 FAX: (951) 781-6288

SAN DIEGO REGION (9)
9174 Sky Park Court, Ste. 100
San Diego, CA 92123-4340
(858) 467-2952 FAX: (858) 571-6972

STATE WATER BOARD
PO Box 1977
Sacramento, CA 95812-1977
stormwater@waterboards.ca.gov



Appendix I: Monitoring Records

THIS FLYSEET FOR APPENDIX I MONITORING RECORDS IS INCLUDED AS A PLACEHOLDER APPENDIX PER THE REQUIREMENTS THAT WERE STIPULATED IN THE CERCLA SWP.

Note: Monitoring Records (such as the BMP Inspection and Maintenance Checklists, and any photographs taken documenting observations) generated during construction will be maintained on site with the Final SWP and included as a part of the field documentation appendices in the project's Investigation/Closure Report.

ATTACHMENT 6

ACCIDENT PREVENTION PLAN
AND SITE SAFETY AND HEALTH PLAN

FINAL ACCIDENT PREVENTION PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared Under:
Contract Number N62473-10-D-0808
Contract Task Order Number CTO 0004
Document Control Number: ITSI-0808-0004-0013

Prepared for:

Base Realignment and Closure
Program Management Office, West
1455 Frazee Road, Suite 900
San Diego, California 92108

DEPARTMENT OF THE NAVY
Chris Yantos, Remedial Project Manager
Naval Facilities Engineering Command Southwest
San Diego, California

Prepared by:

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July 2013

ITSI Gilbane Project No. 07204.0004

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Appendix C Safe Work Procedures (SWP)
Appendix D Forms

ACRONYMS AND ABBREVIATIONS

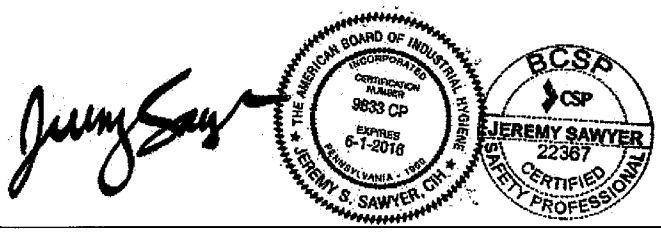
°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
AIHA	American Industrial Hygiene Association
AL	action level
APP	Accident Prevention Plan
BBP	bloodborne pathogens
BPM	beats per minute
BRAC	Base Realignment and Closure
Cal/OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CHSP	Corporate Health and Safety Program
CIH	Certified Industrial Hygienist
CL	ceiling limit
CO	Contracting Officer
COR	Contracting Officer's Representative
CPR	cardiopulmonary resuscitation
CIH	Certified Industrial Hygienist
CSIR	Contractor Significant Incident Report
CSP	Certified Safety Professional
DO	Delivery Order
DOT	Department of Transportation
EM	Engineering Manual
EMAC	Environmental Multiple Award Contract
EMT	Emergency Medical Technician
EZ	Exclusion Zone
H&S	health and safety
HEPA	high efficiency particulate arresting
HPNS	Hunters Point Naval Shipyard
HRA	Historical Radiological Assessment
HSM	Health and Safety Manager
HSA	Hollow-Stem Auger
HSO	Health and Safety Officer
HTRW	Hazardous, Toxic, and/or Radioactive Work
IIPP	Injury and Illness Prevention Program
ITSI Gilbane	ITSI Gilbane Company
MSDS	material safety data sheet
NAVFAC SW	Naval Facilities Engineering Command Southwest
NAVSEA	Naval Sea Systems Command
Navy	U.S. Department of the Navy
NIOSH	National Institute for Occupational Safety and Health
NOA	naturally occurring asbestos
NOAA	National Oceanic and Atmospheric Administration

ACRONYMS AND ABBREVIATIONS (Continued)

OSHA	Occupational Safety and Health Administration
PBSB	Performance-Based Small Business
PCB	polychlorinated biphenyl
PEL	permissible exposure limit
PM	Project Manager
PMO-West	Project Management Office, West
PPE	personal protective equipment
psi	pounds per square inch
RA	remedial action
RCT	Radiation Control Technician
ROC	radionuclides of concern
ROI	radius of influence
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
SOW	Statement of Work
SSHO	Site Health and Safety Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
SWP	Safe Work Procedure
TCRA	Time Critical Removal Action
TLV	threshold limit value
TtECI	Tetra Tech ECI
USACE	United States Army Corps of Engineers

1.0 SIGNATURE SHEET

Plan Preparation:



07/18/2013

Jeremy Sawyer, CIH, CSP
ITSI Gilbane Industrial Hygiene Manager
Phone: 303-204-3896

Date

Plan Concurrence:

07/18/13

Ed Palser
Project Manager
Phone: 505-400-4076

Date

Plan Approval:

07/18/13

Tej Singh
Executive Vice President
Phone:925-946-3110

Date

2.0 BACKGROUND INFORMATION

This Accident Prevention Plan (APP) was prepared by ITSI Gilbane Company (ITSI Gilbane), as requested by the U.S. Navy (Navy) under Radiological Environmental Multiple Award Contract (EMAC) Number N62473-10-D-0808, Delivery Order CTO-0004, and based on the Statement of Work (SOW) submitted by the Navy on April 17, 2012. This purpose of this APP is to identify the activities necessary to implement Phase II Radiological Remediation and Support in Parcel D-1 at Hunters Point Naval Shipyard (HPNS) in San Francisco, California (Figure 1).

This APP was developed in accordance with the United States Army Corps of Engineers (USACE) *Safety and Health Requirements Manual EM 385-1-1*, Appendix A; Code of Federal Regulations (CFR) Title 29, Part 1926, *Safety and Health Regulations for Construction*; other applicable regulations; and good industrial hygiene practice. The APP will be used in conjunction with the ITSI Gilbane Corporate Health and Safety Program, and the health and safety policies and procedures provided in the Site Safety and Health Plan (SSHP). The procedures and guidelines are based on the best available information at the time of the preparation of the APP and SSHP. Specific requirements may be revised if new information is received or conditions change, especially based upon information gathered during the pre-construction survey. Written amendments will document any changes made to the APP or SSHP and will be issued as an addendum.

2.1 SCOPE OF WORK/WORK AREAS

This APP covers the work areas where project field activities will take place. The survey area is defined as the portion of land that extends inland fifty feet from the water's edge at Berths 21, 22, and 29. Berths 21, 22, and 29 make up the entire perimeter of the Phase II area of focus. Although the ship berths are listed in the HRA as part of Parcel F, the portion of land that is to be included in this survey is considered Parcel D-1. The locations of the rail tie stockpiles are in the southern portion of Parcel D-1 near Berths 22 and 29 (Figure 2), and at the head of Gun Mole Pier adjacent to Berth 14.

The project site activities included in this scope of work are expected to include the following:

- Perform the radiological investigation and any remediation necessary to achieve free release, and final status surveys of the ship berths adjacent to Parcel D-1.
    - Remove, sample, survey, remediate, backfill, and restore a minimum of 5,700 lineal feet of sewer and storm drain line.
    - Conduct surveys of Parcel D-1 Ship Berths to support the Final Status Survey (FSS) goal and free-release of the site. Survey work may require asphalt removal to support clean closure. Contaminated areas shall be remediated and re-surveyed to support clean closure.
    - Radiologically survey and release several large stockpiles of rail ties from radiological controls.
- Provide health and safety monitoring, air monitoring, and fire prevention monitoring in accordance with Basewide and task-specific health and safety plans, dust control mitigation plans, and air monitoring plans.

2.2 ACCIDENT EXPERIENCE

The ITSI Gilbane experience modification rates and federal Occupational Safety and Health Administration (OSHA) recordable incident rates for the last 3 years are indicated below.

Year	Experience Modification Rate	OSHA Recordable Incident Rate
2012	0.47	1.00
2011	0.80	1.60
2010	0.76	2.45

2.3 ACTIVITIES REQUIRING ACTIVITY HAZARD ANALYSIS

Activity Hazard Analyses (AHAs) have been prepared for the project activities (Appendix A).

The AHAs include:

- Mobilize and demobilize all equipment, materials, and personnel for the field effort including utility surveys.
- Radiological surveys and sampling
- Civil surveys, identification and tracking
- Excavating soil, removing piping systems and transport and disposal
- Backfill and site restoration.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

Safety on the job is of foremost importance for all activities conducted by ITSI Gilbane. No operation, either in the field or in the office, is so important that it must be done in a manner that allows unacceptable hazards to personnel, property, clients, or visitors. Safety is a team effort that must be implemented through the cooperative efforts of management and employees.

The ITSI Gilbane Corporate Health and Safety Program has been developed to establish procedures and policies to attain the goals stated below:

- To facilitate a safe work environment for all ITSI Gilbane employees, and assist in the prevention of workplace accidents and injuries.
- To provide a safe environment for visitors and clients to complete their transactions without injury or property damage.
- To eliminate all incidents through the use of best practices, planning, lessons learned and a culture that considers all incidents preventable.
- Specific safety policies which will be followed include:
    - Pre-planning for safety, and anticipation of hazards in each operation, will be accomplished through job hazard assessments and through regular workplace inspections.
    - All hazards and incidents must be reported immediately. Hazard abatement will be implemented in a timely manner, and imminent hazards will require immediate abatement.
    - Engineering controls and physical safeguards will be considered first and utilized wherever feasible.
    - Employees will be adequately trained in safety procedures for their job functions prior to commencement of work. Procedures and training will be updated as necessary, and the procedures will be enforced through the company's disciplinary procedures.
    - Necessary personal protective equipment (PPE) will be provided, along with training in its use, limitations, and care.
    - Incidents and accidents will be investigated thoroughly by the Site Safety and Health Officer (SSHO), Health & Safety Manager (HSM), and Project Manager (PM) to find the cause, and the appropriate controls will be implemented.
    - Personnel working on project sites must be familiar with and comply with the provisions of site-specific health and safety plans, including work rules,

specific protective equipment and respiratory protection requirements, decontamination procedures, and medical and exposure monitoring.

ITSI Gilbane management will provide all equipment, time, and resources necessary for a safe and healthy work environment. All employees are expected to read and understand the applicable portions of the Corporate Health and Safety Program, comply with all relevant requirements, and work with management to improve the Program. Failure to meet the expected safety responsibilities will be grounds for appropriate disciplinary action, potentially including termination.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITY

ITSI Gilbane corporate and project safety responsibilities, accountability, and lines of authority are discussed in this section. An organization chart reflecting the lines of authority between ITSI Gilbane and Base Realignment and Closure (BRAC) Program Management Office, West (PMO-West) is presented on Figure 3.

4.1 CORPORATE HEALTH AND SAFETY RESPONSIBILITIES

ITSI Gilbane corporate and project safety responsibilities, accountability, and lines of authority are described in the following subsections.

4.1.1 ITSI Gilbane Company President

The company President has overall responsibility for the success of the Corporate Health and Safety Program. The company President will support and maintain the company's safety program through the following:

- Maintaining an atmosphere within the company that encourages employees to be proactive and innovative in responding to potential workplace hazards, and where reporting of hazards is never discouraged and is never discriminated against;
- Allocating sufficient resources–including funding, staff, training, and equipment–to support a proactive health and safety program; and
- Holding Program Managers, Project Managers and project Site Management staff accountable for both enforcing safety rules and supporting employees in working safely.

4.1.2 Corporate Director, Health and Safety

The Corporate Director of Health and Safety, Ms. Carole Fried, a Certified Industrial Hygienist (CIH) and Certified Safety Professional (CSP), reports to the President and is supported by the Health and Safety staff and managers and supervisors for implementation of this Program. The Director has the authority and responsibility for implementing the provisions of this Program. The Director may delegate specific tasks as needed, but retains the responsibility for seeing that these tasks are carried out. The Director, Health and Safety staff, and all Project Managers/Supervisors and Site Safety and Health Officers (SSHOs) possess the authority to stop work and take measures necessary to protect ITSI Gilbane employees and property.

Specific duties of the Director include:

- Maintaining current information on local, state, and federal health and safety regulations;

- Preparing and distributing company health, safety, and environmental policies and procedures;
- Developing and updating the Safe Work Procedures (SWPs) and inspection guidelines;
- Reviewing and approving Site-Specific Health and Safety Plans (as applicable);
- Acting as liaison with government agencies;
- Arranging workplace inspections/audits and maintaining inspection records;
- Ensuring employees complete the appropriate safety training;
- Performing follow-up to ensure that necessary corrective actions are completed, and maintaining pertinent records thereof;
- Ensuring that an adequate supply of personal protective equipment is available;
- Implementing accident reporting and investigation procedures, and maintaining injury and illness records;
- Reviewing incident/accident investigations, with special emphasis on recordable accidents;
- Determining, with the Safety Committee, appropriate corrective actions in response to findings of accident investigations;
- Providing regular worksite visits to support project activities and audit compliance with corporate health and safety requirements;
- Managing the health and safety recordkeeping;
- Providing support to the loss control efforts for worker's compensation; and
- Assuring that all chemical product safety provisions are followed in offices and on job sites.

The ITSI Gilbane Corporate Director of Health and Safety will provide support to project personnel as needed for questions regarding health issues and site contaminant control.

4.2 Project Health and Safety Responsibilities

The ITSI Gilbane Project Manager (PM), Health and Safety Manager (HSM), Site Safety and Health Officer (SSHO), and subcontractor Site Superintendents are responsible for formulating and enforcing health and safety requirements and implementing the APP.

4.2.1 ITSI Gilbane Health and Safety Manager

The ITSI Gilbane Project HSM is Jeremy Sawyer, CIH, CSP. Mr. Sawyer will review and certify the APP, SSHP, and AHAs, will approve all changes or amendments, and will provide support to site personnel as needed for questions regarding health issues and site contaminant control.

As HSM, Mr. Sawyer has developed the APP, SSHP, and AHAs with the site planning team, and will approve all changes during the course of project activities. The HSM will support the SSHO for questions or problems relating to health and safety concerns at the site. Responsibilities also include reviewing and monitoring compliance with this APP, its components, and other industry standards; implementing corrective measures for health and safety deficiencies; and ensuring required training and medical monitoring of personnel. If changing conditions require revisions/additions to this APP during the course of the project, the HSM will review the issues and, if necessary, issue new directions/changes to this APP. Specific duties of the HSM will include items listed below:

- Approving and providing necessary updates to this APP and its components;
- Providing technical assistance on an as-needed basis;
- Arranging for employee exposure air monitoring as required; and
- Arranging for additional hazard-specific training for employees working on the site, as required.

4.2.2 ITSI Gilbane Project Manager

The ITSI Gilbane PM, Mr. Ed Palser, will have overall responsibility for successful and safe completion of the project, and for management of ITSI Gilbane crews. The ITSI Gilbane PM will be responsible for assuring that ITSI Gilbane project personnel are trained, qualified, and available for their assigned tasks; setting expectations for the safe performance of their work; assuring adequate personal protection, and that all necessary safety equipment is provided. The PM also will be responsible for assuring that all recordkeeping required by the federal or California Occupational Safety and Health Administration (Cal/OSHA) is completed, including inspections, training documentation, and accident reporting and investigation.

4.2.3 ITSI Gilbane Site Safety and Health Officer

ITSI Gilbane has appointed Tony Poon as Site Safety and Health Officer (SSHO) during this project. The SSHO reports directly to the PM. The SSHO will have overall responsibility for overseeing safety for the field activities and will assure that all activities are conducted in strict accordance with the approved Work Plan and APP requirements, while protecting the health and safety of on-site workers. The SSHO will ensure that no work is performed unless a designated Competent Person is present on the job site.

The SSHO will be directly responsible for implementation of and compliance of site personnel with the APP and will be on site at all times. The SSHO will ensure that pre-task safety and health analysis have been performed prior to the start of work. The SSHO will also enforce the minimum requirements of the APP for all personnel on site, including subcontractors. The SSHO will function as the Response Coordinator in case of an emergency. The SSHO has the responsibility and authority to modify and stop work, and to remove personnel from work areas if conditions warrant. Other SSHO responsibilities will include:

- Reviewing, understanding, and administering this APP in the field;
- Conducting health and safety oversight of ITSI Gilbane and subcontractor personnel;
- Monitoring daily weather and site conditions;
- Performing air sampling and monitoring;
- Performing and documenting daily worksite inspections and tracking corrective actions;
- Coordinating and/or conducting daily tailgate health and weekly safety meetings;
- Halting project activities, when necessary, for significant noncompliance with this APP;
- Ensuring proper emergency notifications to client personnel;
- Investigating exposure incidents and injuries;
- Controlling access to the site;
- Completing incident reports, and recommending any changes to engineering controls based on lesson learned or best practices discovered;
- Establishing on-site and off-site communications, including emergency communications with local emergency response organizations; and
- Assisting contractors in implementing recognition and award programs for their workers.

4.2.4 ITSI Gilbane Site Superintendent

ITSI Gilbane Company has appointed Mr. Charles Cronister as Site Superintendent during this project. As Site Superintendent, he will have overall responsibility for implementation of the field activities, and for the health and safety of all site workers and visitors. The Site Superintendent will assure that all activities are conducted in strict accordance with the approved Work Plan requirements and that no work is performed unless a designated Competent Person is present on the job site. He will oversee the work of ITSI Gilbane Company subcontractors, and will communicate directly with the ITSI Gilbane Company PM and client representatives.

4.2.5 Project Workers

All project workers are expected to comply with the requirements of the APP and its components, especially requirements for work practice controls and PPE. They are expected to participate in daily tailgate meetings and other safety programs implemented at the site. Project workers must report all unsafe conditions, accidents, incidents, near misses, and/or injuries that occur at the job site to their supervisors immediately. A written copy of this APP will be available to all workers, and the location and statement of availability will be posted on the project job board.

4.3 LINES OF AUTHORITY

Figure 3 presents a diagrammatic representation of the lines of authority for this project.

4.4 NONCOMPLIANCE WITH SAFETY REQUIREMENTS

All ITSI Gilbane employees are expected to comply with the ITSI Gilbane Corporate Health and Safety Program (CHSP) Chapter 8 Work Rules. Violation of the established work rules will result in disciplinary action, in accordance with the CHSP Chapter 9 Employee Compliance and Discipline Program. Disciplinary actions are of a progressive nature, beginning with oral warning/counseling followed by written warnings/reprimands, suspensions, and ending in termination. In the case of serious violations of safety standards, immediate dismissal may be utilized.

4.5 MANAGERS' AND SUPERVISORS' SAFETY ACCOUNTABILITY

It is the duty of a first-line supervisor to motivate employees to adhere to ITSI Gilbane's safety policy in each work situation. A first-line supervisor is defined for these purposes as that person designated to give immediate on-site supervision to personnel involved in a task. All supervisors will have complete knowledge of the safe procedures for all jobs and tasks under their supervision or, when in doubt, will seek assistance prior to initiating a task. This is the only acceptable manner to perform the task. If the task cannot be accomplished safely, it will not be attempted. Supervisors will:

- Explain the safety procedures involved with a task to employees, using the applicable AHA, and check frequently to see that the employees understand the work as instructed;
- Allocate sufficient time for the training and coaching of all employees to ensure that everyone knows the correct procedure for safely accomplishing required tasks;

- Prevent new employees from performing any tasks until all required training is completed;
- Immediately correct unsafe conditions that involve site employees or subcontractors;
- Ensure that the employees are outfitted with and wear PPE as specified by this APP, its components, and other ITSI Gilbane procedures, or as directed by the HSM;
- Set a good safety example;
- Obtain the cooperation of employees and subcontractors;
- Provide a safe work environment for employees and subcontractors;
- Review contractor safety performance records prior to contract award and monitor contractor performance during operations; and
- Report all accidents, near misses, and property damage.

5.0 SUBCONTRACTORS AND SUPPLIERS

This section discusses ITSI Gilbane's coordination with subcontractors and subcontractor responsibilities.

5.1 SUBCONTRACTORS AND SUPPLIERS

Subcontractors and suppliers will include the following:

- Test America – Testing Laboratory;
- Timmy's Team – Radiation Control Technicians;
- Envirachem – Radiological Safety Lab (Smear Samples)

5.2 SUBCONTRACTOR/SUPPLIER COORDINATION AND CONTROL

Each subcontractor working on the Site will be required to adhere to the APP, SSHP, and the requirements of their own company's Injury and Illness Prevention Program (IIPP). All subcontractors will be screened for safety performance and compliance with federal alcohol and drug testing requirements before being issued any contract for site work. Subcontractors will comply with the specific requirements for site safety as outlined in the SSHP. The ITSI Gilbane Site Superintendent and SSHO will be responsible for the conduct and control of field related work and subcontractors.

5.3 SUBCONTRACTOR/SUPPLIER SAFETY RESPONSIBILITIES

All subcontractor employees are subject to the same training and medical surveillance requirements as ITSI Gilbane personnel, as applicable to their job activities and as outlined in the SSHP. All subcontractor personnel will be required to sign in daily and be required to attend a daily meeting detailing operations and safety issues. Each subcontractor involved in the site activities may be required to submit a work plan to the ITSI Gilbane SSHO detailing its anticipated work procedures and safety precautions. All incidents and near misses involving subcontractor employees will be reported to the ITSI Gilbane SSHO, and a copy of the subcontractor's injury/illness report must be submitted to the ITSI Gilbane SSHO within 24 hours of the incident.

Subcontractors are required to read and sign the SSHP and comply with all requirements of the APP, SSHP, and their own company's IIPP. In the event of a conflict, the most stringent requirement will apply. Subcontractors not in compliance will submit a corrective action plan

detailing their means to achieve compliance. Subcontractors not correcting deficiencies in an appropriate time frame, based on the deficiency, may be dismissed from the Site.

Suppliers delivering various materials to the Site or providing equipment and/or equipment maintenance will comply with all project and HPNS work rules and regulations. Supplier personnel will not be permitted in restricted work areas without the appropriate training and medical monitoring. Subcontractor personnel will not ride on tractors, forklifts, or similar vehicles unless specific seats with seatbelts are provided. They will be required to follow facility hot work rules, as applicable, if hot work is required. Trucks will be loaded and unloaded in a safe and effective manner, and materials will be stored safely only in designated locations. Any packaging material received will be properly disposed, and litter will not be scattered or blown from truck beds. Operators of mobile equipment on the site must observe all traffic rules, such as speed limits and rights-of-way for pedestrians. Any subcontractor operating an ITSI Gilbane vehicle will be required to meet the same safety training requirements as an ITSI Gilbane employee.

6.0 TRAINING

Training and certification requirements for this project are listed below and discussed in detail in Section 5.0 of the SSHP (Appendix B).

- The SSHO will conduct site-specific training with all employees to discuss the following: project activities and potential hazards; key personnel and lines of authority; basic work rules and conditions of access to the site; emergency response procedures and the route to the nearest hospital; accident and hazard reporting requirements; Hazard Communication training for handling chemical products; and PPE requirements, proper use, and limitations.
- Tailgate meetings will be conducted daily.
- Baseline Radiation Awareness Training for all site personnel.
- All personnel entering Exclusion Zones (EZs) will have completed 40-hour Hazardous Waste Operations training, as well as 8-hour annual refreshers as necessary.
- All employees entering EZs must participate in a medical monitoring program in compliance with the OSHA Hazardous Waste Operations Standard, and have medical clearance, training, and fit testing for respiratory protection, if necessary.
- The Site Superintendent and SSHO must have completed the 30-hour OSHA Construction Safety training. The Site Superintendent and SSHO, and the subcontractors' supervisors must have completed an 8-hour training course in Supervision of Hazardous Waste Sites.
- All personnel involved in activities with potential exposure to naturally occurring asbestos must have asbestos awareness training.
- At least two employees with current first aid and cardiopulmonary resuscitation (CPR) certifications must be on site during all working hours.

7.0 HEALTH AND SAFETY INSPECTIONS

This section discusses health and safety inspections that will be carried out during the project.

7.1 INSPECTIONS

Section 10.1.5 of the SSHP (Appendix B) outlines the required inspections for the project. The SSHO will conduct daily safety inspections to determine if operations are being performed in accordance with the SSHP and Navy requirements and regulations. Inspection findings will be recorded on a Daily Activity Report, in SafetyNet or in a project notebook.

The SSHO is responsible for conducting and preparing reports of daily safety inspections of the work processes, site conditions, and equipment conditions and submitting them to the ITSI Gilbane Site Superintendent. The SSHO will discuss any necessary corrective actions with the ITSI Gilbane HSM or representative and will review new procedures. Copies of these reports will be maintained at the project location. Deficiencies also will be documented on the project health and safety assessment summary/deficiency tracking log and posted on the project safety board.

The ITSI Gilbane HSM will conduct site visits and perform site safety audits as necessary. Audit reports will include the number of action items noted during the visit and written confirmation of the corrective actions for each item. Responses will be compiled and provided to program management for review. Inspection findings and corrective actions will be recorded on a Daily Activity Report and/or in Predictive Solutions SafetyNet database.

7.2 EXTERNAL INSPECTIONS/CERTIFICATIONS

ITSI Gilbane does not anticipate the use of outside sources to provide safety inspections. As required, safety equipment will comply with appropriate regulations and standards issued by OSHA, the National Institute for Occupational Safety and Health (NIOSH), the American National Standards Institute, ASTM International, the United States Coast Guard, and other recognized certification organizations.

8.0 ACCIDENT REPORTING

This section describes ITSI Gilbane's methods for tracking work hours, safety incidents, and accident reporting.

8.1 EXPOSURE DATA (HOURS WORKED)

The ITSI Gilbane HSM tracks and maintains incident records including OSHA 300 logs for federal and state reporting requirements. In addition, ITSI Gilbane formally submits a report of work hours including lost workdays, if any, to Naval Facilities Engineering Command (NAVFAC) on a quarterly basis.

8.2 ACCIDENT INVESTIGATIONS, REPORTS, AND LOGS

The SSHO and HSM conduct accident/incident/near miss investigations. Verbal or e-mail notification of the accident or incident will be made to the ITSI Gilbane Health and Safety (H&S) office as soon as feasible following the event. An accident/incident investigation report (ITSI Gilbane Accident/Loss Report form) completed by the SSHO must be submitted to the H&S office within 24 hours. The investigation report will include findings and corrective actions, which will be implemented as soon as reasonably possible. As corrections are made, those actions will be documented. Information on any deficiency and the corresponding corrections will be made available at the ITSI Gilbane site office, and notice of availability will be posted on the project safety board.

8.3 REPORTING ACCIDENTS TO THE CLIENT

All accidents will be reported as soon as possible, but not more than 24 hours after the incident, to the Contracting Officer/Contracting Officer's Representative (CO/COR), Remedial Project Manager (RPM), and Navy Resident Officer in Charge of Construction (ROICC). An accident investigation report will be submitted as soon as possible, but no later than five working days following the accident. Client accident report forms such as a Contractor Significant Incident Report (CSIR) may be required.

8.4 IMMEDIATE NOTIFICATION OF MAJOR ACCIDENTS

ITSI Gilbane will immediately notify the ROICC, RPM, and CO/COR in the following cases: a fatal injury, any injury resulting in permanent total disability or permanent partial disability, hospitalization of 3 or more workers resulting from a single occurrence, property damage equal

to or in excess of $2,000, or an arc flash incident/accident. A full report will be provided within 24 hours. The ITSI Gilbane HSM or Corporate Director of Health and Safety will be responsible for reporting all serious injuries or illnesses to the appropriate Cal/OSHA office within 8 hours of the incident.

8.5 ACCIDENT RESPONSE

Emergency and accident response procedures are detailed in Section 15.0 of the SSHP (Appendix B). The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident, as long as the accident scene is first determined to be safe. The Site Superintendent and SSHO will be summoned and alerted of the medical emergency.

The ITSI Gilbane SSHO will assess the following information:

- Location of the victim at the work site;
- Nature of the emergency;
- Whether the victim is conscious;
- Specific conditions contributing to the injury, if known; and
- Need to transport to the nearest medical facility.

9.0 EM-385-1-1 REQUIREMENTS FOR PLANS, PROGRAMS, AND PROCEDURES

This section presents project-specific information related to requirements listed in the USACE Safety and Health Requirements EM-385-1-1 (USACE, 2008). This section provides a risk assessment of the work to be done based on the scope of work, client-specified health and safety programs, and mandatory federal and state OSHA compliance programs.

ITSI Gilbane will provide personnel with the necessary training and experience to execute this project and SOW safely. Employees will be competent in the respective areas of site work with which they will be involved. The names of individuals identified as Competent Persons in this APP will be forwarded to the client prior to the start of their work activity. Chemical, physical, and biological occupational exposure prevention are addressed in the AHA (Appendix A).

ITSI Gilbane will ensure that suitable PPE is utilized as required by the nature of the job being performed, including but not limited to protective-toe boots, retro-reflective vests, hard hats, safety eyewear, and gloves. Protective clothing will be provided as required. Employees will use the appropriate PPE on any task where there is potential exposure to physical hazards such as equipment operation, noise, objects dropping from above, flying particles, or exposure to toxic or irritating gases, fumes, vapors, liquids, or other materials that may cause respiratory distress or skin irritation. Employees will be trained in the proper use, maintenance, and limitations of PPE.

9.1 LAY-OUT PLANS

Figure 2 indicates the site layout plan. Work zones are identified in Section 11.0 of the SSHP (Appendix B). Public safety will be achieved by the means of site control zones and restriction of access to the work areas to authorized personnel only

9.2 EMERGENCY RESPONSE PLANS

Figure 4 shows the route to the nearest hospital in case of medical emergency. ITSI Gilbane will physically verify the route to the facility prior to initiating site work.

Emergency response plans are briefly described in the subsections below. The SSHP and AHA provide additional details regarding emergency procedures, including the following:

- Emergency contacts and communications;
- Mission critical systems and their management during an emergency or threat;
- Medical emergencies;
- Personal exposure or injury;
- Fire prevention and response;
- Spills or leaks;
- Emergency decontamination;
- Emergency equipment;
- Adverse weather conditions/natural disasters alerting systems and areas of shelter, and;
- Critique and follow-up of emergency procedures.

9.2.1 Procedures and Tests

In the event of a general site emergency (e.g., earthquake, fire, etc.), all personnel will observe site conditions and proceed immediately to the designated Gathering Point (Figure 5) by the most direct route that prevents exposure to the emergency condition. Hand-held two-way radios and/or cell phones will be used as necessary to assist in communication during the emergency. At the Gathering Point, the Site Superintendent and SSHO will be responsible for evaluating site conditions. If evacuation from the Gathering Point is warranted, the signal for evacuation will be three long blasts on a vehicle horn repeated at 15-second intervals. In the event that vehicle horns are not working or not readily available, hand-held air horns will be maintained and used as appropriate. The SSHO or designee will account for all site personnel at the Gathering Point. The Gathering Point will provide a location for everyone to receive additional instructions.

9.2.2 Spill Response Plans

If appropriate, spill receptors such as storm drains will be protected before site work begins. Care will be taken to prevent spills during handling of liquids. Any spill of fuel or chemicals will be contained and cleaned up immediately. Adequate spill response materials, such as sorbents, shovels, and containers, will be maintained near the possible spill area. Used spill materials will be containerized for appropriate disposal. Personnel handling spill materials will be trained in the hazards and protective measures for the materials they will be handling. Drums and other liquid storage containers will be staged near any potential spill site. Any spill will be reported to the client immediately.

9.2.3 Firefighting Plan

Site personnel will not engage in fire-fighting activities beyond the incipient stage. The fire department listed in Table 1 will be called for any fire event. If a fire requires more than one fire extinguisher, site personnel will evacuate the area and wait for the fire department to respond.

9.2.4 Posting of Emergency Telephone Numbers and Hospital Routes

In case of medical emergency, Figure 4 shows the route to the nearest hospital (San Francisco General Hospital [Trauma Center], 101 Potrero Avenue, San Francisco, California; 415-206-8111). ITSI Gilbane will verify the route to the facility prior to initiating site work. St. Luke's Hospital (Emergency Room, 3555 Cesar Chavez Street; 415-641-6625) also may be used in case of medical emergency. ITSI Gilbane will verify the route to the facility prior to initiating site work. All ITSI Gilbane site vehicles will carry a copy of the hospital route and emergency contact telephone numbers. Additional copies will be posted on the site project safety board and in the site trailer.

9.2.5 Medical Support

The SSHO is designated as the first response coordinator for medical emergencies or minor injuries. On-site first response medical support will be provided by personnel trained in first aid, CPR, and bloodborne pathogens (BBP). A minimum of two on-site employees will be certified in CPR, first aid, and BBPs. This requirement may be coordinated with on-site subcontractors. On-site medical support will be provided by local ambulance/Emergency Medical Technician (EMT) services and by the medical facility identified in Table 1 of this APP. Figure 4 of this APP presents the route and directions to the hospital.

If an employee is injured or becomes ill, he or she will be removed from the work area if it can be done safely and without aggravating medical conditions. Minor injuries may be treated by trained personnel at the site. Only individuals currently trained in first aid or a higher level of recognized emergency care shall render this type of assistance.

Personnel designated to provide first aid to injured workers will receive training and information on BBPs. BBP training also may be provided during first aid or CPR certification courses. Affected individuals will be advised of the hazards and modes of transmission of BBPs and offered the option of receiving a Hepatitis B vaccination series. The site first-aid kit(s) will be

outfitted with universal precaution protective gear for prevention of exposure to BBPs during treatment of injured workers. Any items that come in contact with blood or other body fluids will be "red bagged" and disposed as medical waste. Each employer having designated first aid responders on site must maintain its own Bloodborne Pathogens Exposure Control Plan.

Injuries requiring more than first aid will be transported to the medical facility designated on Figure 4. Depending on the nature of the injury, site personnel may be transported in site vehicles or by ambulance. All life-threatening injuries will require contacting emergency responders and transport by ambulance.

Whenever possible, personnel injured on site who have been handling chemicals will be decontaminated prior to transport to the medical facility, so long as such procedures do not further compromise the health and safety of the injured individual. Emergency employee decontamination should consist of removing protective clothing and washing with soap and water as necessary. Protective clothing should be cut away to minimize injury to the injured person, if necessary. The receiving facility will be warned that a contaminant-compromised victim is being transported so they can prepare for that arrival.

9.3 DRUG AND ALCOHOL ABUSE PREVENTION

ITSI Gilbane is committed to a drug- and alcohol-free workplace. Pre-employment, reasonable cause, and client-specific drug and alcohol testing is part of ITSI Gilbane's overall substance abuse program. Post-accident drug and alcohol testing may be a requirement where not prohibited by state or local laws or when required under the contractors own health and safety plan protocols. All truck drivers must meet Department of Transportation (DOT) testing requirements.

9.4 SITE SANITATION

A Site Sanitation Plan is not required, based on the current SOW. ITSI Gilbane will provide potable drinking water, on-site toilets, hand washing facilities, and appropriate waste disposal for site employees. Toilets will be conditioned for the expected weather. If vermin are suspected, provisions will be made to eliminate them.

9.5 ACCESS AND HAUL ROAD PLAN

Access and haul roads in the vicinity of the project site will be demarcated in advance of site activities. Site vehicles will be operated by ITSI Gilbane, subcontract personnel, and vendors using safe driving and parking practices.

9.6 RESPIRATORY PROTECTION PLAN

The SSHP (Appendix B) details the medical monitoring, training, fit testing, and air monitoring requirements for the project work. The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. Based on historical air monitoring data collected from previous HPNS transport and disposal projects occupational exposure levels are not expected to exceed OSHA permissible exposure limits (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) as well as applicable corresponding action levels (ALs), short-term exposure limits (STELs) and ceiling limits (CLs). Historically, the engineering and/or administrative exposure controls detailed in the AHA have effectively controlled potential airborne hazards. Due to these conditions, respirators are not expected to be required at any time on this project; therefore, a site-specific Respiratory Protection Plan is not necessary under the terms of EM385-1-1. If conditions change in the future, and it is determined by the SHO and HSM/CIH that respiratory protection is required, a site-specific Respiratory Protection Plan will be added to the appropriate sections of the APP, SSHP, and AHA and resubmitted for approval.

As directed by the Hunters Point Basewide Dust Control Plan (Tetra Tech ECI [TtECI], 2009), the SSHO will conduct air monitoring to verify that site workers as well as residents of the surrounding community are adequately protected against respiratory hazards, in the form of real-time worksite air monitoring. In consultation with the HSM/CIH, the SSHO will determine if personal or additional monitoring is required to evaluate the potential for personnel exposure. Though not anticipated, any air monitoring results that exceed the action levels established for this project (see SSHP) or the Cal/OSHA permissible exposure limits will be reported immediately to the HSM/CIH, who will evaluate the results. If the evaluation finds elevated results, personnel monitoring as well as respiratory protection may be required. The ITSI Gilbane Respiratory Program Manager, in consultation with the HSM will periodically oversee

and evaluate the implementation of the APP/SSHP/AHA to determine its continued effectiveness with regard to respiratory protection.

9.7 HEALTH HAZARD CONTROL PROGRAM

The AHA (Appendix A) addresses the hazard evaluation for proposed site activities. The AHA will serve as the initial certification of hazard assessment. The AHA is an ongoing process from initiation of the APP to implementation and completion of fieldwork. The second phase consists of further analysis in the field and updating of the AHA as necessary. The SSHO, in consultation with the HSM, will update the AHA when site conditions or potential hazards change. The updated AHA will be reviewed with all site employees during the daily tailgate safety meeting.

9.8 HAZARD COMMUNICATION PROGRAM

Section 10.1.6 of the SSHP (Appendix B) describes the Hazard Communication Program and procedures to be followed on site. This includes on-site maintenance of the updated material safety data sheet (MSDS) for each chemical product that may be required during site operations; review of the appropriate safety precautions with site employees; labeling of all chemical containers; and proper storage of all chemical products.

9.9 PROCESS SAFETY MANAGEMENT PLAN

Based on the current SOW, a Process Safety Management Plan is not currently required.

9.10 LEAD ABATEMENT PLAN

The current SOW does not include lead abatement; however lead contamination is commonly present in HPNS soils designated for off-site disposal. Based on the work practices to be implemented for dust control, any potential lead exposure is anticipated to be less than the federal OSHA and Cal/OSHA Action Level (<30 micrograms per cubic meter [ug/m^3]); therefore, a Lead Abatement Plan is not required. All site workers will receive lead awareness training in accordance with OSHA regulations. Based on the work practices to be implemented for dust control and ITSI Gilbane historical data collected from this site, any potential lead exposure is anticipated to be well below regulatory exposure limits.

9.11 ASBESTOS ABATEMENT PLAN

The current SOW does not include asbestos abatement; therefore, an Asbestos Abatement Plan as specified in EM-385-1-1 is not required for the project. Naturally occurring asbestos (NOA) materials are present on the Site. Based on the work practices to be implemented for dust control and ITSI Gilbane historical data collected from this site, any potential asbestos exposure is anticipated to be well below regulatory exposure limits.

9.12 RADIATION SAFETY PROGRAM

Activities conducted at several locations will be performed at radiologically-impacted sites as designated by the Historical Radiological Assessment (HRA) Volume II (NAVSEA, 2004). All work activities in those areas will therefore be conducted in accordance with the Base Wide Radiological Work Plan, Rev.1 (TtECI, 2007) and the ITSI Gilbane Radiation Protection Plan (Appendix B of the Project Execution Plan).

9.13 ABRASIVE BLASTING PLAN

An Abrasive Blasting Plan is not required, based on the current SOW.

9.14 HEAT/COLD STRESS MONITORING

Heat and cold-related illnesses are common occupation hazards related to work situations involving either high or low ambient temperatures, physically demanding work, and work in impermeable clothing. The ITSI Gilbane Heat and Cold Stress SWP will be implemented in compliance with the ITSI Gilbane IIPP. The SWP describes the responsibilities of Project Management, Site Supervisors, the SSHO, and employees with regard to heat and cold stress.

9.14.1 Heat Stress

In order to control heat stress hazards, a combination of the following practices will be implemented based on site conditions:

- Medical evaluations for field employees to identify risk factors that could make the individual more susceptible to heat illness, and to evaluate medical fitness for duty in hot environments or while wearing protective clothing or respirators.
- Training of site workers to recognize high-hazard conditions, heat stress symptoms, contributing factors to heat related injuries (i.e., avoiding alcohol intake, etc.) and prevention techniques.
- Use of the buddy system by site workers, including monitoring of themselves and their buddies for symptoms of heat stress and encouraging fluid intake.

- Encouraging workers to drink water before they are thirsty, and providing ready access to potable water at all times. Studies have shown intake of adequate quantities of water to be the most important factor in preventing heat illness. At least one quart of potable water per worker per hour must be provided during work situations where the potential for heat illness exists.
- Providing electrolyte fluids as needed for extreme heat or work situations.
- Adjusting the time of operations to cooler periods whenever possible.
- Use of mechanical equipment whenever possible in hot environments to reduce physical workload.
- Providing shaded areas for breaks, and enclosed, air-conditioned cabs for equipment whenever possible. Shade must be readily available whenever the predicted high temperature for the workday will be greater than 85°F. The predicted temperature is that predicted by 5pm the previous day, according to the National Weather Service. If the prediction on the previous day is for the temperature high for the area to exceed 85°F then the shade must be up as of the beginning of the shift and present throughout. The Site Supervisor or SSHO will monitor the temperature throughout the day. If the temperature exceeds 90°F, then the shade must actually be present regardless of the previous day's predicted high.
- Rotation of personnel in and out of physically demanding jobs whenever possible.
- Adjusting the work rate and break schedule according to ambient conditions, workers' acclimatization, workload, and level of protective clothing/respirators. Unacclimatized workers should start at a lower work rate, and gradually increase each day.
- Performing monitoring as an additional means of hazard assessment and adjusting the work/rest schedule. This may include ambient monitoring (temperature, humidity, solar radiation) and/or worker physiological monitoring. Physiological monitoring may include monitoring of worker body temperature, respiratory rate, or resting heart rates.
- Resting pulse rate monitoring, with subsequent adjustments to the work/rest schedule, performed as follows:
    - Count the wrist pulse during a 30-second period as early as possible in the rest period:
    - If the heart rate exceeds 110 beats per minute (BPM) at the beginning of the rest period, shorten the next work cycle by one-third, and keep the rest period at 10 - 15 minutes.
    - If the heart rate still exceeds 110 BPM at the next rest period, shorten the next work cycle by one-third and keep the rest period the same.
    - If the heart rate still exceeds 110 BPM at the next rest period, shorten the following work cycle by one-third and keep the rest period the same.
    - It should be noted that this schedule is for work performed without impermeable protective clothing.
- Cooling devices such as ice vests and cool deluge showers may be implemented on a site-specific basis.

9.14.2 Cold Stress

Cold stress preventive measures should be implemented prior to the exhibition of any signs or symptoms. When the ambient air temperature (allowing for wind chill) falls below 40°F, the following requirements will apply:

- Medical evaluations for field employees to identify risk factors that could make the individual more susceptible to cold stress, and to evaluate medical fitness for duty in cold environments.
- Training of site workers to recognize high-hazard conditions and cold stress symptoms, and to avoid alcohol intake.
- Workers should utilize the buddy system, and monitor themselves and their buddies for symptoms of cold stress.
- Adjusting the time of operations to warmer periods whenever possible.
- Utilization of enclosed, heated cabs on equipment whenever possible.
- Providing a warm and dry place of refuge to employees, and give them adequate opportunities to warm themselves during the work day, especially if their clothes become wet or if they exhibit symptoms of hypothermia or frostbite.
- Shielding the work area if possible, if wind chill is a factor.
- Ensuring that employees are attired in the weather-appropriate clothing. This includes:
    - Outer protective layer that is water and wind-repellant, but which provides for ventilation to allow perspiration to escape;
    - Insulating layer of wool or synthetic materials;
    - Moisture-wicking layer next to the skin (i.e., materials such as polypropylene);
    - Socks of materials such as wool or synthetic materials;
    - Gloves that protect from both wind and water;
    - Hard-hat liners to protect ears and minimize heat loss from the head;
    - Protection of the face as necessary; and
    - Boots that protect from water, as necessary.
- If clothing becomes wet, workers should change into dry clothes as soon as possible.
- Workers whose clothing becomes drenched in water should immediately be moved to a dry, warm location, where they should change into dry clothing, and be treated for hypothermia as necessary.
- Metal handles of tools and control bars should be covered by thermal insulating materials when temperatures fall below 30°F.
- Workers should eat proper meals and drink warm drinks as necessary.

9.15 CRYSTALLINE SILICA MONITORING PLAN

The risk of exposure is greatest when site workers chip, cut, grind, or drill objects that contain crystalline silica. On a construction site, the most common activities that potentially generate silica dust include: abrasive blasting with sand to remove paint and rust, jackhammering, rock/well drilling, concrete mixing, concrete drilling, and brick and concrete block cutting and sawing.

Water will be proactively applied during such intrusive activities to minimize silica dust generation. The quantity of water applied will be controlled to ensure slip hazards are not created. Appropriate PPE such as Tyvek coveralls, gloves, safety glasses and/or face shield and NIOSH approved respiratory protection will be worn, if necessary, for protection against silica dust. The HSM will determine the appropriate level of respiratory protection based on the SOW and exposure control strategies (local exhaust, wet methods, etc.) implemented. As a minimum, N95 NIOSH certified respirators will be available to site workers who wish to voluntarily wear them when not required based on silica dust hazard assessments. Employees voluntarily using N95 respirators will receive a copy of 29 CFR 1910.134 Appendix D (Mandatory) Information for Employees Using Respirators When Not Required Under Standard. If there is the chance of dust, note that the use of appropriate dust controls will eliminate the hazard and need for a written program.

9.16 NIGHT OPERATIONS LIGHTING PLAN

A night operations lighting plan is not required, based on the current SOW.

9.17 FIRE PREVENTION PLAN

Fire-prevention procedures are discussed in the SSHP and AHA. Fire prevention will be accomplished by the use of inspections and permit systems for all spark- or flame-producing activities. Areas adjacent to heat-producing equipment will be kept free from accumulations of oil, fuel, or other flammable materials, following good housekeeping procedures. Combustible materials will not be allowed to accumulate and will be containerized as generated for removal that day. Fire extinguishers will be readily available (see below table). The fire extinguishers will be inspected monthly by the SSHO or a contracted service and replaced if not in proper working condition.

Fueling of all equipment will be performed in a safe area, away from combustible materials or sources of ignition. Gasoline cans will not be filled in the back of pickup trucks. All site vehicles will be equipped with fire extinguishers no smaller than 10-ABC. All hot work (including grinding) will be performed with the appropriate daily permits. One-hour fire watches will be required, and personnel will understand how to properly operate fire-extinguishing systems and make emergency notifications. Trained personnel may utilize the appropriate extinguisher to attempt to extinguish an incipient stage fire only. If a fire requires more than one fire extinguisher, all personnel will evacuate the area and wait for the local Fire Department to respond.

Fire Extinguisher General Guidelines

Location	Type and Size	Notes
Vehicles and equipment	10lbs-ABC	Must be secured in holder
Compressed gas cylinder staging	20 lbs -ABC	Must be near but not immediately adjacent to or within staging area
Structures undergoing work	20 lbs -ABC	At least one adjacent to stairwells (per floor)
Office and trailers	20 lbs -ABC	Immediately inside common entrance
Fuel container storage areas	20 lbs -BC	Must be near but not immediately adjacent to or within staging area
Fuel dispensing or service truck (truck mounted saddle tank)	20 lbs #-BC	Must be protected from weather if mounted on exterior
Propane storage	20 lbs -BC	Must be near but not immediately adjacent to or within staging area

NOTE: All exterior fire extinguishers will be protected from the elements and their locations marked with obvious signage. This chart is not intended for formal fueling locations or fuel-carrying vehicles.

If temporary heating will be provided (construction or warming shelter), a plan for the safe installation and monitoring of that heat source will be provided by ITSI Gilbane for client review

All site employees will follow the SWP for Fire Protection and Response (Appendix C).

9.18 WILD LAND FIRE MANAGEMENT PLAN

A Wild Land Fire Management Plan is not required based on the current SOW.

9.19 HAZARDOUS ENERGY CONTROL PLAN

Hazardous energy will be controlled using the ITSI Gilbane SWPs for Electrical Safety and Power Tools and Lockout/Tagout. Prior to use of Lockout/Tagout, a tailgate meeting will be held to assure that all personnel performing the work or affected by the work are aware of exactly what is being done, and the safety requirements that may apply to the work. Energized

electrical work is not permitted. An energy control plan is also required when equipment is serviced on site. A specific plan for control of energized systems will be coordinated by ITSI Gilbane and each exposing contractor and reviewed with ROICC prior to any work. This planning session must follow the protocols established by the USACE EM 385-1-1 Safety and Health Requirements Manual, Section 12, and all codes and standards referenced.

9.20 CRITICAL LIFT PROCEDURES

Critical Lift Plans are not required, based on the current SOW. All regular and routine lift operations will be pre-planned, the proper equipment will be selected and inspected, and a maximum acceptable wind speed will be agreed upon for each lift sequence. Only qualified personnel will be used and a pre-lift meeting held to ensure the success of the lift operation.

9.21 CONTINGENCY PLAN FOR SEVERE WEATHER

Contingency Plans for severe weather are included in the AHA. That analysis is based on site-specific controls and will include:

- When to discontinue work and seek shelter in severe weather conditions like high winds or heavy rain, if lightning is observed, or if thunder is heard;
- Determining the best shelters including those made available by the client;
- Site readiness considerations like empty fuel tanks and securing of equipment/materials (e.g., supplies on a roof) for coming storms;
- Monitoring of available site warning systems and/or National Oceanic and Atmospheric Administration (NOAA) weather system alerts; and
- Warning procedures to those in the field to stop work and seek shelter.

9.22 FLOAT PLAN

A Float Plan is not required based on the SOW.

9.23 SITE FALL PROTECTION AND PREVENTION PLAN

A Fall Protection Plan is required whenever personnel will be working at heights greater than 6 feet above the next level. This plan will be re-evaluated every six months. ITSI Gilbane has implemented a 100% fall protection policy, which includes “zero tolerance.” As such, with the sole exception of portable ladders, any personnel who may be exposed to a fall of 6 feet or greater must use personal fall protection. The “zero tolerance” aspect of the policy means that any person who fails to comply with fall protection requirements will be removed from the job

site. No job site exceptions to this policy are permitted without consultation with the HSM. Each person performing work in a mobile elevated work platform (e.g., scissor lift, boom lift) shall tie off using an OSHA-compliant harness and lanyard specified by the manufacturer at all times. Anchor points for lift buckets or trucks must be rated for such a purpose; lanyards must not be attached to the rail of the lift.

Scaffolding will be constructed and inspected by a Competent Person. Each such worker will have undergone training on each of the required PPE items that the worker is to use during the performance of task six (6) feet or more above ground. Fall protection will comply with OSHA 29 CFR 1926 Subpart M (all applicable sections) and with USACE EM 385-1-1, Section 21 as applicable. Subcontractors will provide ITSI Gilbane with a site-specific fall protection plan to be approved by the HSM and the client before tasks requiring fall protection take place.

9.24 DEMOLITION PLAN

There is no anticipated demolition of structures, based on the current SOW.

9.25 EXCAVATION/TRENCHING PLAN

Based on the scope of work an excavation plan is required and will be submitted prior to any excavation activities taking place.

Excavation and/or trenching will be conducted in accordance with ITSI Gilbane's SWP. All excavation locations will be evaluated for underground utilities. A Dig Permit will be obtained from existing site information prior to any excavation. The USA North Regional Utility Notification Center (811) will be notified at least two days prior to the start of any excavation regardless of location. All locations will also be evaluated for aboveground and overhead utilities and the intended area clearly marked in white paint or flags. All marking must be maintained. Hand excavation must precede equipment use within 3 feet.

All excavations must be adequately protected from cave-in through sloping, benching or shoring. These protective measures must comply with all Cal-OSHA requirements, based on soil type, moisture content, presence of water, presence of shear planes, and other risk factors. Site personnel will not enter any excavation deeper than 4 feet until appropriate slope protection

measures are in place and the Competent Person has determined the conditions are acceptable for entry.

9.26 EMERGENCY RESCUE (TUNNELING)

Tunneling is not anticipated, based on the current SOW.

9.27 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

An Underground Construction Fire Prevention and Protection Plan is not required, based on the current SOW.

9.28 COMPRESSED AIR PLAN

A Compressed Air Plan is not required, based on the current SOW.

9.29 FORMWORK AND SHORING ERECTION AND REMOVAL PLANS

Formwork and Shoring Erection and Removal Plans are not required based on the current SOW.

9.30 PRECAST CONCRETE PLAN

A Precast Concrete Plan is not required, based on the current SOW.

9.31 LIFT SLAB PLAN

A Lift Slab Plan is not required, based on the current SOW

9.32 STEEL ERECTION PLAN

A steel erection plan is not required, based on the current SOW.

9.33 SITE HEALTH AND SAFETY PLAN FOR HAZARDOUS, TOXIC, AND/OR RADIOACTIVE WORK

An SSHP is required based on the current SOW. It can be found in Appendix B.

9.34 BLASTING PLAN

A Blasting Plan is not required, based on the current SOW.

9.35 DIVING PLAN

A Diving Plan is not required, based on the current SOW.

9.36 CONFINED SPACE PROGRAM

Confined space entry is not anticipated, based on the current SOW. If confined space entry becomes necessary due to project conditions, ITSI Gilbane's Confined Space Entry Program (Appendix C – Safe Work Procedures/Confined Space Entry SWP 2011) will be followed and a site specific confined space entry plan will be developed."

10.0 RISK MANAGEMENT PROCESSES

10.1 ACTIVITY HAZARD ANALYSIS

Detailed project specific hazards and controls for each major phase of work or work activity are described in the Activity Hazard Analysis (AHA) found in Appendix A.

Before initiating a work activity presenting hazards not previously identified in the initial AHA, the SSHO will complete an amended AHA in consultation with the HSM. Should the job requirements change; the AHA will be updated promptly to address any new hazard. Site personnel involvement in AHA development will be encouraged. The AHA will describe ways to safely mitigate classic safety hazards, and chemical, physical, and biological hazards. All personnel involved in a task will review the AHA before performing the task. This review will be appropriately documented. Upon commencement and throughout the activity, the AHA will be used to verify compliance with the prescribed hazard controls and to note any potential changes in process and, therefore, potential hazards.

10.2 SAFE WORK PROCEDURES

ITSI Gilbane's SWPs will also be used to assist in the identification and implementation of appropriate hazard control measures. SWPs may be referenced throughout the APP and its attachments, appendices and supplemental plans.

10.3 ACCIDENT PREVENTION SIGNS, TAGS, AND LABELS

Standard accident prevention signs, tags, and labels will be used to communicate hazards and precautions in accordance with Section 8 of EM 385-1-1. Examples that may be used include:

- A project sign, including running injury-free record;
- Danger, warning, and caution signs;
- Work zone signs;
- PPE requirement signs;
- Lockout/tagout tags;
- Inspection and Do Not Use tags;
- Overhead electrical lines or other overhead hazards; and
- National Fire Protection Association or Hazardous Materials Identification System signs and labels.

Specific items will be determined by the SSHO or described in the AHA.

10.4 SAFETY AND HEALTH BULLETIN BOARD

ITSI Gilbane will erect and maintain a project safety and health bulletin board in an area commonly accessed by workers. The bulletin board will be kept current, in clear view of on-site workers, and protected against the elements and unauthorized removal. It will contain at least the following safety and health information:

- Map denoting the route to the nearest emergency care facility;
- Emergency phone numbers;
- Copy of the current APP mounted on or adjacent to the bulletin board (or instructions to its location), which will be accessible on the site by all workers;
- Copy of current AHAs mounted on or adjacent to the bulletin board (or instructions to its location), which will be accessible on the site by all workers;
- OSHA Form 300A (posted from February 1 through April 30 of each year) on or adjacent to the bulletin board;
- Safety and health promotional posters;
- Date of last lost workday injury;
- OSHA safety and health poster; and
- Copy of Safety and Occupational Health Deficiency Tracking Log mounted on or adjacent to, the bulletin board (or instructions to its location) where it will be accessible by all workers upon request.

11.0 REFERENCES

Naval Sea Systems Command (NAVSEA), 2004. Final Historical Radiological Assessment (HRA) Volume II, Hunters Point Shipyard.

Innovative Technical Solutions, Inc. (ITSI), 2005. Corporate Health and Safety Program. October.

Tetra-Tech, E.C.I. (TtECI), 2007. Base Wide Radiological Work Plan, Rev.1, Hunters Point Shipyard. October.

United States Army Corps of Engineers, 2008. Safety and Health Requirements Manual, EM-385-1-1. November.

Tetra Tech, ECI (TtECI), 2009. Final Basewide Dust Control Plan, Hunters Point Naval Shipyard. June.

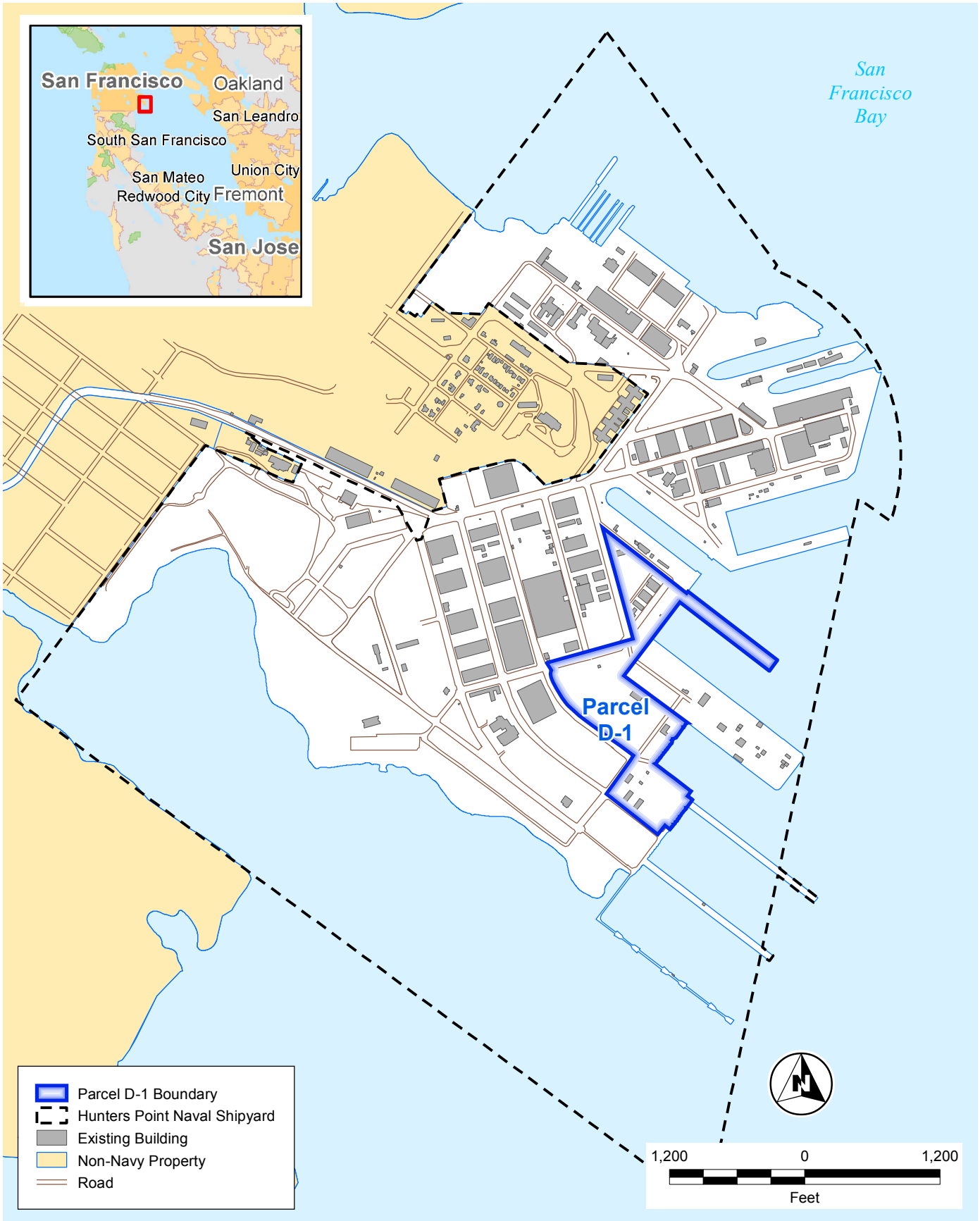
TABLES

Table 1

Emergency Telephone Numbers

Contact	Phone Number
Activity Point of Contact: Doug DeLong, BRAC Field Team Leader Caretaker Site Office Mel Asuncion, BRAC Field Team Caretaker Site office	 (415)743-4713 (415)743-4721
U.S. Navy ROICC Contacts: Mr. Peter Stroganoff Mr. Andrew Uehisa Ms. Shirley Ng	510-755-6828 510-755-5875 510-749-5939
Police Department	911
Fire Department	911
San Francisco General Hospital (Trauma Center) 1001 Potrero Ave San Francisco, CA 94110	415-206-8111
St. Luke's Hospital (Emergency) 3555 Cesar Chavez Street San Francisco, CA 94110	415-641-6625
Poison Control	800-222-1222
ITSI Gilbane Company Mr. Ed Palser (Project Manager) Mr. Tony Poon (SSHO) Mr. Charles Cronister (Site Superintendent) Mr. Jeremy Sawyer (HSM)	 505-400-4076 925-765-1034 925-250-7945 303-204-3896
Office of Emergency Services, Coastal Region – Help Desk	510-286-0895
Regional Water Quality Control Board (RWQCB) – Reception	510-622-2300

FIGURES



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ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Parcel D-1 Vicinity Map

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2
Site Layout Map

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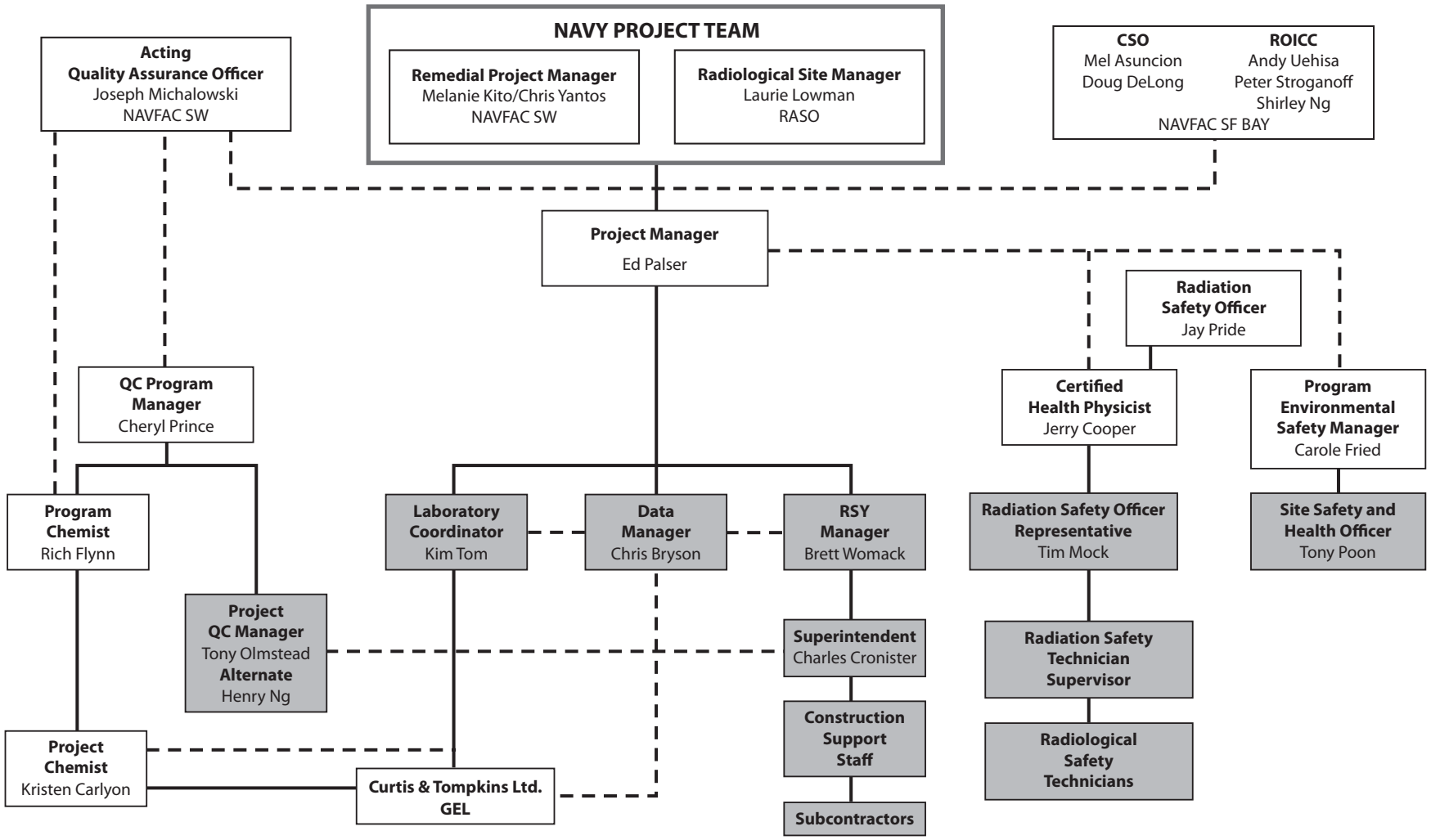

Abbreviations and Acronyms:

CSO - Contractor Site Officer
NAVFAC SW - Naval Facilities Engineering Command Southwest
RASO - Radiological Affairs Support Office
ROICC - Resident Officer in Charge of Consturction
RSO - Radiation Safety Officer
RSY - Radiological Screening Yard
QC - Quality Control
SF - San Francisco

Formal reporting relationship
Supporting relationship

Staff in shaded boxes are on-site and responsible for field implementation of activities under the Execution Plan.

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 3
Project Organization Chart

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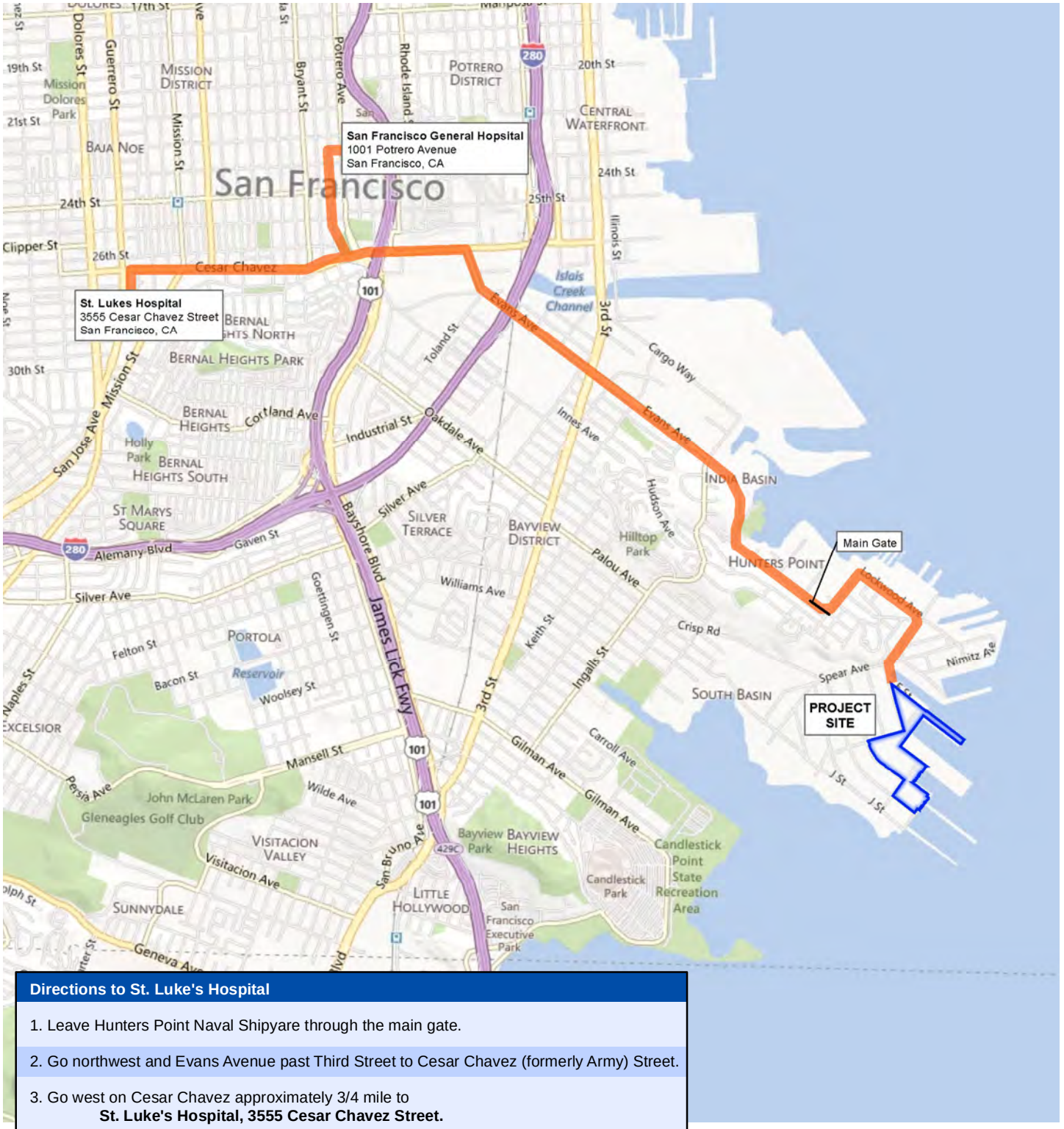

Directions to St. Luke's Hospital
1. Leave Hunters Point Naval Shipyare through the main gate.
2. Go northwest and Evans Avenue past Third Street to Cesar Chavez (formerly Army) Street.
3. Go west on Cesar Chavez approximately 3/4 mile to **St. Luke's Hospital, 3555 Cesar Chavez Street.**

Directions to San Francisco General Hospital (Alternate)
1. Follow instructions 1 through 3 above.
2. From Cesar Chavez Street go north on Potrero Avenue approximately 1/2 mile to **San Francisco General Hospital, 1001 Potrero Avenue.**

Basemap © 2010 NAVTEQ © AND © 2012 Microsoft Corporation

3,000 0 3,000
Feet

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 4
Route to Hospital

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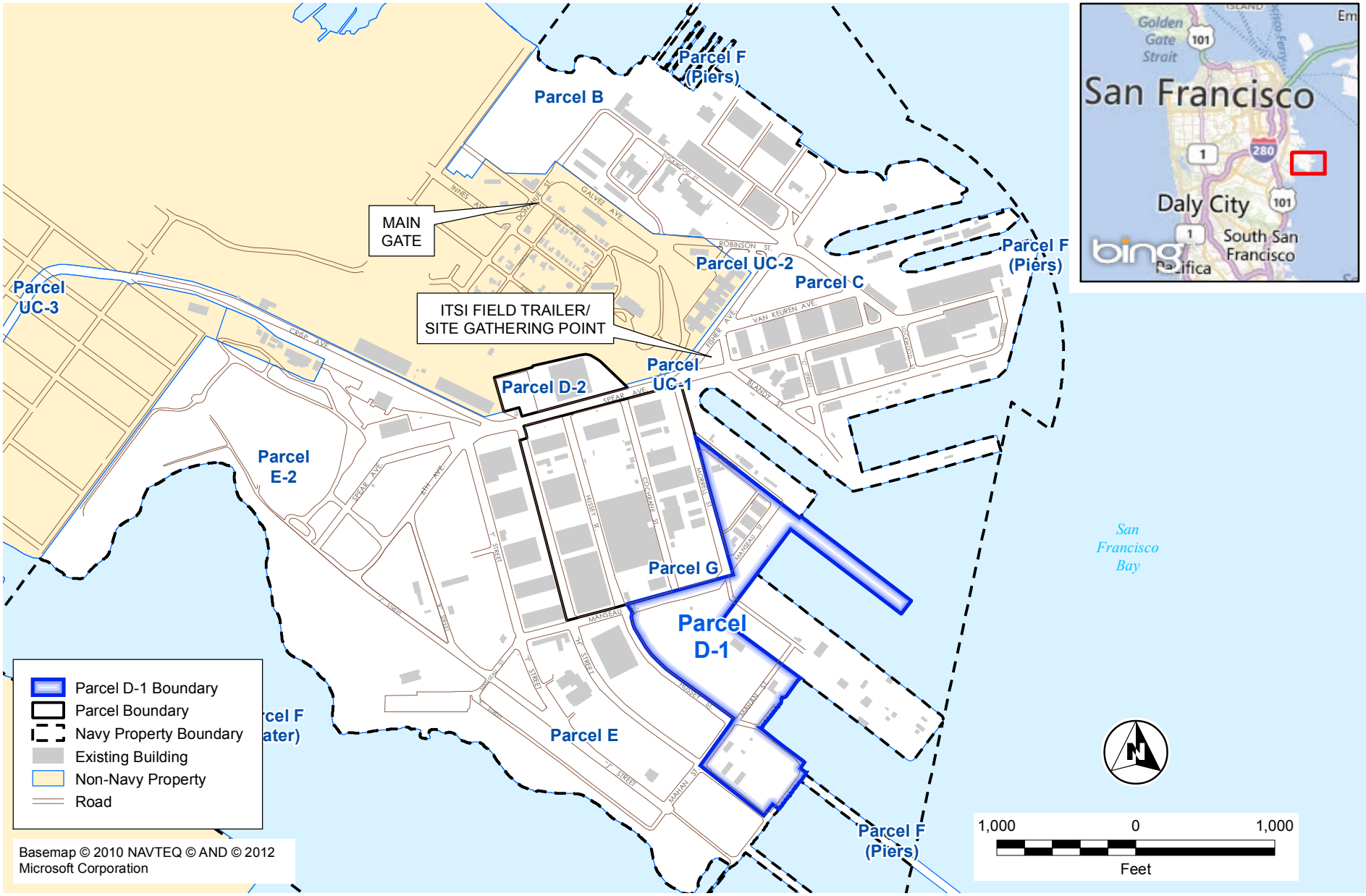

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 5
Emergency Gathering Point

APPENDIX A

ACTIVITY HAZARD ANALYSIS (AHA)

Appendix A
Radiological Remediation and Support
Activity Hazard Analysis

Analyzed By: Jeremy Sawyer *Date:01/02/2013*

Checked By: Ed Palser *Date:01/15/2013* Edited:

Location:	**Contract No:**	**Project Title:**
Hunters Point Parcel D-1	N62473-10-D-0808 CTO 0004	Radiological Remediation and Support
Activity:	**Prime Contractor:**	**Subcontractors:**
Radiological Investigation and Remediation	ITSI Gilbane Company	• Test America – Testing Laboratory; • Timmy's Team – Radiation Control Technicians; • Envirachem – Radiological Safety Lab (Smear Samples)

General Description for Scope of Work of This Activity:

- Perform the radiological investigation and any remediation necessary to achieve free release, and final status surveys of the ship berths adjacent to Parcel D-1.
  - Remove, sample, survey, remediate, backfill, and restore a minimum of 5,700 lineal feet of sewer and storm drain line.
  - Conduct surveys of Parcel D-1 Ship Berths to support the Final Status Survey (FSS) goal and free-release of the site. Survey work may require asphalt removal to support clean closure. Contaminated areas will be remediated and re-surveyed to support clean closure.
  - Radiologically survey and release several large stockpiles of rail ties from radiological controls.

RAC = Risk Assessment Code Matrix **RAC for Project=M**

RISK ASSESSMENT CODE (RAC) MATRIX				
HAZARD PROBABILITY	HAZARD SEVERITY			
FREQUENCY OF OCCURRENCE	CATASTROPHIC	CRITICAL	MARGINAL	NEGLIGIBLE
FREQUENT	E	E	H	M
LIKELY	E	H	M	L
OCCASIONAL	H	H	M	L
SELDOM	H	M	L	L
UNLIKELY	M	L	L	L

Hazard Risk Assessment Code (RAC)	Risk Level	
Probability is the likelihood to cause an incident, near miss or accident & identified as: *Frequent, Occasional, Seldom* or *Unlikely*	E= Extremely High Risk	M= Moderate Risk
Severity is the outcome/degree if an accident did occur & is identified as: *Catastrophic, Critical, Marginal or Negligible*	H= High Risk	L= Low Risk

Date of Pre-Construction Meeting:

Estimated Start Date of Site Activity:

Table of Contents	
Activity	**Competent Person(s)**
• Mobilize and demobilize all equipment, materials, and personnel for the field effort. • Radiological surveys and sampling • Civil surveys, identification and tracking • Excavating soil, removing piping systems and transport and disposal • Backfill and site restoration	ITSI Gilbane SSHO must have: • OSHA 30Hr Construction Training • 40Hr Hazwoper and 8Hr. Supervisor training with current refreshers • CPR, First Aid, Bloodborne Pathogen training, **Excavation Competent Person:** **Charles Cronister - Phone Number: 925-250-7945** **Fall Protection Competent Person:** **Tony Poon – Phone Number: 925-765-1034** **NOTE:** *Where a contractor competent person is required (i.e. excavation, fall prevention, confined space, etc.) that individual's qualifications will be submitted for review by ITSI Gilbane.*

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• General site activities such as mobilization, site inspection, material handling, and equipment maintenance. **NOTE**: *All equipment arriving, including rentals must be functioning correctly and in current calibration, and in new or like new condition. The ITSI Gilbane site superintendent or SSHO and responsible contractor will review the equipment as it arrives and document acceptance or refusal per Section 18.8.03 Inspections of the Army Corps EM 385.1.1 Safety and Health Requirements Manual and ITSI Gilbane Safe Work Procedures*	• Slips, trips, falls • Falls from same level • Falls from improper access to area or elevation • Falls from and through openings or holes Tube Rack Metal Tote	• Watch where you walk, place your feet and observe possible traffic patterns (where machines are working, traffic lanes and the public is passing) before entering any area. • Follow good housekeeping practices – no accumulation of tools, materials or debris is allowed on a walking or working surface. **Containerize waste or debris immediately. The "nothing hits the ground" policy will be tracked to eliminate clutter and trips.** • Establish walkways and materials storage areas, barricade or identify as needed and maintain • Establish and properly store materials using containers racks or like devices. See examples. • Remove, cover, or barricade identified hazards prior to any work in those areas. • Step carefully when leaving any elevated work platform, stairs or ladders • Wear well-fitted safety boots with good tread and well defined heel. Steel erectors etc. may use alternate sole. • Provide safe access through rated stairs or work platforms • Loose materials are to be delivered and handled in suitable containers for ease of movement and to limit handling of materials.	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Vehicle and equipment accidents • Struck-by or crushing accidents with ground personnel • Contact with overhead power • Vehicle rollover • Falls from equipment • Struck-by - backing • Struck-by – site workers • Struck-by - collisions with objects or personnel	General: • Establish and demarcate vehicle and equipment routes. • Assure all equipment has operational backup alarms. Ground personnel: • Wear ANSI Class 2 reflective vests. • Maintain line of sight with operators when approaching equipment. • Observe vehicle/equipment routes before entering site. • Stay out of swing radius of equipment. • Stay out of equipment areas if possible. • NEVER stand under suspended loads. Operators: • Operate vehicles/equipment within the speed limit and at a safe speed for current conditions or when troops are alongside roadways. • Wear seat belts at all times. • Check mirrors and blind spots on an ongoing basis. • Use spotters during dumping, backing, when near overhead power lines, or with limited visibility. • Establish and use appropriate hand signals • Do not let equipment run unattended. • Secure loads on trucks. • Perform repairs in a safe location. • Maintain at least a 10-foot distance from overhead power lines with “look-up” signs at approaches	M
	Fire and fueling hazards	• Smoke only in designated areas, and never during fueling	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	• Fire and fueling hazards • Exposure -burns **Note:** *Specific, documented awareness training will be held by ITSI Gilbane with all crews completing any heat producing activities. The topics will include but not be limited to:* • *A review of fire precautions detailed in this AHA* • *An examination and discussion on preparation of the Hot Work Permit.* • *Fire extinguishers, their location and their use* • *How notification will be made should a fire occur* • *A review of the USACE Fire Prevention protocols.* • *A one-hour fire watch will be in effect for hot work.*	or when vapors are present. • Keep charged fire extinguishers accessible on vehicles, in equipment, near fuel storage, and near hot work. • Do not conduct flame- or spark-producing activities in areas of wood debris, dry grass, or brush. Should heat producing work be completed adjacent to an area of concern (like dry grass) a three-foot barrier (currently required by the Army Corps) will be maintained, if conditions allow. Surface soils will be exposed along the specific work area. This fire-break will be maintained until heat producing work is completed. This reflects the Army Corps of Engineers 385.1.1 fire prevention section 09.A.11requirements • All combustible materials will be removed or protected within 50 feet of heat producing work. • Should the fire risk be deemed excessive and controls impractical, attempts will be made to schedule any heat producing work at another time, such as after a rain event, or provide mist or adequate wetting of the area of concern during the work. • Post NO SMOKING signs at fuel storage areas. • Use only approved metal fuel storage cans. • Do not fill gasoline cans in the back of pickup trucks or other vehicles. • Fuel vehicles and equipment away from brushy areas, and shut down during fueling. Allow cooling time for any motorized equipment per the OEM recommendations or 30 minutes, whichever is greater. • Clean up spills promptly. • Keep supplies of PPE and absorbent readily available. • Always work within your training and equipment limitations during spills.	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Personal Exposure • Heat related injuries • Sunburn • Dehydration • Cold related injuries **NOTE:** Summer high temperatures in the 70s and mild winters with daytime highs in the 50s	• Drink plenty of water, and electrolyte drinks as needed. • Wear light-colored, cotton or moisture wicking clothing in hot weather. • Slow down work rate and increase breaks in hot weather. • Keep an eye on co-workers for symptoms. If noticed, get to shade, open clothing, and give fluids if conscious. Contact 911 if heat stroke is suspected. • Use sunscreen for the exterior and roof work due to surface reflection. • In cold weather, minimize or avoid exposure to wind and rain and wear rain-resistant clothing as necessary. • Provide place of refuge: shaded for hot weather, warm and dry in cold weather • If possible wear vented hard hats • Follow the ITSI Gilbane SWP for heat and cold stress. • Working temperatures indoors or inside tanks may exceed outdoor temperatures due to lack of wind. Ventilation should be increased and temperatures monitored inside structures, as needed.	M

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Personal exposure – domestic animals, snakes, poisonous plants and insects like ticks and chiggers, wildlife	• Stay on established paths; avoid walking through brush. • Don't reach under objects on the ground. • Recognize and avoid poisonous plant like ivy, oleander etc. Never burn • Wear gloves, wash your hands regularly, and shower at the end of your shift or immediately at home. • Recognize insects of concern like mosquitos and ticks and symptoms of exposure. • Avoid insect and vermin nests • Use DEET or similar insect repellents • Avoid contact with wild animals. Never approach or entice an animal no matter how tame it seems. • Do not feed or provoke animals. • If an animal approaches you, back away facing the animal. • Never turn your back to the animal. • Report any animal bites or unhealthy looking animals immediately to SSHO or Supervisor	L
	• Personal exposure - noise from activities or equipment	• Always locate noise generating equipment like generators as far as possible from personnel or behind a barrier like a wall or a berm. • Ensure noise producing equipment is not placed near a reflective vertical surface like the side of a building or tank. • Stand away from operating equipment whenever possible. • When feasible, order equipment with noise reduction devices such as mufflers, enclosed cabs for operators, etc. • Wear ear plugs/ear muffs when conversation is difficult at an arm's length or if measured noise level exceeds 85dBA.	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Handling heavy materials and/or hazardous objects • Struck by and strains, soft-tissue injuries • Struck by - handling heavy materials (rigging) and/or hazardous objects and pinch-points • Struck-by – lacerations from tool use • Struck-by – failure of lifting devices	• Use mechanical equipment whenever possible. • Use proper lifting methods, including team lifting for loads that are more than 50 lbs. • Lift with legs, keep loads close to body, don't twist while picking up loads and avoid awkward positions. • Always wear gloves and cut-resistant work gloves when working with sharp objects or knives/razor knives. • Since drums handling may occur, a specific review of this activity (approach, path, hand and foot protection etc.) will be coordinated by the contractor and ITSI Gilbane.	M
	Earthquake	• Remain calm, assess the situation • If outside, avoid buildings, walls, power poles, and other objects which could fall during the earthquake. If possible, move to an open area away from all hazards • If in a vehicle, pull your car to the side of the road and stop in the safest place available. Avoid power lines. Remain inside your vehicle until the shaking is over. Proceed with extreme caution because of the danger of debris in the road or damage to the road itself • Do not touch downed power lines or objects touched by the downed wires	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Environmental exposures • Electrocution – lightning • Struck-by falling or flying objects - storms, high winds, , etc.	• ITSI Gilbane to be familiar with site evacuation routes for emergency weather events and the individual area severe weather shelters. • Review each of sites Emergency Weather Warning Systems with all site workers. Consider if the tank is an appropriate option for sheltering in place. • A NOAA "weather-cube" radio alert will be in use at the site to deliver back-up severe weather warnings in addition to any site alerting system. • Discontinue work and seek shelter in severe weather conditions such as high winds or heavy rain, or if lightning is observed. • Best shelters for lightning include a large permanent building or a fully enclosed vehicle. Unsafe places are near metal or water; under trees; on hills; or near electrical/electronic equipment. • If lighting is observed or thunder heard, work will cease immediately • It's usually safe after no thunder and no lightning have been observed for thirty minutes but be conservative. • As an additional control, ITSI Gilbane has determined one of the first steps in this work is to confirm earth-grounds for each structure before any work. This will include lightning rods and attractor grounds, if any.	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	• Traffic safety A traffic control plan is not anticipated. If needed it will be coordinated with the client for review.	• Site vehicles will observe posted speed limits. • Personnel working within 10 feet of an active road will employ warning signs, cones, and a traffic flag person. • Use a flag person equipped with a stop/slow sign or flag when: 1) two-way traffic is reduced to using one common lane; 2) driver visibility is impaired or limited; 3) project vehicles enter or exit traffic in an unexpected manner; or 4) the use of a flagger will enhance or enforce established vehicular traffic warning systems • Wear an ANSI-rated Class 2 reflective safety vest when working on or near roadways • Implement additional controls as necessary for factors such as glare, rain, wind, limited sight-distance, hills, and curves. • Always remain aware of an escape route–behind an established barrier, parked vehicle, guardrail, etc. • Always pay attention to moving traffic; never assume drivers see workers. • All vehicles must be equipped with a backup alarm or spotter when backing. Refer to ITSI Gilbane SWP Traffic Control	L
	• Spill control	• Review MSDS for appropriate control measures, PPE. • Absorbent material selection will based on the spilled material encountered • Clean up spills promptly • Keep supplies of PPE (minimum of nitrile gloves, goggles) and absorbent readily available. • Always work within your training and equipment limitations during spills • When water is present on or adjacent to a work area, equipment will be filled at least 20’ from the water edge. • Floating sorbent booms will be immediately available when equipment is working within 20’ of the water’s edge. • Refer to ITSI Gilbane SWP for Spill Response	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	General hazards from miscellaneous tools and equipment including: • Struck by – tool failure • Struck by – control of energized system (air) • Slips trips and falls from cords • Electrical hazards – water and temporary power • Struck by – flying objects • Struck by – lacerations from tools Example of Connection	• Use tools only for their intended purpose. • Inspect all tools prior to use. Tag and remove from service all defective tools and equipment immediately. Only use power tools equipped with a safety guard with the guard in place and functioning. • Gloves will be worn for any handling of tools or materials with the possible exception of hand-operated drilling equipment. • Unplug electric tools when changing attachments or performing maintenance. • Assure that all pressurized hoses have proper safety restraints. Only connections secured per the USACE 385-1-20-A16 (see example) will be allowed. • Disconnect and release air pressure from pneumatic tools prior to repairs or adjustments. • Cords, cables, ropes and lines must be kept out of walking areas and the water. The use of cordless tools is recommended. • If drills are designed and supplied with a torque control handle they will be used. • The idling of equipment will not be allowed • Wear appropriate PPE including the right gloves for the exposure always, hard hat, protective toe boots and eye protection (safety glasses with side shields, goggles in dusty environments and faceshields for higher impact protection. Faceshields must be worn in conjunction with goggles or safety glasses with side shields). • All work stations will be in a “user neutral” position and no one will work on the floor unless the task requires it.	L

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Excavation and trenching hazards: Struck by • Moving equipment and loads • Trench or excavations failures • Falling loads • Water accumulation hazards • Hazardous atmospheres • Adjacent structures falling into excavation or trench • Contacting with underground utility • Falls to a lower level – access US Marking Color Legend Red – Electric Yellow – Gas / Oil / Steam Orange – Communications / CATV Blue – Water Green – Sewer Pink – Survey Markings White – **Proposed Excavation**	• Contact facility HPNS POC and USA North utility service (811) for locates and dig permit approvals. • Conduct utility locating survey which includes a review of all as-built drawings. Update as-builts to reflect additional utilities and ensure communication of all findings to all penetrating contractors • Penetrating contractor to notify in all cases regardless of location, and retain a copy of the specific 811 notifications ticket which is to be contacted in all instances regardless of physical location for verification of utility notification for the area disturbed – post ticket at the site where work is underway. • Inspect potential area for surface indications of possible unmarked underground utilities like manholes, or conduits running down from poles into the ground, disturbed earth, fuel dispensers or fuel islands. • Mark all intended areas for locating in white paint only • Hand-dig within three feet of known utilities • Respect and maintain the marks per established US color protocols as shown.	M

Activity (Task Identification):	**General Site Hazards, including Mobilization/Demobilization (May apply to all site activities)**		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Electrical hazards • Temporary power supplies, conductors including cords and lighting • Electrified tools • Electrical shock – wet conditions • Fire – flammable atmospheres • Fire – heat producing work NOTE: A specific plan for control of energized systems will be coordinated by ITSI Gilbane and each exposing contractor and reviewed with base engineering prior to any work. This planning session must follow the protocols established by the USACE EM 385.1.1 Safety and Health Requirements Manual section 12 Control of Hazardous Energy and all codes and standards referenced. **The hazards and controls identified by exposing contractors are not included here.**	• Only qualified electricians may perform work • Electric tools with missing ground prongs or cut or frayed cords will be removed from service. • Field repairs to power tools are not authorized. • A minimum of 12 AWG will be used on this job site. • All grounds will be present in flexible cords and no separation from cord and plug will be visible. • Tape will not be used to repair flexible cords. • Flexible cords will not be routed where they can be run over or cut/abraded. Cords will be kept from water. • Temporary panels for exterior usage will be approved for that use. • Temporary lighting will be 7’ off ground level and all bulbs will be protected with cages Electric tools used in highly conductive locations, such as where the employee may contact water, will be approved for use in those locations. • Power for portable electric tools will be supplied from a ground fault circuit interrupter (GFCI)-protected. • Portable GFCI’s will be inspected by the user daily – GFCI breakers will be inspected before each use and at a minimum monthly by an electrician. • Electric tools must be grounded, except tools that are equipped with double insulation. • Electric tools will not be used in hazardous locations such as flammable or explosive atmospheres unless they are approved for such locations. • All live or hot panels, outlets or feeder boxes will have live parts guarded and proper warning signs placed on doors or entrances. • No “hot” work is allowed under any conditions Refer to ITSI Gilbane SWP for Control of Energized Sources	M

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Hand and power tools • Utility locating equipment • Project vehicles • Fire extinguishers, 1st aid kit, eye wash, spill clean-up supplies	• Daily site inspections • Pre-use and daily equipment inspections (hand tools, PPE) • Pre-use and daily vehicle inspections • Excavation as needed for underground utilities	• General site orientation • Hazard-specific training including accident/incident reporting, weather warnings, Hazcom and fire prevention • Emergency procedures, spill response • Control of Energized Systems –Lockout/Tagout (LOTO) • Training in specific equipment used • Review of this AHA • Daily tailgate meetings • SSHO must have 30 Hr OSHA Construction, 8Hr. Hazwoper Supervisor, , LOTO, fall protection, confined space training • Two employees must have CPR, First aid, Bloodborne Pathogen training. • Radiation Awareness Training

Activity (Task Identification): Radiological surveys and sampling			
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Radiological surveys/sampling	• General	• Review section in AHA for All Site Activities.	L
	• Falls from same level	• Watch where you walk, and place your feet and observe possible traffic patterns (where machines are working, traffic lanes and the public is passing) before entering any area. • Follow good housekeeping practices – no accumulation of tools, materials or debris is allowed on a walking or working surface. **Containerize waste or debris immediately. The "nothing hits the ground" policy will be tracked to eliminate clutter and trips.** • Remove, cover, or barricade identified hazards prior to any work in those areas. • Step carefully when leaving any elevated work platform, stairs or ladders • Wear well-fitted safety boots with good tread and well defined heel.. • Provide safe access through rated stairs or work platforms • Loose materials are to be delivered and handled in suitable containers for ease of movement and to limit handling of materials.	L
	• Radiation Exposure	• All work to be done in accordance with Radiation Protection Program: (Appendix B of the Execution Plan)	M

Activity (Task Identification): Radiological surveys and sampling			
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Rail tie loading	Material Handling • Struck By – loading and unloading of material and equipment • Equipment failure – rigging of loads and during transport • Struck by – rigging failure • Slips and trips –materials placement	• No manual lifting of rail ties is permitted. • Rail ties will be loaded onto transport trucks in a manner that ensures their stability • **Tag lines will be used for guiding equipment rather than hand contact whenever feasible.** • **Only qualified riggers will be used for any such operation** • **Use mechanical equipment whenever possible to eliminate lifting or hand guiding.** • **Use proper lifting methods, including team lifting for loads that are more than 50 lbs.** In the unlikely event that manual lifting of a rail tie is required; obtain permission and instructions from the SSHO prior to lifting. • Lift with legs, keep loads close to body, don't twist while picking up loads and avoid awkward positions. • Wear cut-resistant work gloves when working with sharp objects or knives/razor knives. • Use proper body and **hand positioning** to avoid pinch point when handling materials or moving and installing equipment to reduce or eliminate hand injuries. • Store material in secure locations and block rolling stock to eliminate roll-off hazards. • Never stand or remain under suspended loads. • Free-rigging of material is prohibited. • Weights of items to be hoisted will be known and riggers will be qualified and those qualifications available. • Loads will be rigged properly and balanced accordingly. Piggy backing items which are not secured is prohibited. • Inspect rigging or securing methods before lifts take place. • If required, ensure full deployment of forklift outriggers and proper cribbing if on dirt surface**. Only fabricated or manufactured outrigger pads for cranes and lifts will be used.** • Secure decked material and store in such a manner it will not become a struck-by hazard. • Keep work areas free from clutter. • Stay out of lift areas and avoid turn radius of swinging equipment. • **Swing radius must be protected and identified by a rope or chain, warning tape is not allowed.**	M

Activity (Task Identification): Radiological surveys and sampling			
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Rail tie loading	• Traffic safety A traffic control plan is not anticipated. If needed it will be coordinated with the client for review.	• Site vehicles will observe posted speed limits. • Personnel working within 10 feet of an active road will employ warning signs, cones, and a traffic flag person. • Use a flag person equipped with a stop/slow sign or flag when: 1) two-way traffic is reduced to using one common lane; 2) driver visibility is impaired or limited; 3) project vehicles enter or exit traffic in an unexpected manner; or 4) the use of a flagger will enhance or enforce established vehicular traffic warning systems • Wear an ANSI-rated Class 2 reflective safety vest when working on or near roadways • Implement additional controls as necessary for factors such as glare, rain, wind, limited sight-distance, hills, and curves. • Always remain aware of an escape route–behind an established barrier, parked vehicle, guardrail, etc. • Always pay attention to moving traffic; never assume drivers see workers. • All vehicles must be equipped with a backup alarm or spotter when backing. Refer to ITSI Gilbane SWP Traffic Control	L
EQUIPMENT USED	**INSPECTION REQUIREMENTS**	**TRAINING REQUIREMENTS**	
• Radiation detection equipment • Hand and power tools • Material Handling equipment (forklift, tow trucks, cranes, slings and other rigging devices)	• Daily site inspections • Crane inspection (if brought on site) upon arrival on site and daily pre-use • Pre-use and daily equipment/tool/machinery inspections	• Same training requirements as for “General Site Hazards” • Review of this AHA • Review of emergency and contingency plans • Review of Radiation Protection Plan (Appendix B of the Execution Plan) • Attend daily tailgate meetings • Training in specific equipment used. • Use qualified Radiation Technician during Radiation work • Use qualified crane operator (if necessary), qualified riggers & signal persons • Use certified forklift operators	

Activity (Task Identification):	Civil surveys, identification and tracking		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Survey area via GPS. • Locate underground utilities • Ensure utilities are disconnected • Install barriers or barricades • Post signage as needed	• General Site Hazards	All Site Activity Hazards and Controls Apply	L
	Slips, trips, falls • Falls from same level • Falls from improper access to area or elevation • Falls from and through openings or holes	• Watch where you walk, place your feet and observe possible traffic patterns (where machines are working, traffic lanes and the public is passing) before entering any area. • Follow good housekeeping practices – no accumulation of tools, materials or debris is allowed on a walking or working surface. **Containerize waste or debris immediately. The "nothing hits the ground" policy will be tracked to eliminate clutter and trips.** • Establish walkways and materials storage areas, barricade or identify as needed and maintain • Establish and properly store materials using containers racks or like devices. See examples. • Remove, cover, or barricade identified hazards prior to any work in those areas. • Step carefully when leaving any elevated work platform, stairs or ladders • Wear well-fitted safety boots with good tread and well defined heel. Steel erectors etc. may use alternate sole. • Provide safe access through rated stairs or work platforms • Loose materials are to be delivered and handled in suitable containers for ease of movement and to limit handling of materials.	L

Activity (Task Identification):	Civil surveys, identification and tracking		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
	Overhead hazards – power lines 	• Install signage warning of overhead hazards and plan the work to stay away from overhead power lines, poles and guy-wires. • Discuss the hazards of working around power lines at each morning toolbox huddle. • Maintain at least a 10-foot distance from overhead power lines (50,000 volts or less, greater distance for higher voltages) and 17’ for concrete pumping operations. • Maintain at least a 10-foot distance from overhead power lines and if vehicle will pass below, install signs alerting drivers to the overhead hazard visible from all directions. • Identify overhead utilities prior to mobilizing equipment, and mark on site map. • The installation of “insulators” for protection will not be allowed. “Spotters” for warning are not allowed. • Plan staging areas away from overhead hazards • Do not move equipment with the mast up. • Utilize a spotter during all work in proximity to electrical utilities • If possible the overhead lines will be relocated during this work or indicators will be placed on the ground identifying the approach area to operators. • Request the Owner to flag the lines if allowable for added recognition of the hazards.	M

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Hand tools • Power tools, concrete sawing, jackhammers, etc. • Utility locating equipment	• Daily site inspections • Pre-use and daily equipment/vehicle inspections • PPE daily inspection (with emphasis on fall protection)	• Same training requirements as for "General Site Hazards" (see above) • Review of this AHA • Daily tailgate meetings • Training in specific equipment used. Use qualified and experienced equipment operators • Review of Radiation Protection Plan (Appendix B of the Execution Plan) • Overhead power hazards awareness • Review of emergency procedures, including actions for various types of utility strike (gas, electrical, water etc.).

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage the water in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles	• General site hazards	• Same controls as for each general site hazard (above).	L
	• Unstable surfaces for construction machinery	• Fully extend outriggers. • Place outriggers on appropriate cribbing. • Inspect ground for stability prior to raising mast.	L

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage water in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles (Continued)	• Confined Space Entry • Excavation: cave-in, utilities, falling loads, water accumulation, hazardous atmospheres	• No confined space work is anticipated. • Follow Excavation SWP requirements, including: • Competent Person Conduct daily inspections. • Contact underground utility service locator to define utility locations. • Competent Person will determine the need for protective systems based on any or combination of the following criteria: o Trench/excavation depth AND/OR o Soil classification AND/OR. o Posture of workers (on knees for majority of time etc.) • Access will be provided if trench 4' (1.2-meters) or more in depth or if entry without approved means (ramp, steps, and ladder) presents a hazard to entrants. • Active trenches and excavations will be marked with highly visible material. • Competent Person will designate perimeter protection at trenching sites as either Class I, II or III based on definitions form EM 385-1-1- regardless of trench depth and will barricade accordingly. • Workers will not enter any trench if it contains standing water. • Workers exposed to trenches or excavations over 6' deep will be protected from falls or a barrier warning of the hazard installed. • Competent person will inspect the trench/excavation for signs of soil disruption or instability daily as well as the condition of protective systems used. • Workers will be immediately removed from trenches and excavations if utilities are hit, the presence of hazardous atmospheres is detected or workers begin to feel ill.	M

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage water in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles (Continued)	• Heavy earth moving equipment (trucks, backhoes, etc.)	• Ground personnel wear reflective (Class 2) vests. • Minimize the number of workers around equipment. • Maintain line of sight with operators. • Establish and use appropriate hand signals. • Establish, inspect, and clearly demarcate vehicle/equipment routes. • Operate vehicles/equipment at a safe speed for current conditions. • Check mirrors and blind spots on an ongoing basis. • Assure all equipment has operational backup alarms. • Operators must wear seat belts at all times. • Use spotters during dumping or backing. • Perform repairs in a safe location. • Do not let equipment run unattended. • Clean-load trucks, secure loads.	M

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles (Continued)	• Underground utilities **Approval** - Utility Locating Red – Electric Yellow – Gas / Oil / Steam Orange – Communications / CATV Blue – Water Green – Sewer Pink – Survey Markings White – **Proposed Penetration**	• Contact underground utility service locator -811- to define utility locations at least five days before starting work, and obtain clearance tickets or numbers from the service company. • Conduct own underground utility location survey as needed. • Review all available as-built drawings. • Inspect area and pay close attention to surface indications of possible unmarked underground utilities. • Maintain appropriate distances (outside tolerance zone) from identified utilities. • Shut off utilities whenever possible. • Hand-dig within three feet of known utilities.	M

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles (Continued)	Handling heavy materials and/or hazard – piping and structures • Struck by – moving and placing equipment • Struck by and strains, soft-tissue injuries • Struck by - handling heavy materials (rigging) and/or hazardous objects and pinch-points • Struck-by – lacerations from tool use • Struck-by – failure of lifting devices	• Use mechanical equipment whenever possible. • Use proper lifting methods, including team lifting for loads that are more than 50 lbs. • Lift with legs, keep loads close to body, don't twist while picking up loads and avoid awkward positions. • **Wear cut-resistant work gloves when working with sharp objects or knives/razor knives.** • Use proper body and **hand positioning** to avoid pinch point when handling materials, mating pipe or moving and installing equipment to reduce or eliminate hand injuries. • Never place your hand across the end of any pipe when moving. • Only qualified riggers will be used for operation requiring rigging or rigging devices • Free rigging is not allowed. • Use stop-logs or physical barriers to keep pipe and materials from entering excavation or trench. • Never allow material to pass over the head of anyone. • Use tag lines to place materials whenever possible.	M

Activity (Task Identification):	Excavating Soil, Removing Piping Systems and Transport and Disposal		
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Excavate and remove soil in designated locations • Cut pipe. • Drain residual fluids. • Remove in sections. • Cap end of pipeline not removed. • Collect confirmation soil samples from within excavation. • Dewater excavation with sump pumps, as needed. • Stage in drums or polytank for disposal pending analysis. • Load and transport excavated pipeline and soil to designated HPS laydown area. • Collect representative soil samples from stockpile for waste characterization. • Manage stockpiles	• Exposure to site contaminants	• Limit access to exclusion zones to only trained and qualified personnel. • Do not eat, drink, or smoke in the exclusion zone. • Wear the appropriate PPE, including gloves, safety glasses with side shields, boots, coveralls, and respirators based on action levels and Radiation Work Permit (RWP). • Follow decontamination procedures and wash hands upon exiting exclusion zone. • Dispose of PPE appropriately, and store all waste materials and used PPE in approved containers to await appropriate disposal. • Maintain good housekeeping, keep equipment clean. • Work areas must be inspected at least once per shift by the SSHO. • Maintain ANSI-rated eyewash in support zone.	L

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Hand and power tools • Earth Moving Machinery • Hoisting/rigging equipment • Dewatering pumps • Air monitoring instruments	• Daily site inspections • Pre-use and daily equipment/tool inspections • Protective system and trench/excavation inspection (as required) and general conditions by Competent Person. • Hazardous atmosphere assessment of excavation (if hazard is believed to exist).	• Same training requirements as for "General Site Activities" • Review of this AHA and ITSI Gilbane Excavation/Trenching SWP's. • Daily tailgate meetings • Training in specific equipment used. Qualified and experience equipment operators • Hazard Communication Training • Hazwoper 40-hour training • 8-hour annual refresher • 8-hour supervisor's training, as appropriate • Radiation Awareness Training • Review of emergency procedures, including actions for various types of utility strike (gas, electrical, water etc). • Competent person trains employees in hazard recognition regarding trench and excavation. • Competent Person oversight for excavations

Activity (Task Identification): Backfill and Site Restoration			
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Grade final contours • Install asphalt • Provide plantings, removed existing planting barriers, reseed as required. NOTE: Ensure any abandoned utilities are properly de-energized, marked on as-built drawings and properly sealed.	• General	• Review section in AHA for All Site Activities.	L
	• Struck by - Earth moving or planting equipment to backfill, grade surfaces and plant • Caught in rotating equipment - Augers for fencing and poles • Struck by - tree-spades for plantings • Falls from height	• (Ground personnel) wear reflective vest (ANSI Class 2 or equivalent) • Minimize the number of workers around equipment. • Maintain line of sight with operators. • Establish and use appropriate hand signals • Establish, inspect, and clearly demarcate vehicle/equipment routes. • Operate vehicles/equipment at a safe speed for current conditions. • Check mirrors and blind spots on an ongoing basis. • Assure all equipment has operational backup alarms. • (Operators) wear seat belts at all times. • Use spotters during dumping or backing. • Perform repairs in a safe location. • Do not let equipment run unattended. • Clean-load trucks, secure loads. • Fill water trucks from valve on side/end of truck, where possible	L

Activity (Task Identification): Backfill and Site Restoration			
PRINCIPAL STEPS	**POTENTIAL HAZARDS**	**RECOMMENDED CONTROLS**	**RAC**
• Grade final contours • Install paving • Provide plantings, removed existing planting barriers, reseed as required. NOTE: Ensure any abandoned utilities are properly de-energized, marked on as-built drawings and properly sealed. (Continued)	Exposure to chemical products (asphalt sealants, hot asphalt, paint, hydro-seeds, fertilizer, etc.) Personal exposure to fuels and other chemical products including inhalation, ingestion and skin contact • Struck-by – eye injuries • Fire hazards of volatiles • Burns • Chemicals, pavements • Personal exposure to materials when mixing, preparing or application • Burns from asphalt • Struck by – loads • Struck by - moving equipment	• Review MSDSs for chemicals used. • Follow safe work procedures for flammable products. • Do not eat, drink, or smoke in areas where chemicals are used or stored. • Wear stitched sole footwear on hot paved surfaces • Always wear gloves when working with asphalt • Remain upwind whenever possible of asphalt fumes • Maintain good housekeeping, keep equipment clean. • Wash hands after handling chemicals • Maintain ANSI-rated eyewash within ready access of chemical-handling areas. • Wear appropriate personal protective equipment (PPE) including chemical resistant gloves, heat resistant gloves, safety glasses, face shields and respirators, as required by manufacturer. for sealant applications, hot asphalt hazards, flying particles, etc.) • Use only approved solvents for asphalt cleanup on tools and machinery.	L

Activity (Task Identification): Backfill and Site Restoration

PRINCIPAL STEPS	POTENTIAL HAZARDS	RECOMMENDED CONTROLS	RAC
• Grade final contours • Install paving • Provide plantings, removed existing planting barriers, reseed as required. NOTE: Ensure any abandoned utilities are properly de-energized, marked on as-built drawings and properly sealed.	Vehicle and equipment accidents • Struck-by or crushing accidents with ground personnel • Contact with overhead power • Vehicle rollover • Falls from equipment • Struck-by - backing • Struck-by – site workers • Struck-by - collisions with objects or personnel	General: • Establish and demarcate vehicle and equipment routes. • Assure all equipment has operational backup alarms. Ground personnel: • Wear ANSI Class 2 reflective vests. • Maintain line of sight with operators when approaching equipment. • Observe vehicle/equipment routes before entering site. • Stay out of swing radius of equipment. • Stay out of equipment areas if possible. • NEVER stand under suspended loads. Operators: • Operate vehicles/equipment within the speed limit and at a safe speed for current conditions or when troops are alongside roadways. • Wear seat belts at all times. • Check mirrors and blind spots on an ongoing basis. • Use spotters during dumping, backing, when near overhead power lines, or with limited visibility. • Establish and use appropriate hand signals • Do not let equipment run unattended. • Secure loads on trucks. • Perform repairs in a safe location. • Maintain at least a 10-foot distance from overhead power lines with “look-up” signs at approaches	L

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Skid-steer type equipment • Hand tools • Paving equipment • Dumping trucks	• Daily site inspections • Pre-use and daily equipment/tool inspections • Equipment upon Arrival	• Same training requirements as for “General Site Hazards” • Review of this AHA • Trained and qualified operators of specific motorized equipment used • Review of emergency and contingency plans • Daily tailgate meetings

REVIEWED BY:	**REVIEWED BY:**
Safety Officer (signature)	
Subcontractor (signature)	Authorized Representative (signature)

END

APPENDIX B

SITE SAFETY AND HEALTH PLAN (SSHP)

FINAL SITE SAFETY AND HEALTH PLAN
Radiological Remediation and Support
Parcel D-1 Phase II
Hunters Point Naval Shipyard
San Francisco, California

Prepared Under:
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July 2013

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ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
AIHA	American Industrial Hygiene Association
AL	action level
APP	Accident Prevention Plan
BBP	bloodborne pathogens
BPM	beats per minute
BRAC	Base Realignment and Closure
Cal/OSHA	California Occupational Safety and Health Administration
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CHSP	Corporate Health and Safety Program
CIH	Certified Industrial Hygienist
CL	ceiling limit
CO	Contracting Officer
COR	Contracting Officer's Representative
CPR	cardiopulmonary resuscitation
CIH	Certified Industrial Hygienist
CSIR	Contractor Significant Incident Report
CSP	Certified Safety Professional
DO	Delivery Order
DOT	Department of Transportation
EM	Engineering Manual
EMAC	Environmental Multiple Award Contract
EMT	Emergency Medical Technician
EZ	Exclusion Zone
H&S	health and safety
HEPA	high efficiency particulate arresting
HPNS	Hunters Point Naval Shipyard
HRA	Historical Radiological Assessment
HSM	Health and Safety Manager
HSA	Hollow-Stem Auger
HSO	Health and Safety Officer
HTRW	Hazardous, Toxic, and/or Radioactive Work
IIPP	Injury and Illness Prevention Program
ITSI Gilbane	ITSI Gilbane Company
MSDS	material safety data sheet
NAVFAC SW	Naval Facilities Engineering Command Southwest
NAVSEA	Naval Sea Systems Command
Navy	U.S. Department of the Navy

ACRONYMS AND ABBREVIATIONS (Continued)

NIOSH	National Institute for Occupational Safety and Health
NOA	naturally occurring asbestos
NOAA	National Oceanic and Atmospheric Administration
OSHA	Occupational Safety and Health Administration
PBSB	Performance-Based Small Business
PCB	polychlorinated biphenyl
PEL	permissible exposure limit
PM	Project Manager
PMO-West	Project Management Office, West
PPE	personal protective equipment
psi	pounds per square inch
RA	remedial action
RCT	Radiation Control Technician
ROC	radionuclides of concern
ROI	radius of influence
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
SOW	Scope of Work
SSHO	Site Health and Safety Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit
SWP	Safe Work Procedure
TCRA	Time Critical Removal Action
TLV	threshold limit value
TtECI	Tetra Tech ECI
USACE	United States Army Corps of Engineers

CERTIFICATION OF HAZARD ASSESSMENT

This Site Safety and Health Plan is project-specific and addresses safety and health-related hazards anticipated to be encountered during project activities. This site-specific plan is intended to apply to the project activities at the above site only, and must not be extrapolated to other substances, activities, or project locations without modification to address the specific hazards associated with those substances, activities, locations, and/or any other specific regulatory requirements.

A Personal Protective Equipment (PPE) Hazard Assessment in accordance with OSHA regulation 29 CFR 1910.132 has been made to determine the likelihood of excessive exposure to physical and chemical site hazards. This plan addresses the potential hazards associated with each phase of the work and provides for appropriate protective measures for the specific tasks involved.

It is not possible in advance to discover, evaluate, and protect against all possible hazards, which may be encountered during the duration of this project. Therefore, this SSHP may not be appropriate if the work is not performed by or using the methods presently anticipated. In addition, as the work is performed, conditions different from that anticipated may be encountered and this SSHP may have to be modified.

Adherence to the requirements of this Site Safety and Health Plan will significantly reduce, but not eliminate, the potential for occupational injury and illness at the project site. The guidelines contained in this APP were developed specifically for the activities described herein and should not be used at any other site without the review and approval of a qualified safety and health professional.

07/25/2013

Jeremy Sawyer CIH, CSP
ITSI Gilbane Company
Industrial Hygiene Manager / HSM

Date

1.0 INTRODUCTION

This Site Safety and Health Plan (SSHP) was prepared by ITSI Gilbane Company (ITSI Gilbane), as requested by the U.S. Navy (Navy) under Radiological Environmental Multiple Award Contract (EMAC) Number N62473-10-D-0808, Delivery Order CTO-0004, and based on the Statement of Work (SOW) submitted by the Navy on April 17, 2012. This SSHP is Appendix B of the Accident Prevention Plan (APP) and references the figures and other attachments provided as a part of the APP. This SSHP covers the activities necessary to implement Phase II Radiological Remediation and Support in Parcel D-1 at Hunters Point Naval Shipyard (HPNS) in San Francisco, California.

This SSHP and the APP were developed in accordance with the United States Army Corps of Engineers (USACE) Safety Manual EM385-1-1 (November 2008); Code of Federal Regulations (CFR) Title 29, Part 1926, Safety and Health Regulations for Construction; California Code of Regulations (CCR), Title 8, Sections 1500-1938, Construction Safety Orders; 29 CFR 1910.120/8 CCR 5192, Hazardous Waste Operations (as general guidance); the Navy Environmental Health Center Health & Safety Plan Checklist; other applicable regulations; and good industrial hygiene and safety practice.

This SSHP is designed to be part of ITSI Gilbane's overall Corporate Health & Safety Program. The Corporate Program is incorporated into this SSHP by reference. This SSHP is project-specific and addresses safety and health-related hazards anticipated to be encountered during project activities. This SSHP incorporates ITSI Gilbane's Hazard Communication Program and Codes of Safe Practice by reference. If, in any instance, there is a conflict between this SSHP and any employer's corporate health and safety program, the more stringent requirement will apply to the work.

This SSHP covers all ITSI Gilbane employees, and serves as the minimum requirement for protective measures for all subcontractors on the project working at the site. A copy of this SSHP will be provided to all subcontractors on site during the project's field activities. All subcontractors working on the project at the site are responsible for the health and safety of their own employees, and are responsible for compliance with the provisions of the applicable health and safety regulations. Each subcontractor will provide health and safety equipment for its

employees. All on-site personnel, including visitors, are expected to be familiar with, and comply with the provisions of this SSHP.

This SSHP is intended as a practical approach to the activities in light of the potential occupational and public health hazards identified. The procedures and guidelines are based on the best information available at the time of the preparation of this SSHP. Specific requirements may be revised during the course of the field work if new information is received or conditions change. Written amendments will document any changes made to this plan and will be included as an addendum.

2.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

2.1 SITE BACKGROUND AND DESCRIPTION/SCOPE OF WORK

This SSHP covers the work areas where project field activities will take place. The survey area is defined as the portion of land that extends inland fifty feet from the water's edge at Berths 21, 22, and 29. Berths 21, 22, and 29 make up the entire perimeter of the Phase II area of focus. Although the ship berths are listed in the HRA as part of Parcel F, the portion of land that is to be included in this survey is considered Parcel D-1. The locations of the rail tie stockpiles are in the southern portion of Parcel D-1 near Berths 22 and 29, and at the head of Gun Mole Pier adjacent to Berth 14.

The project site activities included in this scope of work are expected to include the following:

- Perform the radiological investigation and any remediation necessary to achieve free release, and final status surveys of the ship berths adjacent to Parcel D-1.
    - Remove, sample, survey, remediate, backfill, and restore a minimum of 5,700 lineal feet of sewer and storm drain line.
    - Conduct surveys of Parcel D-1 Ship Berths to support the Final Status Survey (FSS) goal and free-release of the site. Survey work may require asphalt removal to support clean closure. Contaminated areas shall be remediated and re-surveyed to support clean closure.
    - Radiologically survey and release several large stockpiles of rail ties from radiological controls.
- Provide health and safety monitoring, air monitoring, and fire prevention monitoring in accordance with Basewide and task-specific health and safety plans, dust control mitigation plans, and air monitoring plans.

2.2 CONTAMINATION CHARACTERIZATION

The radionuclides of concern for the storm drain and sanitary sewers are cesium-137, radium-226, and strontium- 90. The historical radiological assessment (HRA) also identified the ship berths along Parcel D-1 as radiologically impacted. The radionuclides of concern associated with the ship berths in Parcel D-1 are considered to be cesium-137, radium-226, plutonium-239, and strontium-90.

These radionuclides are not expected to pose a significant health risk during the project activities, and exposure may easily be controlled through basic hygiene and dust control procedures.

Routes of exposure include inhalation of the radionuclides as particulate as well as ingestion of particulate due to poor personal hygiene. Exposure will be controlled through Radiation Safety Awareness Training, administrative controls, PPE and personal dosimetry, as required.

2.3 SITE ACTIVITIES

An Activity Hazard Analysis (AHA) (see Appendix A of the Accident Prevention Plan [APP]) will be prepared for each of the following anticipated phases of work. The phases of work include:

- Mobilize and demobilize all equipment, materials, and personnel for the field effort.
- Radiological surveys and sampling.
- Backfill and site restoration.
- Civil surveys, identification and tracking.
- Excavating soil, removing piping systems and transport and disposal.

3.0 JOB HAZARD ANALYSIS

This section summarizes the potential chemical, radiological, physical, and biological hazards that may be associated with the project activities. Personnel working most directly with the project activities will have the greatest chance of encountering these hazards; however, all personnel on site may encounter them at one time or another.

Additional specific precautions are provided in the AHA for this project (Appendix A of the APP). The AHA will be reviewed with the field crew prior to the start of work at the initiation of each definable feature of work and at other times as needed during the execution of specific tasks. If additional tasks are identified or added at a later date, if work requirements change or if additional hazards are encountered, the AHA will be revised and the new information will be reviewed with the site personnel. Safe Work Procedures (SWP) and Safety Forms that will be used for this project are attached in Appendix C and D, respectively of the APP.

3.1 CLASSIC SAFETY

Personnel working most directly with the site activities will have the greatest chance of encountering these hazards; however, all on-site personnel will have the possibility of encountering them at one time or another.

The Primary Classic Safety Hazards potentially associated with the site are expected to include:

- Equipment hazards
- Equipment and vehicular traffic
- Overhead and underground utilities
- Electrical hazards
- Fire hazards
- Head, back, and eye injuries
- Slips, trips and falls
- Pressurized lines
- Excavations

3.1.1 Equipment and Traffic

Vehicles, heavy equipment, and other equipment (e.g., excavators, backhoes, loaders, dump trucks, and water trucks) will be used at the site. Only qualified operators and drivers with demonstrated training and experience will be permitted to operate equipment. Operators must ensure that equipment movements are deliberate and predictable. Safe vehicle speeds for each area of the site and each operation will be established, taking into account slope, soil conditions and moisture, types and weights of vehicles, and ground obstructions. All drivers and operators will be required to maintain vehicles speeds which allow them to keep their equipment under control at all times, and are always required to obey the maximum site speed limit of 15 miles per hour. If operators demonstrate an inability to maintain this control, they will be removed from operation of that equipment or vehicle. Operators of ride-on equipment will wear seat belts at all times of operation. Parking brakes must be set and attachments and buckets lowered to the ground when units are parked. Equipment must be shut off when left unattended. All personnel operating such equipment will be made aware of the presence of other site personnel. Communication between workers on the ground and operators will be by line of sight, utilizing standard construction hand signals. Spotters will be utilized when equipment is backed in areas with limited visibility, or when it is moved in proximity to overhead hazards or utilities.

Surface obstructions, overhead hazards and utilities, road hazards, and vehicle routes will be clearly demarcated using cones, tapes, and/or signs. Heavy equipment will have the right of way on site. The Site Superintendent will inspect work areas on a daily basis to verify that travel pathways, roads and the work area are in acceptable condition.

On-site personnel will be made aware of the presence of construction equipment and the unique hazards of working around each piece of equipment. Ground personnel must stand clear of the swing radius and routes of equipment travel, and must never stand under suspended loads or under blades or buckets. Workers on the ground must make sure they are visible at all times to operators and drivers, and should maintain line of sight at all times. Ground personnel will be reminded of the need to approach equipment only after acknowledgement from the operator.

All personnel working around heavy equipment must wear high-visibility vests (minimum of American National Standards Institute [ANSI] Class 2) on the outside of all clothing. Hearing

protection must be worn by operators and by ground personnel working in proximity to equipment, as needed based on ambient noise levels.

Equipment must be equipped with rollover protection where appropriate, and with working backup alarms, and must carry at least one 10 pounds ABC-rated fire extinguisher. Heavy equipment must be marked with the maximum lifting or load capacity. All equipment must be inspected by a qualified person prior to use on site. In addition, daily inspections will be performed by operators. Recordkeeping forms for these inspections are included in Appendix D of the APP. All heavy equipment repairs will be performed by a qualified person in a protected area.

Fuel storage containers will be protected from damage, marked with NO SMOKING signs, have appropriately-rated fire extinguishers within 25 feet, and have spill control materials and eyewashes readily available. The ITSI Gilbane Company SWP for Heavy Equipment will be followed (Appendix C of the APP). The ITSI Gilbane Company SWP for Excavations and Trenches will be followed (Appendix C of the APP).

3.1.2 Overhead and Underground Utilities

All work locations will be evaluated for overhead utilities. Where energized overhead power lines may exist within the work area, warning signs reminding ground crews of the presence of overhead lines will be placed at ground level. A minimum separation distance of 10 feet will be maintained from all high-voltage lines of 50,000 volts or less during all construction activities. Additional separation distance based on line voltages will be required for lines with voltages in excess of 50,000 volts.

Excavation will be performed during this project. All excavation locations will be evaluated for underground utilities. The USA North Regional Utility Notification Center (811) will be notified at least two days prior to the start of any excavation, as appropriate. All utilities and surface encumbrances, which may be undermined, must be adequately protected to prevent their collapse. Hand excavation must precede equipment use within 3 feet of all marked utilities.

3.1.3 Electrical Hazards

All electrical equipment and sources at all voltages should be considered dangerous. Before work begins at any location involving power supply lines or electrical equipment, existing

conditions shall be determined by an inspection or test by qualified personnel. Electrical equipment and power supply lines shall be considered energized until determined to be de-energized by tests or by other means. ITSI Gilbane Company's SWP for Control of Hazardous Energy is included in Appendix C.

All electrical equipment must be handled with care by trained personnel. All electrical power tools and extension cords must be protected by ground fault circuit interrupters. Personnel must be insulated or guarded from any energized source or conductive object. Tools should have non-conducting handles and hoses. All electrical equipment must be double insulated or grounded. Power cords must be Underwriters Laboratories listed. Extension cords must be grounded, and grounding plugs must not be removed or disabled. Any tools or cords with loose connections, damaged or frayed wiring, or damaged insulation/shielding must be taken out of service immediately and either repaired or discarded. Flexible power cords passing through areas that would leave them susceptible to damage shall be covered or elevated. ITSI Gilbane Company's SWP for Electrical Safety and Power Tools is included in Appendix C.

3.1.4 Fire and Hot Work

Appropriate measures will be taken to reduce fire risk through proper monitoring of site activities; proper storage, handling, and transfer of flammable liquids; good housekeeping; prohibition of smoking on site; hot work protection; and the maintenance within ready access on-site of the appropriate fire extinguishers.

Smoking will not be permitted on site or near fuel storage or equipment servicing areas. Smoking will be permitted only at designated locations at the Gathering Point.

Generators and gas cans SHALL NOT be filled or refueled in the bed of a pickup truck. The generator or gas container must be placed on the ground during filling or refueling. A suitable tray or other containment device will be placed beneath the generator or gas container to capture any fuel spilled during refueling. Persons performing fueling must ensure that the fill spout remains in contact with the fill port at all times during refueling, in order to prevent a fire hazard from static electricity. Refueling of generators shall not occur in areas where combustibles (including tall grass) are present. Each fueling area will have at least one fire extinguisher, with a minimum rating of 20-B:C, located within 25 feet.

No smoking or other ignition sources shall be allowed in the area during handling of fuel. Fuel containers must be Department of Transportation (DOT)-approved. Fuel containers will be completely closed when not in use, and secured to the vehicle if kept in a vehicle during movement. Gasoline and diesel fuels will not be used as cleaning solvents or for any purpose other than to power vehicles and generators.

Whenever feasible, non-sparking or open flame methods will be utilized. Though not anticipated based on the SOW, if open-flame or spark-producing hot work is required, including torch cutting, welding, welding slag removal, or grinding, the appropriate hot work precautions will be implemented at all times. Prior to hot work, an ITSI Gilbane Company Hot Work Permit will be completed. A Fire Watch equipped with a fire extinguisher with a minimum rating of 2-A:10-B:C will be posted prior to commencement of work; the Fire Watch will remain on duty for at least one hour after the work has completed. Welding and grinding requires a review of the AHA and completion of a task-specific checklist. Cutting, welding, and grinding equipment will be inspected immediately prior to the work. If the potential for flammable gases or vapor exists in the area, air monitoring with a calibrated combustible gas indicator will be performed in the area, and hot work will not be permitted if flammable vapors are detected.

In the event of ANY fire or explosion, all activities shall halt, personnel will evacuate the area, and the local Fire Department shall be notified immediately. Trained personnel may utilize the appropriate extinguisher to attempt to extinguish an incipient-stage fire only. If a fire requires more than one fire extinguisher, all personnel will evacuate the area and wait for the Fire Department to respond.

3.1.5 Head, Back, Hand and Eye Injuries

Prevention of head, neck, back, hand, and eye injuries is expected to be accomplished through the use of protective equipment and proper work and lifting procedures. Site personnel will be required to wear an ANSI Z89.1-compliant hard hat when an overhead hazard exists or working around heavy equipment. Hard hats must be worn properly and not altered in any way that would lessen the degree of protection offered.

Eye protection (ANSI Z87.1 compliant), including safety glasses with side shields, will be required during all work on site, and especially when airborne objects that may be projected or blown into the eyes are present, or when exposure to hazardous materials may occur.

Wherever possible, material handling will be done mechanically. Rail Ties will always be handled mechanically. **No manual handling of Rail Ties is permitted.** Where manual handling of anything other than railroad ties is absolutely necessary, personnel will discuss the situation with the SSHO who will instruct the crew in safe handling techniques, and the use the appropriate protective gear to prevent abrasions, cuts, and struck-by accidents. Personnel will also be encouraged to request assistance from other site personnel when lifting large, heavy, or awkward objects (greater than 50 pounds). The following steps describe the proper method for lifting.

- Get a good footing.
- Place feet about shoulder width apart.
- Bend your knees to pick up the load. Never bend from the waist.
- Keep your back straight.
- Get a firm hold. Grasp opposite corners of the load, if possible.
- Keep your back as upright as possible.
- Lift gradually by straightening your legs, don't jerk the load.
- Keep the weight as close to your body as possible.

When changing directions, turn your entire body, including your feet. Don't twist your body or make awkward moves which force you to be off balance.

3.1.6 Slips, Trips and Falls

Slips, trips and falls on the work site are typically caused by poor housekeeping, lack of awareness of one's surroundings, or the use of unstable equipment (ladders, step-stools, etc.). Proper housekeeping techniques and proper training of workers will minimize this kind of accident.

Debris, supplies, and other materials that may present a tripping or slipping hazard will be removed or barricaded to prevent potential injury.

3.1.7 Pressurized Lines

Pressurized lines present significant physical risks. High-pressure hoses, such as compressed air lines, may whip around violently if the fittings become disconnected. All hose ends and connections must be secured to prevent accidental disconnects and to restrict whipping in the case of disconnect. All hoses and related equipment must be inspected on a daily basis for damage. Personnel working with high-pressure lines must take care not to point the stream at any body part, and must wear the appropriate eye, face, and skin protection. Prior to disconnection, all pressurized lines must be bled to relieve the pressure, and verified to be depressurized.

3.1.8 Excavations

Potential hazards associated with excavations include collapse of sidewalls, water intrusion into the excavation, underground utilities, undermining of surface encumbrances, hazardous atmospheres, surface vehicles and equipment, and exposure to falling loads. Excavations as deep as 16 feet are anticipated based on the scope of work; however entry by site personnel into excavations deeper than 4 feet is not anticipated. All necessary precautions will be implemented in order to ensure the safety of personnel working in or around excavated areas. If excavated soil is temporarily stockpiled on site, it will be staged on, and covered by, plastic sheeting, which will be secured on the stockpile with weights to prevent potential migration off-site. Additionally, the stockpiles would be staged a minimum of three feet away from the excavation.

Each contractor whose employees create or enter excavations must designate in writing a Competent Person before those employees can dig or enter an excavation. Each designated Competent Person must have the necessary training and experience to adequately identify,

evaluate, and control the hazards associated with the creation of or entry into excavations, and must have the authority to take prompt corrective action and/or stop their employees' work and remove them from the excavation in the case of non-compliance with the required safety provisions. The Competent Person must make inspections of the excavation before each shift, and additionally based on site conditions such as rainstorms, identification of additional risk factors, or changes in work activities. All inspections must be documented using the Trench and Excavation Inspection form (Appendix D of the APP).

All excavations must be adequately protected from cave-in through sloping, benching or shoring. These protective measures must comply with all California Occupational Safety and Health Administration (Cal-OSHA) requirements, based on soil type, moisture content, presence of water, presence of shear planes, and other risk factors. Site personnel are not anticipated to enter any excavation deeper than 4 feet however if required they may not enter until appropriate slope protection measures are in place and the Competent Person has determined the conditions are acceptable for entry.

Surface crossing of trenches will be discouraged. However, if this is required, an appropriate walkway or bridge for foot traffic must be provided. All excavations four feet deep or deeper must be provided with means of egress located such that workers do not have to travel more than 25 feet to reach them. Any ladders used must be placed on secure footing, must extend at least three feet above the top of the excavation, and must be secured at the top.

Water accumulation in excavations must be controlled through the use of proper drainage techniques and pumps, as appropriate. During periods of rain, frequent inspections will be made to assure the integrity of the excavation. Surface water must be diverted away from trenches and excavations whenever possible. During periods of heavy rain, employees will be removed from the excavation until their safety can be assured.

All excavations must be adequately demarcated with barricades, cones, and caution tape to prevent personnel and vehicles from falling into the excavation inadvertently. Workers must not be allowed to work under raised loads, and must stand away from equipment or material being loaded or unloaded into or out of the excavation. Stop logs must be installed if there is a danger of the vehicles sliding into a trench or excavation. Soil should be graded away from excavations to assist in vehicle control and drainage of surface water.

All excavations and trenches will be evaluated for the potential of hazardous atmospheres. If the potential for a hazardous atmosphere exists, excavations deeper than four feet in depth must be monitored prior to the entry of personnel, according to the provisions for confined spaces of the air monitoring section of this plan. If a hazardous atmosphere exists in the excavation, it will be treated as a confined space, and all applicable confined space entry provisions must be followed, including provisions for standby and rescue personnel. Special attention must be given if equipment operation or hot work is performed in the excavation.

The potential hazards associated with open excavations–such as falls, collapse of sidewalls, or potential exposure to soil contaminants–must be mitigated, as applicable, through installation of temporary construction fencing and/or use of barricades.

Excavations as deep as 16 feet are anticipated based on the scope of work; however entry by site personnel is not anticipated. Entry into any excavation five feet or deeper (even if riding in equipment) must have a Cal-OSHA trench and excavation permit. A copy of the Permit will be available on site if needed, and notice must be provided to the closest Cal-OSHA district office at least 24 hours prior to entry. Protective systems must be in place prior to entry into an excavation and a Competent Person must be present (ITSI Gilbane Company Excavation/Trenching SWP).

3.2 CHEMICAL HAZARDS

This section outlines the potential chemical hazards associated with the project. During the project activities, employees may be exposed to chemical products brought on site for the work.

3.2.1 Chemical Products

The chemical products to be used on site may include fuels and lubricants for equipment, spray paints, and calibration gases. Personnel exposure to these materials may occur through inhalation of vapors or airborne particulates, direct contact with materials and subsequent absorption, ingestion due to poor work practices and/or poor personal hygiene practices.

A Material Safety Data Sheet (MSDS) will be obtained for each chemical product brought on site. Each employer shall assure that all site personnel handling such materials or working close enough to be exposed to the materials are familiar with the contents of the MSDS and any specific precautions needed to work safely with the materials.

Fuels handled on site may consist of diesel and gasoline. In addition, spray paint propellants and mastic removers typically consist of solvents. The fire hazards associated with these materials will be addressed as discussed in the Physical Hazards (3.3) section. Personnel will utilize the appropriate storage and handling precautions and protective equipment, including handling these materials only in well-ventilated areas, preventing spillage, and storing in ventilated areas away from incompatible materials.

3.2.2 Dust Hazards

Dust may be generated during soil excavation. Wet methods shall be used to minimize the generation of dust. Dust levels may be monitored using real time instrumentation (TSI DustTrak Aerosol Monitor or equivalent) to verify effectiveness of control measures.

The voluntary use of filtering face pieces is permitted per Section 6 - Personal Protective Equipment.

3.3 PHYSICAL HAZARDS

The primary physical hazards potentially associated with the site are expected to include:

- Heat and cold stress/Inclement weather
- Noise

Personnel working most directly with the site activities will have the greatest chance of encountering these hazards; however, all on-site personnel will have the possibility of encountering them at one time or another.

3.3.1 Heat and Cold Stress/Inclement Weather

Weather conditions are expected to vary during the field work. Wind and moisture, as well as areas lacking in shade at the site, may combine with low or high temperatures to create unfavorable working conditions. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards such as poor working conditions and slip, trip, and fall hazards. Natural disasters can create many secondary hazards, such as the release of hazardous materials to the environment, structural failures, and fires.

The SSHO will monitor the site conditions and make periodic ambient temperature measurements, and will implement the appropriate control measures to provide for the comfort

and safety of project personnel. Preventive measures such as rest breaks in sheltered areas, availability of appropriate clothing based on weather conditions, and hydration will be implemented for the protection of the workers. At least one quart of potable water per hour per worker will be available on site at all times when heat stress conditions are present. Workers will be encouraged and be provided the opportunity to drink water at regular intervals outside of the EZ. Electrolyte replacement drinks will be provided as necessary. Workers will have access to a shaded location during hot conditions to take refuge from the heat as necessary to prevent heat stress. Shade will be available when the predicted temperature will be 85 degrees Fahrenheit (ºF) or higher. Shade will be set up if the predicted high will reach 90ºF per CA Heat Illness Standard. Suitable acclimatization periods will be provided for workers to gradually establish their resistance to heat stress, especially during the use of protective clothing.

The SSHO will also monitor workers' conditions for heat stress and implement the appropriate controls, as described below as necessary. If any of the following conditions are present in a worker, they will be removed from heat exposure until their recovery is complete:

- Sustained (several minutes) heart rate in excess of 180 beats per minute (bpm) minus the individual's age in years for individuals with assessed normal cardiac performance
- Body core temperature greater than 101.3ºF for acclimatized personnel, or greater than 100.4ºF in unacclimatized workers
- Recovery heart rate at one minute after a peak work effort greater than 110 beats per minute
- Symptoms of sudden and severe fatigue, nausea, dizziness, or lightheadedness

Workers will be trained in the symptoms of heat stress in themselves and their co-workers, the conditions during which it may occur, the precautions to take, and the need to report all observed heat stress symptoms immediately. Heat stress symptoms include:

- Heat Cramps - cramping of muscles usually due to excessive sweating and loss of body salts - most often associated with moderate or strenuous physical activity.
- Heat Rash - a rash produced when working and sweating in hot environments- greatly enhanced by excessive rubbing of clothing or items in direct contact with the skin.
- Heat Exhaustion - excessive sweating, cool clammy skin, fatigue, weakness, headache, un-coordination, nausea, and/or fainting may occur.

- Heat Stroke - a response to heat characterized by extreme high body temperature and failure of the sweating mechanism. Heat stroke symptoms include hot dry skin, weak rapid pulse, and mental confusion. Unconsciousness may occur. Heat Stroke is considered an immediate, life-threatening emergency for which medical care is urgently needed. Emergency medical personnel should be called immediately for assistance.

First aid for heat stress conditions consists of proper evaluation of their condition, removal to a cool area, cooling the victim down, and rehydration. Specific actions which should be taken include:

- First-aid trained persons should be summoned to assist in evaluation of the victim's condition
- If heat stroke is suspected, outside medical responders should be immediately contacted, as this condition should be considered immediately life-threatening.
- Impermeable clothing should be removed as soon as possible following the required decontamination steps, unless the delay could compromise the victim's health
- The victim should be moved to a shaded, cooler location, preferably air-conditioned
- The victim's clothing should be loosened to aid air circulation
- The victim should sit, or lie down if they are dizzy or at risk of losing consciousness
- The victim should be encouraged to drink cool water if they are not nauseous or losing consciousness
- The victim may be cooled down further by moistening the head, neck and torso and fanning them gently. To minimize the risk of shock, do not drench them with cold water unless advised to do so by medical personnel.
- Persons suffering from heat stress, especially heat stroke, should not be allowed to return to work until after evaluation by a medical professional.

Solar radiation exposures and sunburn will be minimized by wearing long-sleeved shirts, hats, ultraviolet rated sunglasses, and gloves to cover exposed skin; using high sun protection factor barrier cream for exposed skin areas; and encouraging employees to take cover out of direct sunlight when work activities permit.

Although cold stress is not expected, the following information is provided as wind and rainy conditions may occur. Workers will be advised of the appropriate measures to prevent cold stress, including the appropriate layers of insulating and wind and moisture-resistant clothing,

and recognition of symptoms of cold stress. If the SSHO observes or suspects conditions of hypothermia, appropriate first aid will be given, including taking them to a warm, dry area to relieve the symptoms.

3.3.2 Noise

Work around heavy equipment always entails the possibility of exposure to excessive noise, and as such hearing protection will be utilized by personnel when working in the proximity to such equipment. Excessive noise can be readily identified by workers on site by difficulty in hearing verbal communication at approximately an arm's length away. Employees on site will be briefed on noise hazards and protection as part of the site-specific training, and this information will be included in the regular tailgate sessions and documented. Workers on site will be offered a choice of hearing protection such as earplugs and earmuffs. Proper use of hearing protection is expected to reduce exposure levels to well below the ACGIH Threshold Limit Value (TLV) of 85 decibels, A-weighted for 8-hours. Workers will be trained in the hazards of working in proximity to vehicles and heavy equipment while wearing hearing protection. The ITSI Gilbane Company Hearing Conservation Program is included in the Corporate Health and Safety Program.

3.4 IONIZING RADIATION

Activities will be performed at radiologically-impacted sites as designated by the HRA Volume II (NAVSEA, 2004). All work activities will therefore be conducted in accordance with the Base Wide Radiological Work Plan, Rev.1 and with the ITSI Gilbane Radiation Protection Plan (APP Appendix E).

3.5 BIOLOGICAL HAZARDS

Potential biological hazards associated with project activities may include ticks, biting or stinging insects, spiders, snakes, poison oak, and blood borne pathogens.

3.5.1 Ticks

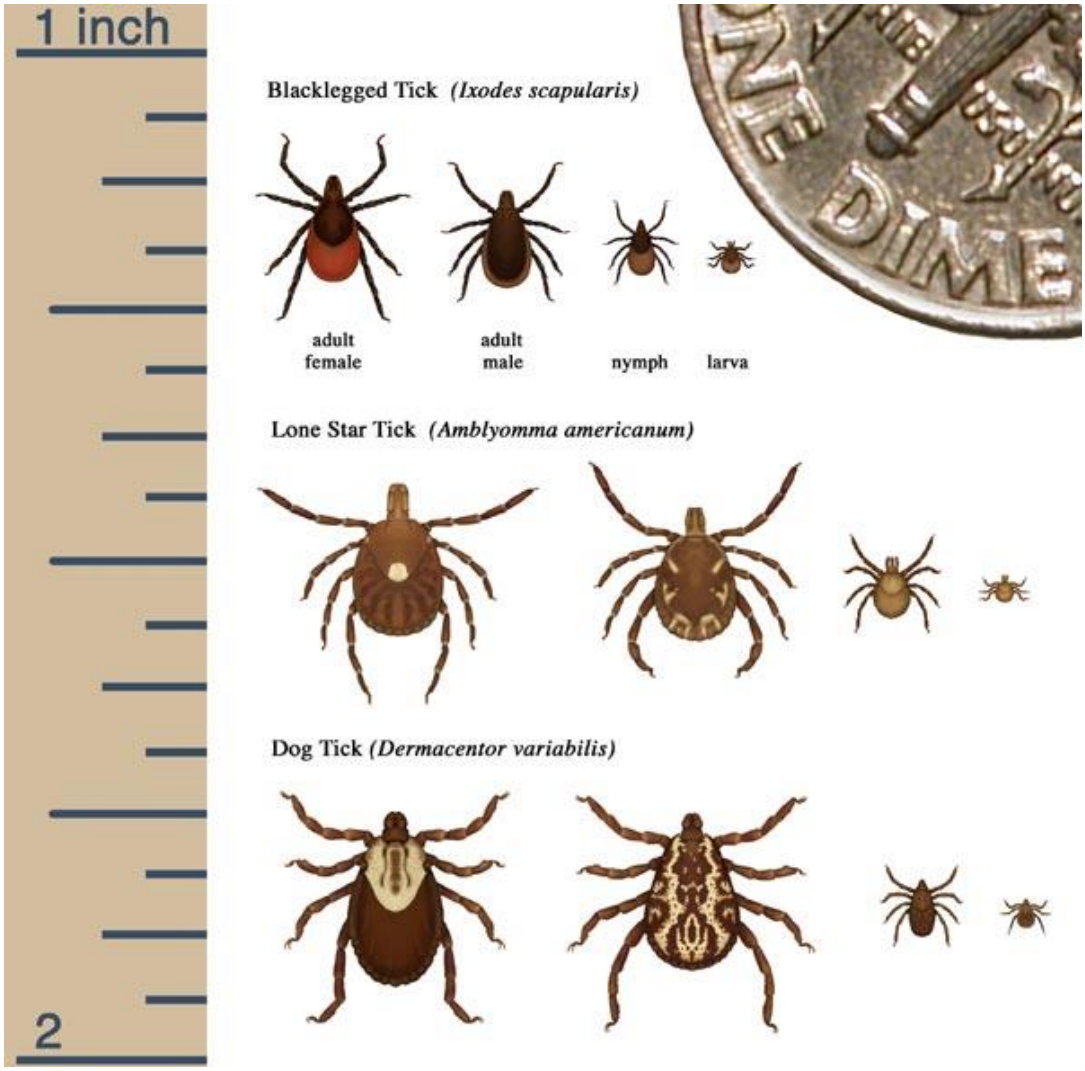
Ticks attach to their host's skin and feed on its blood, creating an opportunity for the transmission of disease. The first symptoms of tick-related disease are flu-like chills, fever, headache, dizziness, fatigue, stiff neck, and bone pain. If treated promptly by a physician, most individuals recover fully in a short period of time. If not treated, more serious symptoms can

occur. Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States. If an employee believes a tick has bitten him/her, or if any of the signs and symptoms appears, the Site Supervisor or SSHO will direct the employee to visit a physician for examination and possible treatment.

When working in areas that might be infested with ticks, personnel should limit the amount of unprotected skin. Light-colored clothing is preferred for higher visibility of ticks. If heavy concentrations of ticks or other insects are anticipated or encountered, Tyvek coveralls will be used for added protection. Personnel should examine their own and their co-workers' clothing frequently for the presence of ticks and should avoid contact with bushes, tall grass, or brush as much as possible when walking in wooded areas.

If a tick is discovered, it should be detached with a fine-tipped tweezers, not with the fingers. The tick should not be twisted as it is detached, and its bloated body should not be squeezed. All parts of the tick should be removed, and the bite area should be washed thoroughly with soap and water and disinfected with alcohol or a similar antiseptic after the removal. The tick should be saved in a small container labeled with the date, the body location of the bite, and the likely source of the tick.

Tick Examples



3.5.2 Stinging Insects

Stinging insects present a serious threat to personnel, and extreme caution must be exercised whenever site and weather conditions increase the risk of encountering stinging insects. Nests and hives for bees, wasps, hornets, and yellow jackets often occur in the ground, in trees and brush and under the eaves of buildings. Work areas will be checked for obvious nests and hives before work is started.

Insect stings are responsible for more deaths in the United States than the bites and stings of all venomous creatures. This is due to hypersensitivity and/or sensitization to toxins from repeated stings, which can result in anaphylactic reactions. Anaphylactic shock manifests itself very

rapidly and is characterized by extreme swelling of the body, eyes, face, mouth, and/or respiratory passages. Individuals who are hypersensitive to such stings and have life-threatening allergies should carry a kit containing antihistamine and epinephrine, and will not work in areas where there is a significant potential for insect stings.

Bites and stings can be painful and may elicit an allergic reaction. To reduce the pain, ice should be placed over the sting and an analgesic corticosteroid lotion applied. If the stinger is embedded in the skin, it should be removed by teasing or scraping rather than pulling. If simple first-aid measures do not alleviate the symptoms, the victim should be taken to the nearest medical center. The offending insect should be killed and taken to the emergency room with the victim if this can be done quickly and without endangering other personnel.

3.5.3 Biting Insects

The biting insects of greatest concern are spiders, especially the black widow and the brown recluse. These spiders are of special concern due to the significant adverse health effects that can be caused by their bites.

The black widow is a coal-black, bulbous spider. The female, whose bite is toxic, has a body length of approximately 1/2 inch and an overall length of about 1-1/2 inches, with a bright red hourglass marking on the underside of the abdomen. The black widow is usually found in dark, moist locations, especially under rocks and rotting logs, and may be found in outdoor toilets.

The brown recluse is brownish to tan in color, rather flat, 1/2 to 5/8 inches long, with a dark brown "violin" shape on the underside. It is most often found in trees or in dark locations.

There is no effective first aid treatment for either of these bites. Except for very young, very old, or weak victims, these spider bites are not considered to be life-threatening; however, medical treatment must be sought to reduce the extent of tissue damage caused by the injected toxins.

Brown Recluse

Black Widow (Bottom View)

Black Widow (Top View)

3.5.4 Snakes and Rodents

Snakes may be present in the work area. Workers will be advised to avoid reaching into areas where they cannot see and under items resting on the ground, and to avoid walking through brushy areas. If a snake suspected of being poisonous is observed, the SSHO should be advised, and a warning given to site personnel to avoid walking in the area. If a person is bitten, an identification of the snake should be made if possible, and the person transported immediately to the medical center.

Workers should also be aware that if there is evidence of the presence of rodents, the hazards associated with exposure to Hantavirus may be present. Site personnel must be warned to avoid direct contact with dead rodents or dried fecal material, and to avoid exposure to airborne dust where dried rodent fecal matter may be present.

Common Snakes of California

California King Snake

Western Yellow-bellied Racer

California Striped Racer

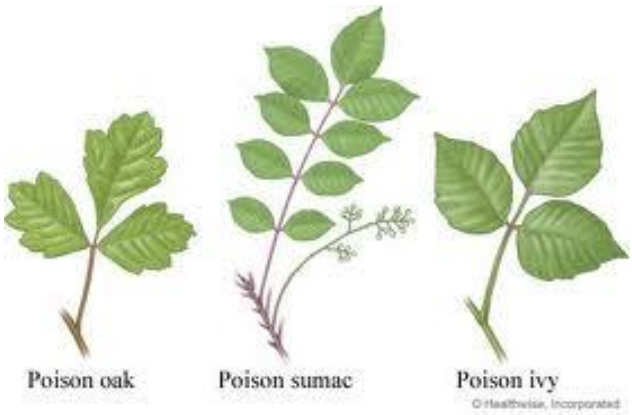
Ring-necked Snake

Western Rattlesnake

Gopher Snake

3.5.5 Poison Oak or Ivy

Poisonous plants (primarily poison oak) may be present in the work areas. These plants contain a resin that causes a delayed allergic hypersensitivity reaction following contact. The resin is active in live, dead, dry, and burned plant parts, and may be carried through the air. Signs and symptoms are usually evident within 24 to 48 hours after exposure. These include burning, stinging, and blisters. Site personnel should notify the SSHO if these plants are observed. If exposure or contact occurs, the affected area should be washed, and care should be taken so that the resin does not spread to uncontacted areas. Protective clothing may be required.



3.5.6 Blood-Borne Pathogens

Blood-borne pathogens are microorganisms present in human blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus and human immunodeficiency virus. All ITSI Gilbane Company employees will be responsible for identifying potential exposures, and reporting them to their supervisors or health and safety staff. It is anticipated that the only potential exposure to blood-borne pathogens would occur during first aid given to injured persons on site.

If a potential for exposure to blood-borne pathogens is encountered, first aid responders will don the appropriate PPE from the site first aid kit, which may include latex or nitrile gloves, safety glasses, and Cardiopulmonary Resuscitation (CPR) shields. Minimum safe work procedures to minimize the risk of employee exposure, including the appropriate hygiene practices, are presented in ITSI Gilbane Company's Corporate Health and Safety Program.

4.0 HEALTH AND SAFETY PERSONNEL AND RESPONSIBILITIES

Personnel on site will be responsible for continuous adherence to this SSHP during the performance of their assigned work. In no case may work be performed in a manner that conflicts with the requirements or intent of this SSHP. After due warnings, personnel violating safety procedures will be dismissed from the site and possibly terminated from this project. All personnel are expected to report unsafe acts or conditions, near misses or other safety problems immediately to their supervisors and the SSHO. If there is any dispute with regard to health and safety, assistance should be requested from the ITSI Gilbane Company Health and Safety Manager (HSM). The qualifications, responsibilities, and reporting structure for health and safety personnel are described in the following subsections. Figure 3 presents the lines of responsibility between ITSI Gilbane Company, the NAVFAC, and ITSI Gilbane Company's subcontractors for this project.

4.1 ITSI GILBANE COMPANY PROJECT MANAGER

The ITSI Gilbane Company Project Manager, Ed Palser, will have overall responsibility for successful and safe completion of the project, and for management of ITSI Gilbane Company crews. The ITSI Gilbane Company Project Manager will be responsible for assuring that ITSI Gilbane Company project personnel are trained and qualified for their assigned tasks; setting expectations for the safe performance of their work; and assuring that all necessary safety equipment is provided to them. The Project Manager will also be responsible for assuring that all required recordkeeping is completed, including inspections, training documentation, and accident reporting and investigation.

4.2 ITSI GILBANE COMPANY HEALTH AND SAFETY MANAGER

The ITSI Gilbane Company HSM, Mr. Jeremy Sawyer, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP), has reviewed and approved this SSHP, will approve all changes to the SSHP during the course of project activities, and will provide support to the site SSHO as HSM for questions or problems relating to health and safety concerns at the site. Mr. Sawyer has over 12 years of experience managing safety and occupational health at hazardous waste site cleanup operations. HSM responsibilities also include reviewing and monitoring compliance with this SSHP and other industry standards; implementing corrective measures for health and safety deficiencies; and ensuring required training and medical monitoring of

personnel. If, in the course of this project, changing conditions require revisions/additions to this SSHP, the HSM will review the problems and, if necessary, issue new directions and/or changes to this SSHP. Specific duties of the HSM will include:

- Approving and providing necessary updates to this SSHP
- Providing technical assistance to site personnel on an as-needed basis
- Arranging for employee exposure air monitoring as required
- Arranging for additional hazard-specific training for employees working on the site, as required.

4.3 SITE SUPERINTENDENT/ SITE SAFETY AND HEALTH OFFICER

ITSI Gilbane Company has appointed Mr. Tony Olmstead as Site Superintendent and Site Safety and Health Officer (SSHO) during this project. As Site Superintendent, he will have overall responsibility for implementation of the field activities, and for the health and safety of all site workers and visitors. The Site Superintendent will assure that all activities are conducted in strict accordance with the approved Work Plan requirements and that no work is performed unless a designated competent person is present on the job site. He will oversee the work of ITSI Gilbane Company subcontractors, and will communicate directly with the ITSI Gilbane Company PM.

As SSHO Mr. Olmstead will have overall responsibility for implementation of the field activities. Mr. Olmstead has the required experience implementing safety and occupational health procedures at cleanup operations. He will assure that all activities are conducted in strict accordance with the approved Work Plan and SSHP requirements, while protecting the health and safety of on-site workers.

He will oversee the work of ITSI Gilbane Company's subcontractors, and will communicate directly with the Project Manager and client representatives. As SSHO, Mr. Olmstead will be directly responsible for implementation of, and compliance of site personnel with, this SSHP, and will be on site or within ready communication at all times. The SSHO will also enforce the minimum requirements of this SSHP for all personnel on site, including subcontractors. The SSHO will function as the Response Coordinator in case of an emergency. The SSHO has the responsibility and authority to modify and stop work, and/or to remove personnel from work areas, if conditions warrant. Other SSHO responsibilities will include:

- Reviewing, understanding, and administering this SSHP in the field
- Conducting health and safety oversight of ITSI Gilbane Company and subcontractor personnel
- Monitoring daily weather and site conditions
- Performing and documenting daily worksite inspections, tracking corrective actions and maintaining a site chemical inventory
- Coordinating and conducting daily tailgate health and safety meetings
- Halting project activities, when necessary, for significant noncompliance with this SSHP
- Ensuring proper emergency notifications to client personnel
- Investigating exposure incidents and injuries
- Completing incident reports
- Establishing on-site and off-site communications

4.4 SUBCONTRACTOR SITE SUPERVISORS

All subcontractors to ITSI Gilbane Company will be directly responsible for implementing and complying with this SSHP as the minimum health and safety requirements on site. Each subcontractor performing on-site activities will designate a responsible person to act as the company's Site Supervisor and competent person for health and safety. Each subcontractor Site Supervisor will act as response coordinator for that company's employees in case of an emergency. The on-site project supervisors for each subcontractor are responsible for oversight of the site activities for their own personnel. They are directly responsible for implementation of, and personnel compliance with, this SSHP.

- Subcontractor Site Supervisors will have the following responsibilities with respect to their employed personnel:
- Conducting and documenting daily heath and safety inspections of the subcontractor's work areas
- Ensuring that all site personnel receive the necessary training, medical monitoring, and respirator fit-testing, as required, prior to working on site
- Performing site-specific training as needed
- Performing personal exposure air monitoring as required
- Providing regular pre-task health and safety briefings
- Ensuring that employees follow proper hygiene procedures

- Reporting accidents and incidents
- Preparing safety-related documentation and work logs

4.5 SITE WORKERS

All site workers are expected to comply with the requirements of this SSHP, especially requirements for work practice controls and PPE. Employees must report all unsafe conditions, accidents, incidents, near misses, and/or injuries that occur at the jobsite to their supervisors immediately.

5.0 EMPLOYEE TRAINING REQUIREMENTS

5.1 VISITORS AND VENDORS

All visitors and vendors on site must receive a briefing by the Site Superintendent or SSHO regarding the basic safety rules on site, such as speed limit, work zones, and emergency procedures. This briefing will be documented on the Visitor Sign-In Log, included in Appendix D of the APP.

5.2 EXCLUSION ZONES

All on-site personnel who may enter an EZ will be required to have the appropriate prior experience and training, in compliance with 29 Code of Federal Regulations (CFR) 1910.120 and 8 California Code of Regulations (CCR) 5192. Such training includes the 40-hour basic training, 3 days of supervised field experience, 8-hour update training, and site-specific training such as radiological hazard awareness.

5.3 SITE-SPECIFIC TRAINING

All personnel performing work on site will receive site-specific training, conducted by the Site Superintendent or SSHO and documented on the HSP Acknowledgement form, prior to the initiation of the on-site activities to which the training applies. This training will include:

- Review of this SSHP
- Key personnel and lines of authority
- Project activities and potential hazards
- Physical hazards on site
- Chemical hazards on site
- Baseline Radiation Awareness Training
- Hazard Communication training for handling chemical products, as necessary
- Work zones
- Training and medical monitoring requirements
- Site safety rules and conditions of access
- Required personal protective equipment
- Emergency response procedures and route to the hospital
- Hazard and accident reporting requirements
- Rights to access medical and exposure monitoring records.

A copy of this SSHP, including all attachments, will be maintained on site, and will be available to site employees. Documentation of this availability will be included with documentation of the training.

5.4 HAZARD COMMUNICATION TRAINING

All personnel on site who may be exposed to chemical hazards related to chemical products brought on site will receive Hazard Communication training. This training will include a review of the chemical products and MSDS, routes of exposure, potential physical and toxicological hazards, appropriate handling procedures, safe storage, labeling, and personal protective equipment.

5.5 SITE SUPERINTENDENT

The Site Superintendent must have completed the 8 Hour Hazardous Waste Operations and Emergency Response Supervisor Training and the 30-hour Occupational Safety and Health Administration (OSHA) Construction Safety training.

5.6 SITE SAFETY AND HEALTH OFFICER

The SSHO must have completed the 30-hour Occupational Safety and Health Administration (OSHA) Construction Safety training and 8 Hour Hazardous Waste Operations and Emergency Response Supervisor Training with appropriate refresher training.

5.7 FIRST AID AND CARDIOPULMONARY RESUSCITATION

At least two persons with current training and certification in first aid and CPR must be present on site during field work. The various employers on site may pool personnel to meet this requirement. The ITSI Gilbane Company SSHO will coordinate any pooling efforts.

5.8 TAILGATE SAFETY MEETINGS

On-site tailgate meetings will be held before each workday to reinforce pertinent topics from the site-specific training, coordinate work activities, address task-specific hazards and protection levels, and anticipate problems that may arise during the day. Topics will include site-specific hazards, accident investigation results, air-monitoring and employee exposure monitoring results, and any specific employee concerns that may arise during the project.

The Site Superintendent, SSHO or subcontractor's supervisor will conduct these meetings for their respective crews. These meetings may be combined into a single meeting in order to aid

coordination between the contractors. The SSHO will review and document the items discussed at the tailgate meeting. Attendance and the items discussed at the meeting will be documented (using the appropriate safety form as provided in Appendix C of the APP) as part of the daily documentation for the site. The Supervisors for the various employers will coordinate work activities on a daily basis.

6.0 PERSONAL PROTECTIVE EQUIPMENT

Specific designations for PPE are identified in the appropriate Activity Hazard Analysis for each task. General guidance for PPE is identified in this section. All PPE must meet ANSI standards, where applicable. The minimum level of protection for personnel working on site is Level D PPE, which includes:

- Work clothes
- Protective-toe boots
- Safety glasses with side shields
- Hard hat (When an overhead hazard exists or working around heavy equipment)
- High-visibility (ANSI Class 2) vest/garment

During activities where skin contact is a potential exposure mechanism, such as during activities that may involve direct contact with radiologically contaminated materials, Tyvek coveralls, nitrile gloves, and chemical-resistant boots will be utilized. Tyvek coveralls will prevent contaminated dirt including radiologically contaminated soil from getting onto employee's work clothing, being transferred in their vehicles, and taken home. These coveralls do not protect against wet materials. If contact with wet materials is a possible, polyethylene-coated Tyvek coveralls and rubber boots and gloves will be required. Chemical goggles or safety glasses in conjugation with a face shield will be worn during all activities with a splash potential.

Personal flotation devices (PFDs) will be worn (zipped, tied, latched, etc., in closed fashion) by all persons in the following circumstances:

a. On floating pipelines, pontoons, rafts, or stages;

b. On structures or equipment extending over or next to water except where guardrails, personal fall protection system, or safety nets are provided for employees;

c. Working alone at night where there are drowning hazards, regardless of other safeguards provided;

d. In skiffs, small boats, or launches, unless in an enclosed cabin or cockpit; or

e. Whenever there is a drowning hazard.

Coveralls or other protective clothing may be worn to prevent exposure to poison oak.

Respiratory protection is not anticipated to be used during this project. All personnel using respiratory protection voluntarily must meet all requirements of the respective employer's Respiratory Protection Program, including medical clearance to wear a respirator, fit testing, and training on the proper selection, use, and limitations of respirators.

Voluntary use of respiratory protection is allowed, but may only involve equipment provided by the employer. Voluntary use of filtering face-pieces (dust masks) will also be allowed for nuisance dust only. Employees voluntarily using filtering face-pieces must receive a copy of Appendix D of 1910.134 (Mandatory) Information for Employees Using Respirators When not Required Under Standard.

Hearing protection, when required, will consist of the worker's choice of earplugs or earmuffs. Workers will be instructed to utilize hearing protection whenever normal conversation at approximately three feet or arm's length becomes difficult due to work area noise levels.

7.0 MEDICAL MONITORING

All personnel working on site will participate in a medical monitoring program appropriate to their work as per 29 CFR 1910.120 (f). Any site personnel and visitors who have not received medical clearance will be excluded from the active work areas. Employees not directly involved with materials handling or disposal, and not likely to be exposed to site contaminants, are not subject to the medical monitoring requirements.

All on-site personnel working in an EZ will participate in a medical monitoring program in compliance with 29 CFR 1910.120/8 CCR 5192. The monitoring program will consist of either a corporate annual physical examination or a pre-employment physical (if the employee was hired specifically for this job) provided by a board-certified occupational medicine physician, which includes:

- Medical and occupational history
- Physical exam
- Pulmonary function test
- Electrocardiogram
- Audiogram
- Blood chemistry
- Complete blood count with differential and platelets
- Urinalysis with dipstick and microscopic morphology
- Chest x-rays.

For those employees who work infrequently in the EZ, i.e., site visitors and those needing only occasional access, the medical exam will be that which the examining physician determines is sufficient given the potential level of exposure.

All personnel wearing respiratory protection must have medical clearance to wear respirators, in accordance with 29 CFR 1910.134. The medical exam will be that which the examining physician determines is sufficient to provide clearance to use respiratory protection.

Post-project physical examinations will be conducted in light of actual site conditions and exposures. Additional monitoring may be required based upon initial results of examination, employee symptoms, or physician request. Employee medical records will be maintained to

preserve their confidentiality. As required by 8 CCR 3204, Access to Medical and Exposure Records, employees shall have the right to access their personal records. Medical and exposure records will be managed in accordance with the provisions of Section 16.0 - LOGS, REPORTS, AND RECORD KEEPING.

8.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Real-time monitoring for airborne dust will be conducted only during intrusive field activities involving excavation to provide an indication of the adequacy of the dust-control measures. Monitoring will be conducted utilizing MiniRAM or Personal DataRAM real-time aerosol monitors, or equivalent. Monitoring will be conducted periodically utilizing the instrument in a hand-held fashion in the work area. These monitors will be connected to an alarm programmed to activate at a level of 0.5 milligrams per cubic meter (mg/m^3). If the alarm is activated, the work activities will be evaluated to determine the source of the dust, and additional dust control measures will be implemented immediately. In addition to the real-time air monitoring, visual dust will be used as an indicator for application of water as a dust suppressant and/or modification of work techniques to minimize dust generation.

9.0 HEAT AND COLD STRESS

Controls and conditions for Heat and Cold Stress can be found in Section 3.4.1.

10.0 SITE SAFETY PROVISIONS

10.1 EXPOSURE CONTROL METHODS

10.1.1 General Approach and Schedule of Implementation

Employee exposures to the site contaminants may be minimized through engineering and administrative controls, and through the use of PPE. Engineering and administrative controls will be used wherever possible, even if PPE will also be utilized. Exposure control methods will be implemented before any work with contaminated materials is performed on site, and protective measures will be utilized at all times during activities on the work site with the potential to create exposure. These controls include proactive use of water spray, careful handling of soils and other materials; establishment of work zones; establishment of appropriate housekeeping and decontamination procedures; assignment of the appropriate personal protective equipment; and provision of hygiene facilities for personnel hand and face washing. In addition, all personnel must show proof of the appropriate level of training before working on the site.

10.1.2 Work Zones

Work zones will be established during all work involving hazardous materials handling, in accordance with the provisions of Section 11. Access to the work areas will be limited to authorized personnel with the appropriate protective equipment and training. All personnel working in an EZ or Regulated Area must perform the required decontamination procedures upon exiting the work zone.

10.1.3 Engineering and Work Practice Controls

Engineering controls for any soils or contaminated materials handling activities shall consist of those methods that produce the least airborne dust, and the judicious use of water spray to minimize dust emissions. All work will be performed with the goal of eliminating visible airborne dust emissions. All work activities will be evaluated prior to implementation for their potential to produce dust, and the appropriate proactive measures will be implemented.

Visible dust will be used as an indicator of the need to increase water application. Dust control on site will be accomplished through water spray on excavated materials, roads, and other open

soil or waste surfaces as necessary. Water application will be increased and work slowed down as necessary during higher wind conditions. Water spray will be applied in advance of the work activities wherever possible, to allow the water to soak into the soil as a means of avoiding muddy conditions. Water will be applied carefully in order to avoid slick conditions.

Waste will be handled in such a manner to minimize their spread. Contaminated materials will be stored in approved containers pending disposal.

Dermal exposure will be controlled by limiting contact, the use of protective clothing as appropriate and personal hygiene. Ingestion hazards will be controlled by strict prohibition of eating, drinking, and smoking in the EZs and decontamination zones, and by rigorous application of decontamination and personal hygiene protocols.

10.1.4 Housekeeping

Active work areas and equipment must be cleaned daily to prevent the accumulation of contaminated dust and debris, and waste materials must be contained on an ongoing basis. Dry sweeping and blowing with compressed air will not be used to clean up or remove contaminated debris or dirt. Removal of materials from equipment or protective clothing by blowing, shaking, or any other means, which may disperse materials into the air, is prohibited. All eating areas shall be kept clean and sanitary.

10.1.5 Inspections

The SSHO and Site Supervisor(s) will make daily inspections of the work site and employee work practices to ensure compliance with this SSHP, note changed conditions, and identify new hazards. These inspections will be recorded in the daily log, and all necessary corrective actions will be implemented in a timely manner. Additionally, periodic in-depth inspections will be performed. These inspections should include, but are not limited to: housekeeping, implementation of tailgate meetings, employee training, employee exposure monitoring, project recordkeeping, accident investigation and recordkeeping, equipment maintenance and inspection, compliance with standard work procedures, response to employee safety concerns, and specific hazard communications.

10.1.6 Hazard Communication Program and Labeling

A chemical inventory and MSDSs for chemical products that may be required during site operations will be maintained on site, and will be updated by the SSHO as new chemicals are brought on site. Employees will receive training in the safe handling of hazardous materials purchased for project activities. All chemical containers must remain labeled with the manufacturer's original label that describes the hazardous properties of the material. If the label is damaged during shipment and cannot be read, a new one must be obtained from the manufacturer. If chemicals are transferred to other containers, the second container must be labeled with the chemical product identity and primary hazards. The SWP for Hazard Communications is attached in Appendix C of the APP.

All on-site personnel are expected to conduct themselves in a professional manner on site. Appropriate conduct includes following established work rules, and supporting the safety of others. Violation of established work rules will result in disciplinary action, which may include verbal warning, written reprimand, removal from the site, and/or termination of employment.

10.2 GENERAL SITE HEALTH AND SAFETY WORK RULES

- All employees must complete the required training programs and submit copies of required certifications prior to starting work at the site.
- No consumption or possession of alcoholic beverages or illegal drugs will be allowed on-site. Anyone reporting to work under the influence of alcohol and/or illegal drugs will be subject to disciplinary action. Any employee under a physician's care and taking prescribed narcotics must notify the Site Supervisor.
- Personal Protective Equipment is required in designated areas. Such equipment may include, but is not necessarily limited to: hard hat, safety glasses with side shields, protective-toe boots, high-visibility garments, gloves, earplugs/earmuffs, protective face shield or splash goggles, and respiratory protection.
- Smoking is allowed only in designated areas. Eating, drinking, smoking, and the chewing of gum or tobacco are not allowed in the Exclusion Zones or Regulated Areas.
- Changes in work practices or work rules will be implemented only after approval by the SSHO and/or the HSM.
- Construction equipment always has the right-of-way over regular vehicles.
- Employees must listen for warning signals on construction equipment and must yield to construction equipment at all times. When working around heavy equipment, employees shall routinely establish eye contact with the equipment

operator so that they are certain that the operator has seen them and knows where they are.

- All equipment operators shall pay deliberate attention to workers on the ground who may be in their path, and provide these people with warning before moving the equipment.
- The wearing of seat belts in personal vehicles, trucks, and equipment is mandatory.
- All workers must follow emergency procedures and instructions from supervisors and health and safety personnel explicitly.
- For any potentially hazardous compounds brought to the site, an MSDS will be provided and will be kept in an on-site binder.
- All workers will demonstrate proper etiquette as the Site lies on a former military base. Workers will enter and depart the Site using routes designated by the Site Superintendent.

10.3 CONDITIONS OF ACCESS TO EZS

- All personnel must meet the medical monitoring requirements described in this SSHP. Failure to submit to, or pass, any examination will be grounds for excluding the employee from the site.
- As required for site-specific work, employees must participate in an air quality exposure-monitoring program by wearing personal monitors or sampling devices or radiation dosimeters designated by the SSHO or RCT. Any employee refusing to participate in the program, or tampering with a monitoring device or sample, will be subject to disciplinary action.
- No beards, goatees, or long sideburns will be allowed by personnel who will be using respiratory protection since they interfere with the seal of the respirator to the face. Trimmed sideburns and mustaches are acceptable. All employees who may be using respirators must report to work clean-shaven in any area of the face that comes in contact with the face-piece seal.
- All on-site personnel must wear the prescribed health and safety equipment, and go through specified decontamination procedures upon exiting the EZ.
- Protective clothing to be worn inside the work areas will be supplied. None of this clothing will be permitted to leave the site with any employee for personal use. Any equipment to be used elsewhere for another project will be fully decontaminated before it is removed from the site.
- Kneeling or sitting directly on the ground in the EZ is prohibited.
- All employees will utilize a buddy system while working on the site.

11.0 WORK ZONES AND SITE SECURITY

This section presents work zone designations and site security procedures. The site is located within the boundaries of Hunters Point Naval Shipyard, and all applicable Hunters Point Naval Shipyard security provisions will be followed by workers. Additional restrictions within the overall site will consist of establishment of Exclusion Zones (EZs) at each area where contaminated materials are handled, Decontamination Zones for equipment and personnel cleanup, and Support Zones.

11.1 EZS

The active work areas around each location where contaminated materials are stockpiled or may be encountered or intrusive activities may occur will be considered EZs. The EZs will be established to accommodate all equipment, personnel, and vehicular movement where the potential for exposure to hazardous materials exists, such as loaders, dump truck operations, soil stockpiles, etc.

The EZs will be modified, as necessary, as the work progresses at a specific location. The EZ will be demarcated by barricades, warning tape, temporary construction fence, and/or other appropriate measures, as well as signs posted in English and, if appropriate, in any other language necessary for all workers and visitors to clearly understand. Access to these areas will be limited to authorized personnel with the appropriate protective equipment, who have met the training and medical requirements, as specified in the appropriate sections of this SSHP, appropriate for their work effort. Personnel working in these areas will utilize the buddy system.

Site activities in the EZ will stop if unauthorized personnel enter the area and work will not resume until those individuals have exited the area. Eating, drinking, and smoking will be prohibited in these zones in order to prevent inadvertent ingestion of contaminated materials.

11.2 DECONTAMINATION ZONES

Decontamination zones will be located immediately adjacent to each EZ. All site personnel working in the EZs must pass through the Decontamination Zone before proceeding to the Support Zone. Personal protective equipment cleaning and storage areas will be included in the Decontamination Zone. Equipment and vehicle decontamination areas will be located immediately adjacent to the work areas, in a manner that prevents tracking of contamination

from the source location to other areas. Temporary equipment decontamination wash pads will be constructed as necessary; all wash water will be collected for appropriate testing and subsequent disposal.

11.3 SUPPORT ZONE

A Support Zone will be established outside each Decontamination Zone. An eyewash station, first aid kit, fire extinguisher, potable water, emergency communications equipment, and sanitary facilities will be maintained in each support zone. Portable or fixed toilet facilities will be provided and maintained in sanitary condition. Sufficient toilets will be available to provide one unit for every 20 workers of each gender. Hand washing facilities will be provided adjacent to the toilets. Adequate supplies of paper towels, toilet paper, and hand soap will be maintained at all times.

12.0 PERSONAL HYGIENE AND DECONTAMINATION

12.1 HYGIENE FACILITIES AND SANITATION

Portable toilet and hygiene facilities for the work crews will be located in clean areas near the work area. The number of toilets and the servicing interval will be appropriate for the size of the work crew. There will be a minimum of one toilet for every 20 workers of each sex, or fraction thereof, at the site. Toilet facilities will be lockable. The supervisor or foreman will assure that adequate breaks are given for personnel to use the toilet facilities. A portable-hand washing facility with adequate supply of soap, running water, and towels will also be provided. The SSHO and Site Supervisors will ensure that employees wash their hands and faces thoroughly before breaks, before lunch, and at the end of the work day. Potable water in closed containers will be available on site.

12.2 PERSONAL DECONTAMINATION

Personal decontamination will occur in the decontamination zones directly adjacent to each EZ. Disposable PPE will be placed in trash bags and disposed of in on-site trash receptacles for subsequent off-site disposal. As needed, wash tubs with soap and water and rinse tubs will be provided for decontamination of boots and outer gloves that will be re-used. Respirators, if required, will be cleaned with respirator wipes unless gross contamination requires heavier cleaning in separate wash and rinse tubs. Soap and running water will be available for personnel to wash up after work, prior to eating, drinking or smoking or if any skin contact occurs during the workday.

13.0 EQUIPMENT DECONTAMINATION

The primary method to be used to prevent equipment or truck contamination is to prevent or minimize travel through contaminated materials. Any equipment that comes in contact with contaminated materials will be properly cleaned before being removed from the site. Equipment decontamination will be in proportion to the degree of contamination encountered.

Equipment decontamination is expected to require only gross removal of soils from buckets or wheels. Shoveling, wet- or damp-brushing or wiping will be the primary decontamination methods used for equipment. Wastes removed from equipment will be returned to the appropriate waste stockpile or placed with the load of waste for transport.

If necessary, when heavier contamination is present, equipment and vehicles will be washed with a pressure washer. Any pressure washing will be performed over a lined area. Decontamination will proceed until all soil and residues are removed. Waste liquids will be contained and disposed of properly.

Small equipment will be washed in the same manner as contaminated personal protective equipment (i.e., with a brush and soapy water and rinse water).

All equipment will undergo radiological surveys per the ITSI Gilbane Sampling and Analysis Plan (SAP- see Project Execution Plan) before being released as clean and able to leave the site.

Employees exiting the work area will wash any boots and/or gloves to be reused in the buckets provided for washing and rinsing, and will remove contaminated clothing items carefully and place them in the appropriate containers.

13.1 DECONTAMINATION WASTE HANDLING

Decontamination wastes are expected to include disposable PPE and wash/rinse fluids. Bags of contaminated PPE will be included in the loads of contaminated waste for transport to the disposal facility.

Decontamination fluids are expected to be containerized on site in DOT-approved containers prior to disposal. If approval for discharge to the sanitary sewer is not received due to contaminants exceeding regulatory limits, liquid wastes will be disposed of at a licensed waste

disposal facility based upon analytical results from representative samples, under the appropriate documentation (e.g., bill of lading or manifest).

14.0 EMERGENCY EQUIPMENT AND FIRST AID

14.1 EMERGENCY EQUIPMENT

Emergency equipment available on-site, to be used only by trained personnel, will consist of:

- First aid kit in the site trailer, and trauma kits in the Site Superintendent's and SSHO's vehicles, as a minimum
- Fire extinguishers, with A,B,C rating. Fire extinguishers will be available, in each supervisor vehicle (minimum 5 pounds ABC), on each piece of heavy equipment (minimum 10 pounds ABC), and immediately available to all fueling operations (minimum 10 pounds ABC). Fire extinguishers will receive a full inspection annually by a qualified service technician, and a visual inspection monthly and during each job site inspection. Fire extinguishers will be re-charged as necessary by a qualified service technician.
- An eyewash station that meets the criteria of ANSI standard Z-358.1-2004 or later, will be available on site and located within immediate use of areas with injurious substances, such as fueling areas and the EZ.

Spill control materials will be immediately available to all chemical and waste handling areas. These materials will include the appropriate absorbent pads for the materials, noncombustible granular absorbent material, polyethylene sheeting, DOT-approved drums/containers, shovels and assorted hand tools, and the appropriate PPE.

15.0 EMERGENCY RESPONSE

Potential on-site emergencies are expected to be restricted to fires, injuries to site personnel, or minor spills. Site conditions are generally expected to be within the limits of response measures which can be taken by on-site personnel. Any emergency that is life-threatening, or which poses a potential threat to the public, will be considered a situation requiring outside assistance from emergency response agencies. The Fire Department listed in Table 1, will provide first response support for fire, medical, and rescue emergencies. During any on-site emergency, work activities in the affected area will cease until the emergency is brought under control. Site workers will report incidents to the Site Superintendent, who will report them in turn to the client and the appropriate agencies. Figures 4 and 5 present the Hospital Route and Gathering Point, respectively. Table 1 presents the Emergency Contact information.

15.1 EMERGENCY RESPONSE ASSIGNMENTS

The SSHO will function as Response Coordinator for emergency operations at the site and will function as the initial site contact for response teams arriving at the site. The Response Coordinator will assign additional roles during the emergency, as needed.

15.2 EMERGENCY REPORTING AND COMMUNICATIONS

Site personnel must report all incidents to their supervisors immediately. The supervisor will assure the appropriate notifications are made. If the Supervisor or SSHO is not immediately available in emergency situations, site personnel may contact outside responders directly.

Table 1 contains the project emergency contact information, and Figure 4 contains the route to the hospital. This information will be maintained in the site trailer and in all site vehicles. All personnel working on site will be informed of these emergency numbers and emergency routes, and will also be informed of evacuation routes, meeting places, and evacuation warning signals in case of the need for an evacuation.

Normal onsite communications will consist of verbal communication, radio and cellular telephones. Cell phone reception will be tested upon mobilization to the site. The Site Superintendent will provide telephone notification to local response agencies and designated client and other agency contacts. After local agencies have been notified, an individual will be assigned to wait at the project entrance to provide initial information regarding the nature of the

emergency and direct response teams to the Response Coordinator. The Site Superintendent will assure that the appropriate notifications are made to the client representative. Any spill will be reported to the client immediately.

Local (site) evacuations will be signaled by site personnel verbally or through repeated three long blasts of vehicle or equipment horns. Emergency evacuation drills will be conducted by the SSHO on a periodic basis.

15.3 EMPLOYEE INJURY OR ILLNESS

If an employee is injured or becomes ill, he or she shall be removed from the work area if it can be done safely and without aggravating medical conditions. An injured individual should be moved only under the following circumstances:

- When there is immediate danger (e.g., risk of fire/explosion, lack of oxygen, collapsing structure)
- When the location of the individual is obstructing co-workers or emergency personnel from caring for another individual who needs immediate attention
- When the movement is necessary to administer proper care (e.g., transfer of the individual to a firm, flat surface for cardiopulmonary resuscitation).

Minor injuries may be treated by trained personnel at the site. Only individuals currently trained in first aid and CPR shall render this type of assistance. Personnel designated to provide first aid to injured workers will receive training and information for blood borne pathogens. Potentially affected individuals will be advised of the hazards and modes of transmission of blood borne pathogens. The site first-aid kit(s) will be outfitted with universal precaution protective gear for prevention of exposure to blood borne pathogens during treatment of injured workers. Any items which come in contact with blood or other body fluids will be "red bagged" and disposed as medical waste. Each employer having designated first aid responders on site must maintain its own Blood borne Pathogens Exposure Control Plan.

Injuries requiring more than first aid will be transported to the medical facility designated in Table 1 and Figure 4. Depending on the nature of the injury, site personnel may be transported in site vehicles or by ambulance. All life-threatening injuries will require contacting emergency responders and transport by ambulance.

Directions to the designated medical facility nearest the work location are included in Figure 4. This Figure will be kept in site vehicles that may be used to transport injured personnel. The list of the emergency contact information included in Table 1 will also be kept in site vehicles.

Whenever possible, personnel injured on site who have been exposed to chemical hazards will be decontaminated prior to transport to the medical facility, so long as such procedures do not further compromise the health and safety of the injured individual. Emergency employee decontamination should consist of removing protective clothing and washing affected areas with soap and water as necessary. If necessary, protective clothing should be cut away to minimize additional trauma to the injured person.

15.4 CHEMICAL EXPOSURES

The following procedures will be initiated as soon as possible in response to chemical exposures:

- For eye exposure, wash the victim's eyes immediately at the emergency eyewash station using large amounts of water for 15 minutes and lifting the lower and upper eyelids occasionally. If irritation persists see a physician.
- For skin exposure, remove any contaminated clothing and wash the contaminated skin areas promptly using soap or mild detergent and water. Obtain medical attention immediately if there are symptoms of chemical exposure (e.g., redness, blistering, or ulceration of the skin).
- For inhalation exposure, move the person to an area with clean air immediately (unless the scene is determined to be unsafe, or other injuries make moving the victim unadvisable). Keep the affected individual warm and at rest. Do not give anything to drink to an unconscious person. If person was or is unconscious, obtain medical attention immediately.
- For ingestion, contact the National Poison Control Center regarding the emergency response procedures specific to the ingested chemical.

15.5 FIRES

Fire risks will be minimized through proper monitoring of the work areas, proper work procedures, good housekeeping, and through the maintenance on-site of adequate fire extinguishers.

Site personnel will not engage in fire-fighting activities beyond the incipient stage. The local fire department will be called for any fire event. If a fire requires more than one fire extinguisher, site personnel will evacuate the area and wait for the fire department to respond.

15.6 SPILLS

Care will be taken to prevent spills during handling of liquids. Any spill of contaminated soil, fuel, chemicals, or groundwater will be contained and cleaned up immediately. Hand tools (shovels) and/or heavy equipment can be used to berm and contain site spills utilizing soil if necessary. Liquids will be containerized for appropriate disposal. Personnel handling contaminated materials shall be current in the training specified in this SSHP. For personnel entering the EZ, this includes 40-hour Hazardous Waste Operations training, which according to the OSHA standard must include the elements of spill response. Drums and other liquid storage will be staged such that a spill in the vicinity of a storm water drain is avoided, if at all possible. ITSI Gilbane Company's Spill Response SWP (included in Appendix B of the APP) will be followed in the event a spill occurs.

15.7 SITE EVACUATION

Potential reasons for site evacuation include earthquakes, fires, or explosions. In the unlikely event of site evacuation, verbal notification or three long repeated blasts on a vehicle or equipment horn will be used to sound the alarm. Employees will report to the supervisor's vehicle without delay, where the supervisor will conduct a head count and establish the proper means and route of evacuation to the gathering point shown on Figure 5. The Site Superintendent or SSHO will notify emergency personnel as soon as possible once all field team personnel are accounted for. If appropriate and safe, the Site Superintendent or supervisor and a "buddy" should remain near the site after the site has been evacuated to assist local responders and advise them of the nature of the incident.

15.8 ACCIDENT FOLLOW-UP

Accident follow-up will be performed in accordance with ITSI Gilbane Company's Corporate Health & Safety Program. Immediately following serious accidents, the appropriate notifications will be made to the ROICC and CO/COR and the appropriate agency (e.g., Cal-OSHA for serious injuries, National Response Center for releases, etc.). In all cases, the appropriate client notifications will be made. Following all accidents and near-misses, an investigation will be initiated by the ITSI Gilbane Company SSHO and Site Superintendent, utilizing the Accident/Loss Report form presented in Appendix D of the APP, in coordination with the ITSI Gilbane Company HSM. The focus of all investigations will be to collect accurate information,

to discern the underlying causes of the accident, to implement appropriate control measures to prevent future accidents, and to improve future emergency response procedures. Corrective actions will be implemented based on the findings; corrective actions will be tracked, and publicized to all affected employees.

16.0 LOGS, REPORTS, AND RECORD KEEPING

16.1 TYPES OF DOCUMENTATION

Health and safety-related documents will be maintained by the SSHO throughout the duration of project activities. These documents include, but are not limited to:

- SSHP
- Safety and Health Requirements Manual, EM 385-1-1 (USACE, 2008)
- 8 CCR 5192 (Hazardous Waste Operations)
- Site safety inspections
- Vehicle and heavy equipment inspections
- Safety equipment inspections
- Visitor sign-in logs and SSHP acknowledgements
- Tailgate Safety Meeting records
- Employee training and medical clearance (non-confidential) records
- Instrument calibration records
- Air monitoring records and documentation of employee exposures
- Accident or incident reports
- MSDSs for chemical products used on site and Chemical Inventory.

16.2 POSTINGS AND SIGNS

Warning signs will be utilized to warn personnel of work zones, special hazards, and PPE requirements. These notices will be posted in English and, if appropriate, in any other language necessary for all workers and visitors to clearly understand.

ITSI Gilbane will erect and maintain a safety and health bulletin board in a commonly accessed area in clear view of the on-site workers. The bulletin board shall be continually maintained and updated and placed in a location that is protected against the elements and unauthorized removal. It shall contain, at minimum, the following safety and health information:

- A map denoting the route to the nearest emergency care facility;
- Emergency phone numbers;
- A copy of the most up-to-date APP shall be mounted on or adjacent to the bulletin board, or a notice on the bulletin board shall state the location of the APP. The location of the APP shall be accessible on the site by all workers;

- A copy of the current AHAs shall be mounted on or adjacent to the bulletin board or a notice on the bulletin board should state the location of the AHAs. The location of the AHAs shall be accessible on the site by all workers;
- The OSHA Form 300A, Summary of Work Related Injuries and Illnesses shall be posted in accordance with OSHA requirements, from February 1 to April 30 of the year following the issuance of this form. It shall be mounted on or adjacent to the bulletin board, which shall be accessible on the site by all workers;
- A Copy of the safety and health deficiency tracking log shall be mounted on or adjacent to the bulletin board or a notice on the bulletin board should state the location where it may be accessed by all workers upon request;
- Safety and health promotional posters;
- Date of last lost workday injury;
- OSHA Safety and Health poster.

16.3 RECORDS MANAGEMENT

All safety-related records generated for project will be reviewed for completeness and accuracy by the SSHO, and may be audited by the ITSI Gilbane Company Health & Safety Manager. All equipment inspections will be tracked for completeness by the SSHO on a daily basis.

All on-site personnel will be required to provide documentation of their training and medical monitoring to the SSHO before they begin to work at the site. Documentation must include (as appropriate):

- 40-hour hazardous waste training
- Most recent 8-hour refresher for hazardous waste
- Most recent medical examination clearance, including clearance to wear respiratory protection (as appropriate)
- Most recent respirator fit test (as appropriate)

The ITSI Gilbane Company SSHO and Site Superintendent must also provide documentation of the following, as appropriate:

- 8-hour supervisory course for hazardous waste
- 30-hour OSHA Construction Safety training

The subcontractor Site Superintendents must also provide documentation of the following as appropriate:

- 8-hour supervisory course for hazardous waste

- Relevent Competent Person (ie: Excavation) training

These records will be tracked by the SSHO via the Site Employee Records Log, included in Appendix D of the APP.

Permanent medical records are maintained in confidential files by the respective contract physicians and/or medical clinics. The examining physician must supply the employing company with a medical status document certifying that the individual examined is physically capable of performing his/her individual work tasks and of wearing respiratory protective devices (as appropriate). These certifications are maintained in confidence at the company's offices. Medical records for each employee shall be preserved and maintained for at least the duration of employment plus thirty (30) years.

Each employee exposure record shall be preserved and maintained for at least thirty (30) years and must contain the collection methodology (sampling plan), a description of the analytical and mathematical methods used, and a summary of other background data relevant to interpretation of the results, including a correlation of the employee name, and job classification with the calculated or monitored exposure levels (this may be accomplished by a daily sign-in log).

17.0 REFERENCES

Innovative Technical Solutions, Inc. (ITSI Gilbane), 2005. *Corporate Health and Safety Program.* October.

United States Army Corps of Engineers, 2008. *Safety and Health Requirements Manual*, EM-385-1-1. September.

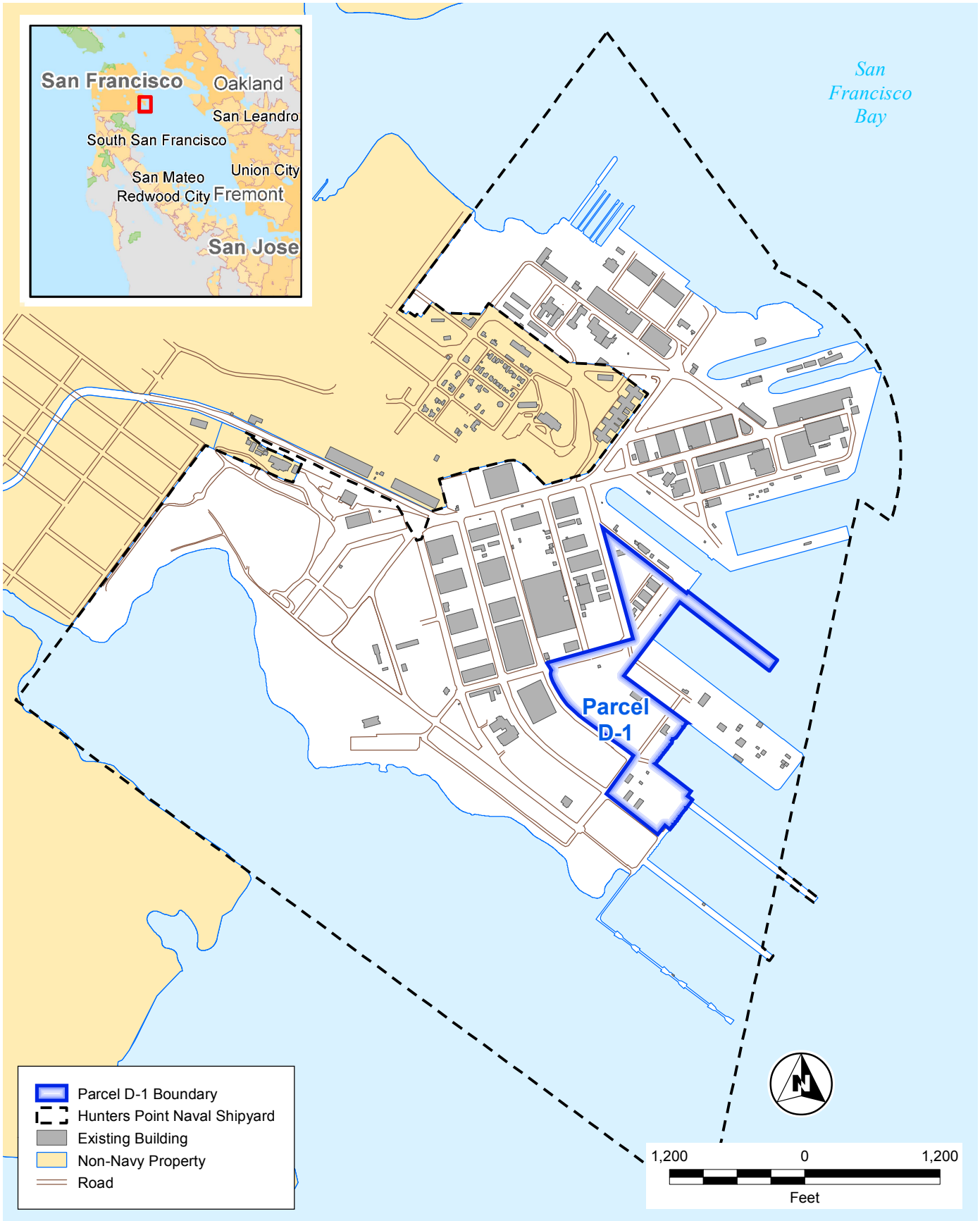
TABLES

TABLE 1

Emergency Telephone Numbers

Contact	Phone Number
Activity Point of Contact: Doug DeLong, BRAC Field Team Leader Caretaker Site Office Mel Asuncion, BRAC Field Team Caretaker Site office	 415-743-4713 415-743-4721
U.S. Navy ROICC Contacts: Mr. Peter Stroganoff Mr. Andrew Uehisa Ms. Shirley Ng	510-755-6828 510-755-5875 510-749-5939
Police Department	911
Fire Department	911
San Francisco General Hospital (Trauma Center) 1001 Potrero Ave San Francisco, CA 94110	415-206-8111
St. Luke's Hospital (Emergency) 3555 Cesar Chavez Street San Francisco, CA 94110	415-641-6625
Poison Control	800-222-1222
ITSI Gilbane Company Mr. Ed Palser (Project Manager) Mr. Tony Poon (SSHO) Mr. Charles Cronister (Site Superintendent) Mr. Jeremy Sawyer (HSM)	 505-400-4076 925-765-1034 925-250-7945 303-204-3896
Office of Emergency Services, Coastal Region – Help Desk	510-286-0895
Regional Water Quality Control Board (RWQCB) – Reception	510-622-2300

FIGURES



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ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Franscisco, California

Figure 1
Parcel D-1 Vicinity Map

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 2
Site Layout Map

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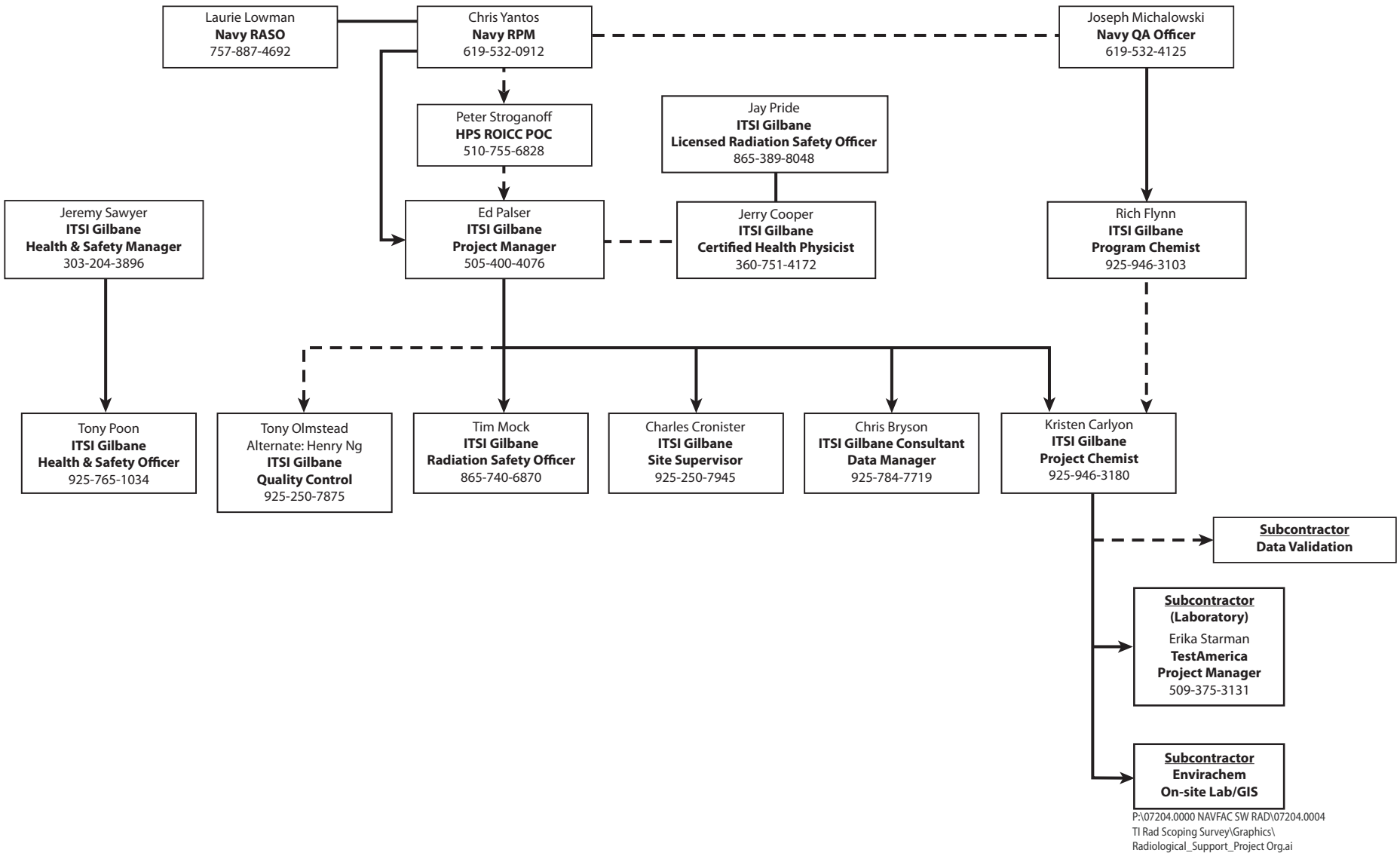

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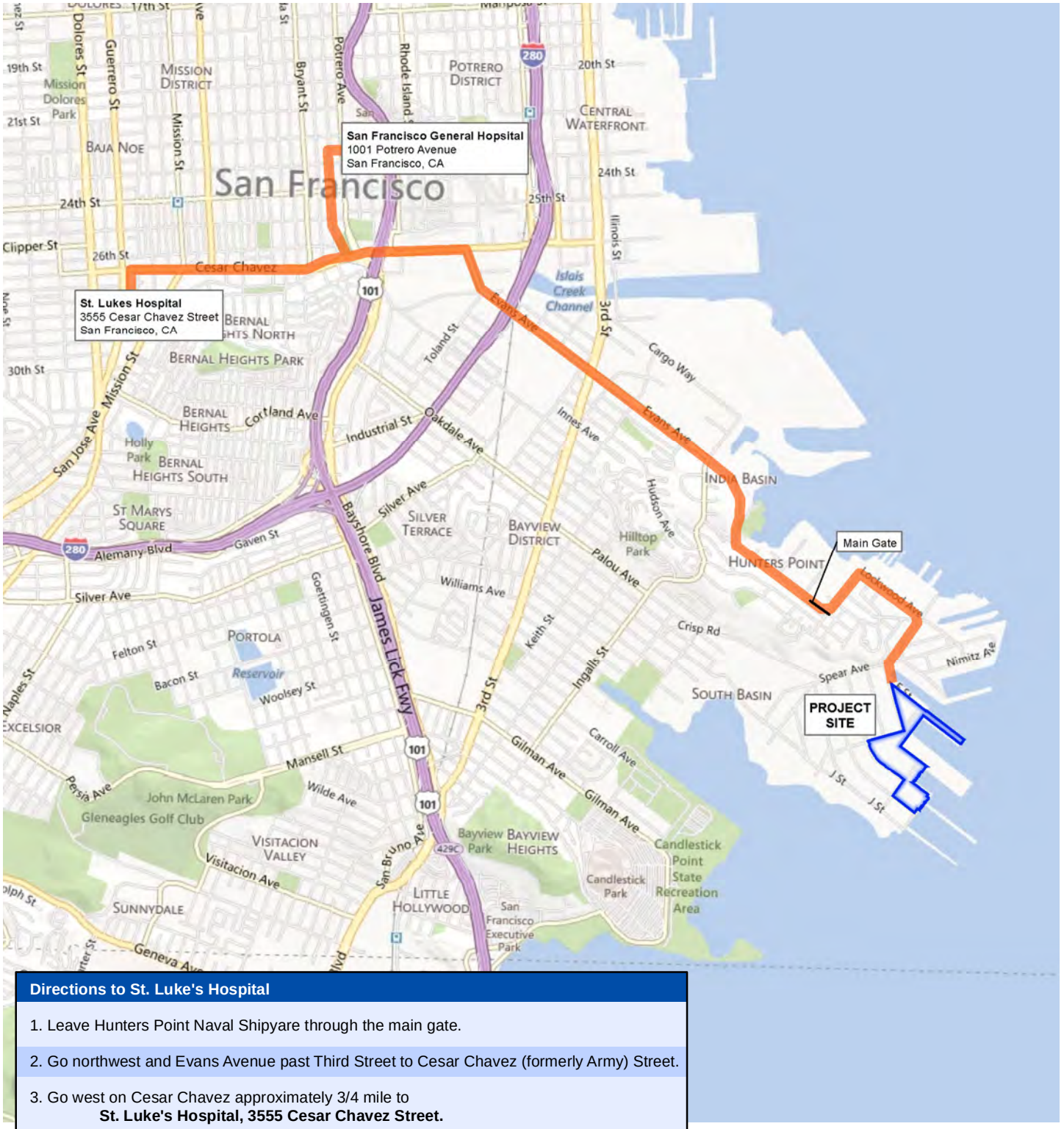
ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 3
Project Organization Chart



Directions to St. Luke's Hospital
1. Leave Hunters Point Naval Shipyare through the main gate.
2. Go northwest and Evans Avenue past Third Street to Cesar Chavez (formerly Army) Street.
3. Go west on Cesar Chavez approximately 3/4 mile to **St. Luke's Hospital, 3555 Cesar Chavez Street.**

Directions to San Francisco General Hospital (Alternate)
1. Follow instructions 1 through 3 above.
2. From Cesar Chavez Street go north on Potrero Avenue approximately 1/2 mile to **San Francisco General Hospital, 1001 Potrero Avenue.**

Basemap © 2010 NAVTEQ © AND © 2012 Microsoft Corporation

3,000 0 3,000
Feet

ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 4
Route to Hospital

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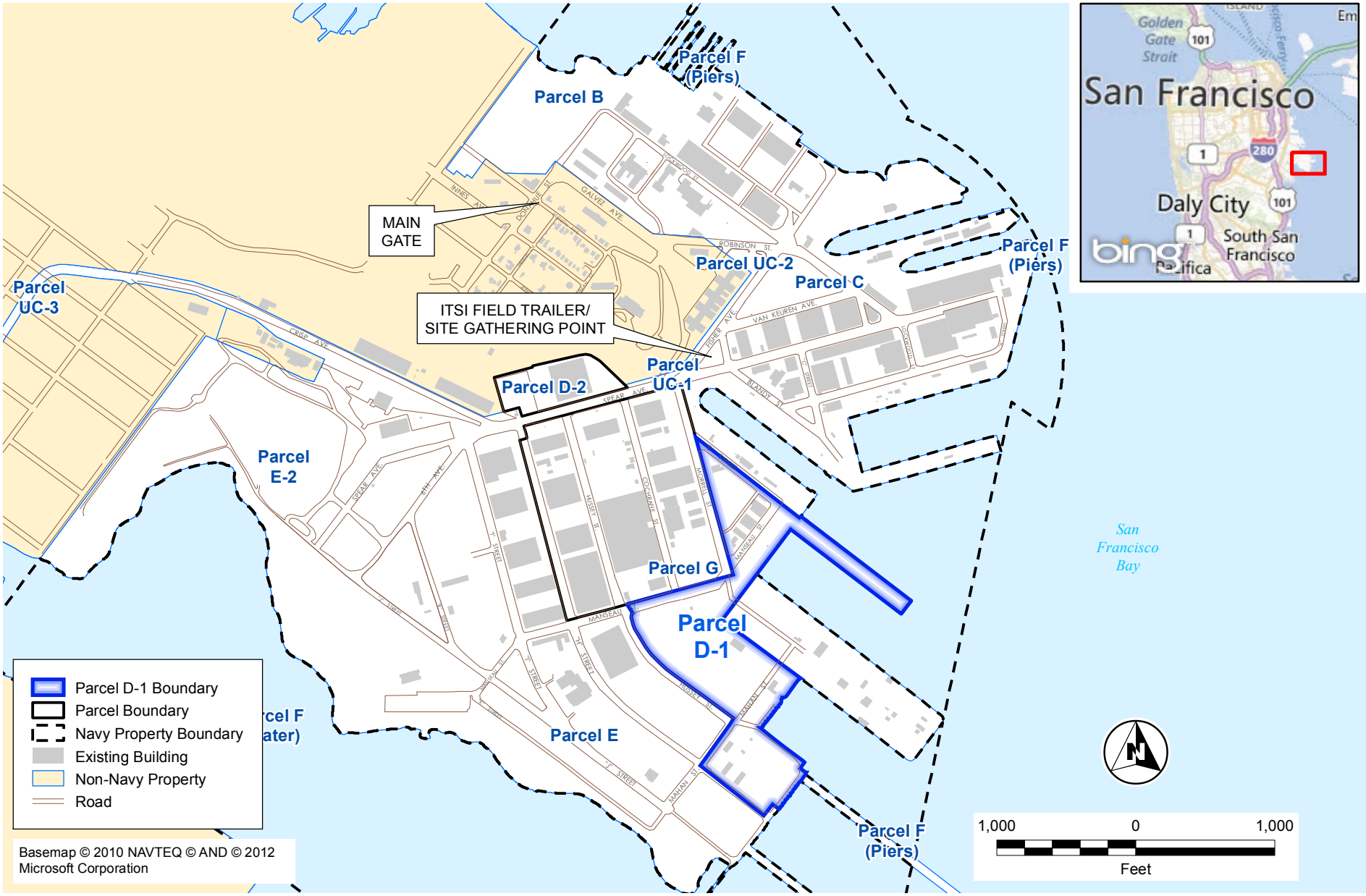
G:\ArcGIS\Navy\HPS\PROJECTS\Parcel_D\Parcel_D1_Emergency_Gathering_Pt.mxd 1/9/2013 [13:07 PM] EANDERSON, ITSI



ITSI Gilbane

Radiological Remediation and Support
Parcel D-1, Phase II
Hunters Point Naval Shipyard
San Francisco, California

Figure 5
Emergency Gathering Point

APPENDIX C

SAFE WORK PROCEDURES
(SWP)

Confined Space Entry
Safe Work Procedures

CONTENTS

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1. REGULATIONS

- 29 CFR 1910.146, Confined Spaces
- 8 CCR 5156 – 5159, Confined Spaces
- American National Standards Institute (ANSI) Z-117.1, Safety Requirements for Confined Spaces, 2003
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), 15 September 2008

2. INTRODUCTION/PURPOSE

Confined spaces may pose a number of potentially deadly risks to personnel who enter them. This Confined Space Program is provided to protect ITSI personnel from the hazards posed by confined spaces. It is specifically intended to protect our employees who will enter confined spaces to perform duties such as inspection, cleaning, repairing, sampling, demolition, installation and maintenance; however, it is also intended to protect unauthorized personnel from inadvertent entry into hazardous confined spaces.

This program has been developed to meet the requirements of the Occupational Health and Safety Administrations (OSHA) 1910.146 Permit-entry confined spaces, the American National Standards Institute (ANSI) Z117.1 for confined spaces and the Army Corp of Engineers (ACE) 385.1.1 Section 34.A.01 Confined Space Entry – Non-Marine Facilities.

This program describes the measures necessary to:

- Prevent unauthorized entry into permit-required confined spaces;
- Identify, evaluate and classify permit space hazards; and
- Implement the procedures and practices necessary for safe entry operations.

Specific provisions of this program include:

- Procedures for an evaluation of potential confined spaces;
- Posting of signs to assist individuals in identifying confined spaces;
- Written permit system for entry planning and execution;
- Training of individuals who will perform work associated with confined spaces;
- Written entry practices and procedures;
- Atmospheric testing;
- Engineering and administrative controls;
- Personal protective equipment and respirators;
- Provisions for personnel roles, including supervisors and attendants; and
- Emergency response procedures and victim rescue.

This Permit System has been developed for those confined spaces designated as "Permit-Required Confined Spaces," which may pose special dangers for entrants because their configurations may hamper efforts to protect entrants from serious hazards such as toxic, explosive, or asphyxiating atmospheres, engulfment in materials, conditions which may trap or asphyxiate due to converging or sloping walls, or any other serious safety or health hazard. In addition, the standard and this program apply to spaces that are evaluated and deemed Non-Permit Required Confined Spaces.

It is ITSI's policy to reduce the need for confined space entry wherever possible. It is also ITSI policy to eliminate, whenever possible, all confined space hazards in order to reclassify Permit-Required Confined Spaces to non-permit spaces. When confined space entry is necessary, all provisions of this program are to be followed.

Note: Coordinating of this program with the Clients' (if applicable) is critical because their program or policies may be more stringent or require actions not included here.

3. SCOPE

This program applies to all ITSI employees. Contractor and subcontractors entering confined spaces shall comply with their own Confined Space Entry Program, which must comply with State and Federal regulations EM385 1-1, as well as the meet or exceed minimum specifications provided in this program. A contractor's program will be reviewed by ITSI prior to mobilization to the site. Due to the hazards of confined spaces, a dedicated planning session will be held. Attendees of this planning session will include, but not be limited to, the ITSI Site Safety and Health Officer (SHO), the confined space competent person/Entry Supervisor overseeing the operations (entry) , the Owner's Representative, confined space competent person representatives from each subcontractor involved in the confined space entry and the named standby rescue team(s).

4. RESPONSIBILITIES

4.1 Health & Safety Manager

The ITSI Health & Safety Manager is responsible for administering the confined space entry program and for:

- Assisting supervisors in determining and identifying confined spaces subject to the requirements of this program;
- Coordinating or conducting training programs for employees engaged in confined space operations;
- Evaluating and approving instruments and equipment to be used for confined space work;
- Verifying accuracy and adequacy of portable gas monitor records;
- Evaluating and analyzing conditions where a hazardous condition exists
- Reviewing and updating the written Confined Space Entry Program as necessary; and
- Maintaining copies of documentation regarding the confined space entry training provided to employees.

4.2 Supervisors/Safety & Health Officers

Site Supervisors/Safety and Health Officers are responsible for:

- Requesting technical assistance from the Health & Safety Manger in determining and identifying areas that may be defined as confined spaces;
- Requesting training for new employees;
- Ensuring that only trained employees are permitted to engage in confined space operations;
- Ensuring that barriers are in place to prevent falls into or unauthorized entrants access during and after work is completed;
- Ensuring that all pre-entry requirements have been met;

- Ensuring that a confined space entry permit is properly completed, reviewed by CP/Entry Supervisor and maintained at the work site, where required;
- Authorizing entry into the confined space by signing the entry permit;
- Ensuring that employees trained in first aid/CPR and confined space rescue are immediately available for response during confined space entry; and
- Maintaining the necessary documentation regarding the training provided, equipment used, procedures followed, and permits issued, according to the requirements of the Recordkeeping section.

4.3 Employees

Employees are responsible for the following:

- Observing all established procedures;
- Using the prescribed personal protective equipment and monitoring instrumentation in the manner to which they have been trained;
- Operating portable gas monitor equipment, per the manufacturer's recommendations;
- Reporting immediately to the Supervisor any equipment that is damaged or fails to operate;
- Entering confined spaces only when trained and directed;
- Entering confined spaces only when there are appropriate safeguards established;
- Advising supervisors of any potential hazards associated with confined space operations – immediately; and
- Evacuating immediately from a confined space that becomes unsafe, or when directed.

4.4 Disciplinary Actions

Employees who violate the procedures established in this program will be disciplined. Supervisors who allow or direct their subordinates to violate any of the provisions of this Program will also be disciplined. Disciplinary measures will be implemented according to the provisions of the Employee Compliance and Discipline Program.

NOTE: Anyone entering what would be considered a typical confined space without the procedures specified in this plan will be removed from the work site for the duration of the project.

5. DEFINITIONS

- *Acceptable entry conditions*. The conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

- *Attendant.* An individual stationed outside a permit space who monitors entrants and performs attendant's duties as required by this program.
- *Blanking or blinding*. The absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.
- *Bonding*. The joining of two or more items with an electrical conductor so that all ends joined have the same electrical charge or potential.
- *Confined space*. A space that consists of the following:
  - Is large enough and so configured that an employee can bodily enter and perform assigned work; and
  - Has limited or restricted means for entry or exit (for example, tanks vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and
  - Is not designed for continuous employee occupancy.
  - Confined space examples include:
    - Storage tanks
    - Process vessels
    - Bins
    - Silos
    - Boilers
    - Ventilation or exhaust ducts
    - Manholes

    NOTE: Trenches deeper than 4 feet, where the potential exists for hazardous conditions, must be evaluated per this program.
- *Control Measures*. A system or device used, or action taken, to control or prevent the introduction of hazards into a confined space.
- *Double block and bleed*. The closure of a line, duct or pipe by closing and locking or tagging two inline valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.
- *Emergency*. Any occurrence (including any failure of hazard control or monitoring equipment) or event(s) internal or external to the confined space that could endanger entrants.
- *Enclosed space.* Spaces that do not meet the definition of a confined space, but may require precautionary measures upon entering. Examples of enclosed spaces are crawl spaces and service tunnels with existing general ventilation.
- *Engulfment.* The surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

- *Entry*. The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred *as soon as any part of the entrant's body breaks the plane of an opening into the space*.
- *Entry Permit.* The written or printed document that is provided by the employer to allow and control entry into a permit space. A permit must be completely filled out by the Entry Supervisor prior to personnel entering the space. No permit shall be valid for more than 8-hours after the time of issue by the Entry Supervisor.
- *Entry Permit System.* The employer's written procedures for preparing and issuing permits for entry and returning the permit space to service following termination of entry, and designates by name or title the individuals who may authorize entry.
- *Entry Supervisor – Confined Space Competent Person.* The person who is responsible for general oversight of the entry to ensure that employees are protected from any potential hazards associated with the entry; that the entry is performed consistent with the terms of the entry permit; and for terminating entry as required by this section.

  NOTE: An entry supervisor may also serve as an attendant, as long as he/she is trained and equipped as required by this section for each role he/she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation. The *entry supervisor* must also be a competent person for confined space entry.
- *Ground-fault circuit-interrupter*. A device designed to disconnect an electric circuit when it seeks ground through a person or grounded object, thus preventing electric shock and fires.
- *Hazardous atmosphere*. An atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from <u>one or more</u> of the following causes:
  - Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
  - Airborne combustible dust at a concentration that meets or exceeds its LFL.

    NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.
  - Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
  - Atmospheric concentration of any substance for which an OSHA Permissible Exposure Limit (PEL) is established and which could result in employee exposure in excess of its PEL. Should the American Conference of Governmental Industrial Hygienist (ACGIH) have established a Threshold Limit Value (TLV) for the substance, the lower of the two limits will be used.

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to it health effects is not covered by this provision.

- Any other atmospheric condition that is immediately dangerous to life or health.

  NOTE: For air contaminants for which OSHA has not determined a dose or PEL, other sources of information, such as Material Safety Data Sheets, that comply with the Hazard Communication Standard, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

- *Host employer*. Any employer who arranges to have the employees of another employer (contractor) perform work for them.
- *Hot Work.* Any work heat producing involving burning, welding or similar fire, heat or spark-producing operations. In addition, any work that produces a source of ignition such as grinding, drilling, blasting, demolition, or heating.
- *Hot work permit*. The ITSI permit, contractor's permit or in the case of a federal facility, the authority having jurisdiction (i.e.: military base Fire Department) will serve as written authorization to perform hot work operations (e.g. welding, cutting, burning, or heating) capable of providing a source of ignition.
- *Immediately Dangerous to Life or Health (IDLH)*. Any condition which poses an immediate or delayed threat to life (after 30-minute exposure) or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space. *Note*: Some materials–hydrogen fluoride gas and cadmium vapor, for example–may produce immediate transient effects that, even if severe, may pass without medical attention, but are followed by sudden, possibly fatal collapse 12 to 72 hours after exposure. The victim "feels normal" from recovery from transient effects until collapse. Such materials in hazardous quantities are considered to be "immediately" dangerous to life or health.
- *Inerting*. The displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

  NOTE: This procedure produces an oxygen-deficient atmosphere that can only be entered using self-contained breathing apparatus (SCBA).
- *Isolation*. The process by which a permit space and all active sources of energy within are removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tag-out of all sources of energy; or blocking or disconnecting all mechanical linkages. All isolation and associated work will comply with the requirements of OSHA 1910.147, ANSI Z244.1 and A10.44, the USACE 385.1.1 section 12 Control of Hazardous Energy and American Petroleum Institute 2015 and 2016.

- *Line breaking*. The intentional opening of a pipe, line or duct that is or has been carrying flammable, corrosive or toxic material, an inert gas, or any fluid at a volume, pressure or temperature capable of causing injury.
- *Local exhaust ventilation.* Ventilation used during welding, cutting or similar operations in confined spaces to capture and remove harmful gases, smoke and fumes and exhaust them to the outside.
- *Lockout-tagout*. Placing locks or tags on the energy isolating device (e.g., breaker boxes, piping, control switches, valves, etc.) to prevent the unauthorized re-energization of the device, line or circuit while work is being performed by personnel. Tags shall indicate that the energy isolated device must not be operated until the tag is removed by the individual(s) that installed the tag.
- *Lower Explosive Limit (LEL).* The minimum concentration of a flammable gas or vapor in air that will ignite if an ignition source is present.
- *Lower Flammability Limit (LFL).* The minimum concentration of a combustible dust in air which will ignite if an ignition source is present.
- *Non-permit confined space*. A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. Reclassification from a permit space to a non-permit space may be done if the space poses no actual or potential atmospheric hazards, the non-atmospheric hazards remain eliminated, and all hazards within the space are eliminated without entry into the space.
- *Oxygen-deficient atmosphere*. An atmosphere containing less than 19.5 percent oxygen by volume.
- *Oxygen-enriched atmosphere*. An atmosphere containing more than 23.5 percent oxygen by volume.
- *Permissible Exposure Limit.* The OSHA-regulated airborne concentration to which an employee may be legally exposed during a given time period.
- *Permit Required Confined Space.* (Permit Space) A confined space that has *one or more* of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfment of an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls, or a floor which slopes downward and tapers to a smaller cross-section; or,
  - Contains any other recognized serious safety or health hazard.
- *Permit Required Confined Space Program.* The employer's overall program (this program) for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.
- *Permit system*. The employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

- *Personal Protective Equipment (PPE).* Any devices or clothing worn by the worker to protect against hazards in the environment. Examples are respirators, gloves, and chemical splash goggles.
- *Prohibited condition*. Any condition in a permit space that is not allowed by the permit during the period when entry is authorized; i.e., Ventilation failure while work in the space is underway and ventilation is an entry condition of the permit or bringing compressed gas cylinders into the space.
- *Purging*. The removal of gases or vapors from a confined space by the process of displacement.
- *Rescue service*. The personnel designated prior to entry to rescue employees from permit spaces.
- *Retrieval system*. The equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device for non-entry rescue of persons from permit spaces.
- *Standby person*. A person designated by to remain outside the confined space and to be in constant communication with the personnel working inside the confined space. This is not the attendant.
- *Testing*. The process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space. Testing enable employers both to devise and implement adequate control measures for the protection of authorized entrants and to determine if acceptable entry conditions are present immediately prior to, and during, entry.
- *Zero Mechanical State.* The mechanical potential energy of all portions of the machine or equipment is set so that the opening of the pipe(s), tube(s), hose(s) or actuation of any valve, lever, or button will not produce a movement which could cause injury. All systems locked-out to achieve this state will be tested first (push the button test) to ensure they cannot start, flow, activate, etc.

6. IDENTIFYING, EVALUATING AND CLASSIFYING CONFINED SPACES

6.1 Identification of Spaces

It is the responsibility of ITSI Supervisor or the exposing subcontractor(s) to identify all potential confined spaces on the project site within the area of their work. Confined spaces are spaces which are not designed for continuous occupancy, are large enough to be entered, and have limited entry/egress. Confined spaces may include tanks, sewers, utility vaults, and trenches deeper than 4 feet. The Health and Safety Manager will work with the Supervisor to develop a specific hazard assessment and entry procedures for ITSI employees that must enter the space. Subcontractors must submit a site specific Confined Space Entry Program in accordance with OSHA regulations and EM 385 1-1 requirements (Section 34 A.06) whenever they will participate in confined space activities. This program must be submitted to ITSI project management and reviewed by HSM prior to performing confined space activities.

6.2 Classification of Spaces

All Confined Spaces shall be considered "permit-required" until a hazard evaluation of the space demonstrates otherwise.

6.3 Non-Permit Required Confined Spaces

A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. Entry into these spaces may be made without use of a Permit; however, the CP shall document the basis for determining that the space does not contain or have the potential to contain hazards through a hazard assessment that contains the date, the location of the space, and the signature of the person making the determination. Labeling of the space will be required for the duration of our work and recommendations made to the Owner of the space to provide and maintain their own signage at the entrance to the space and notification that ITSI will remove our temporary signage at the termination of the work.

6.4 Permit-Required Confined Spaces

A confined space is a Permit-Required Confined Space if it either has or has the *potential* to have *one or more* of the following hazards:

1. A hazardous atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from *one or more* of the following causes:
    - Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);
    - Airborne combustible dust at a concentration that meets or exceeds its LFL;
    - Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;
    - Atmospheric concentration of any substance exceeding the OSHA Permissible Exposure Limit (PEL) or the ACGIH TLV-TWA, whichever is lower.
2. Either a solid or liquid material with the potential to engulf or drown an entrant.
3. An internal configuration such that an entrant could be trapped by inwardly conveying walls or by a floor that slopes downward and tapers to a smaller cross-section.
4. Any other recognized serious safety or health hazard, which may be physical, biological, or mechanical.

6.5 Reclassification of Spaces

OSHA regulations provide for the ability to reclassify permit spaces as non-permit spaces if all serious hazards within the space may be eliminated prior to entry. The basis for the determination that all serious hazards in a permit space have been eliminated shall be documented with certification containing date, space identifier, and signature of the

person making the determination. The certification shall be available to all supervisors and potential entrants.

Labeling of the space will be required for the duration of our work and recommendations made to the Owner of the space to provide and maintain their own signage at the entrance to the space and notification that ITSI will remove our temporary signage at the termination of the work. Labeling should indicate that the space is a Non-Permit Required Confined Space and the hazards which were eliminated should be noted.

6.6 Introduction of Hazards and Special Conditions

If hazards are to be introduced into a non-permit confined space which would change its classification (such as the use of solvents, epoxies, solvent based paints, abrasive blasting media, etc.), then the Health & Safety Manager and competent person will conduct a formal review of the procedure and reclassify the space as a permit-entry confined space.

Confined spaces shall not be used as storage areas for equipment, chemicals, refuse, or anything else that can produce a tripping, atmospheric, or fire hazard.

7. TYPES OF CONFINED SPACE HAZARDS

Once a space has been determined to be a potential permit-required space, the hazards that may be present must be identified and evaluated. Confined-space hazards can be grouped into the following categories:

- Hazardous atmospheres
- Chemical or toxic hazards
- Mechanical and physical hazards

Every confined space must be evaluated for these types of hazards prior to personnel entering the space. The atmospheric hazards are often the most difficult to identify since they are normally invisible. The identification of hazards must include consideration of the type of work to be conducted inside the permit space such as welding, painting or the use of chemical solvents which can introduce hazards.

Hazard identification and evaluation are the responsibility of the ITSI Entry Supervisor/Competent Person. Subcontractor CP must evaluate the space independently. Entry Supervisor shall discuss the space with the Owner's Representative who may have historical information from previous entries. The CP should utilize information provided on the Confined Space Entry Permit to aid with hazard identification. The identified hazards and controls must be documented on the Permit and an ITSI Activity Hazard Analysis prepared for the task.

8. ATMOSPHERIC HAZARDS

The lack of natural ventilation, the presence of stored materials (such as chemicals or residues), the work process to be performed in a confined space, or areas adjacent to the space can result in one or more of the following hazardous atmospheres:

- Flammable atmospheres
- Asphyxiating atmospheres
- Toxic atmospheres

8.1 Sources of Atmospheric Hazards

Atmospheric hazards may be present within a confined space as the result of one or more of the following:

- *Product stored in the confined space:* When a product is stored in a confined space, the product can be absorbed by the walls and give off hazardous vapors when removed or when cleaning the residual material. The product can also produce hazardous vapors which will remain in the atmosphere due to poor ventilation.
- *Process lines:* Process lines passing through or terminating in the confined space can leak or be opened up during the work, producing a hazardous atmosphere.
- *Work being conducted in the space:* Hazardous atmospheres can be generated as the result of work being conducted inside the confined space. Examples of such work include welding or brazing with metals capable of producing toxic vapors; painting; scraping; and sanding. Many of the solvents used for cleaning and/or degreasing produce highly toxic vapors. Work such as spray painting, coating, or the use of flammable solvents for cleaning can result in the formation of an explosive atmosphere. Oxygen and acetylene hoses may have small leaks in them which could generate an explosive atmosphere. Welding or cutting with oxyacetylene equipment can also be the source of ignition if a flammable atmosphere is present.
- *Areas adjacent to the space:* Hazardous gases and vapors produced by processes near the confined space may enter and accumulate in the confined space. For example, if the confined space is lower than the adjacent area and the toxic vapor is heavier than air, the vapor may "settle" into the confined space.

8.2 Flammable Atmospheres

Flammable atmospheres are generally the result of flammable gases, vapors, or dust mixed in the correct concentrations with air, or an oxygen-enriched atmosphere. For an atmosphere to be flammable there must be oxygen in the air and a flammable gas, vapor, or dust present in the proper concentration. An atmosphere becomes flammable when the ratio of oxygen to combustible material in the air is neither too rich nor too lean for combustion to occur. Flammable gases or vapors can accumulate within a confined space when there is inadequate ventilation.

- *Flammable gases and vapors* such as acetylene, butane, propane, hydrogen, methane, natural or manufactured gases or vapors from liquid hydrocarbons can be trapped in confined spaces, and since many gases are heavier than air, they

will seek lower levels as in pits, sewers, and various types of storage tanks and vessels. In a closed top tank, it should also be noted that lighter than air gases may rise and develop a flammable concentration if trapped above the opening.

- *Chemical reactions* forming flammable atmospheres occur when surfaces are initially exposed to the atmosphere, or when chemicals combine to form flammable gases. This condition arises when materials such as dilute sulfuric acid react with iron to form hydrogen, or when calcium carbide makes contact with water to form acetylene. Other examples of spontaneous chemical reactions that may produce explosions from small amounts of unstable compounds are acetylene-metal compounds, peroxides, and nitrates. In a dry state, these compounds have the potential to explode upon percussion or exposure to increased temperature.
- *Combustible dust* concentrations are usually found during the process of loading, unloading, and conveying coal, grain products, fertilizers, finely ground chemical products, and any other combustible material. The explosion from these concentrations occurs when high amounts of static electricity accumulates at low humidity readings and causes a spark which ignites the combustible mixtures present in the air.
- *Oxygen-enriched atmospheres* are those atmospheres which contain an oxygen concentration greater than 23.5% (normal is 21%). The main hazard associated with an oxygen-enriched atmosphere is increased risk of fire. Flammable materials burn more readily in the presence of an oxygen-enriched environment. Some materials which are generally not considered fire hazards (such as clothing and hair) will also burn rapidly upon ignition when the oxygen concentration is increased. A contaminated atmosphere must never be purged with oxygen as this would greatly increase the fire hazard in the space.

- *Ignition sources in confined spaces can include:*
  - Open flames such as matches or cigarettes
  - Electrical arcing
  - Frictional sparks
  - Hot surfaces
  - Static electricity (generated by various activities, including, but not limited to grit/sand blasting, flowing fuel, etc.)
  - Chemical reactions

8.3 Oxygen-Deficient Atmospheres

An atmosphere containing less than 19.5% oxygen is considered oxygen-deficient. Oxygen concentrations below 19.5% can cause progressively more severe effects. When the oxygen level falls to 17%, the physiological effects are increased breathing rate and accelerated heartbeat. Between 14-16%, the effects are very poor muscular coordination, rapid fatigue, and intermittent respiration. Between 6-10% the effects are nausea, vomiting, inability to perform, and unconsciousness. At less than 6%, spasmodic breathing and convulsive movements occur, and death may occur in minutes. The total displacement of oxygen will cause immediate collapse and death.

The oxygen level inside a confined space may be decreased as the result of either consumption or displacement. There are a number of processes which consume oxygen in a confined space. Oxygen is consumed during combustion of flammable materials, as in fires, oxyacetylene torch cutting or burning of fossil fuels. Oxygen can also be consumed during chemical reactions, such as in the formation of rust on exposed metal surfaces of a space. The number of people working in a confined space and the amount of physical activity can also influence oxygen consumption. A more subtle consumption of oxygen occurs during bacterial action, as in the fermentation or composting processes.

Oxygen levels can also be reduced as the result of displacement by other gases such as carbon dioxide or nitrogen. Since these gases are colorless and odorless, they pose an immediate hazard unless ventilation and oxygen measurements are carried out. A confined space into which personnel will enter should never be purged with nitrogen or other inert gas as this could lead to an oxygen-deficient atmosphere. Carbon dioxide may also displace air and can occur naturally in sewers, storage bins, wells, tunnels, wine vats, and grain elevators.

8.4 Irritant (Corrosive) Atmospheres and Materials

Irritant or corrosive atmospheres can be divided into primary and secondary groups. The primary irritants exert no systemic toxic effects (effects on the entire body). Examples of primary irritants are chlorine, ozone, hydrochloric acid, hydrofluoric acid, sulfuric acid, nitrogen dioxide, ammonia, and sulfur dioxide. A secondary irritant is one that may produce systemic toxic effects in addition to surface irritation. Examples of secondary irritants include benzene, carbon tetrachloride, ethyl chloride, trichloroethane, and trichloroethylene.

Prolonged exposure at irritant or corrosive airborne concentrations in a confined space may produce little or no evidence of irritation. This may result in a general weakening of the defense reflexes from changes in sensitivity. The danger in this situation is that the worker is usually not aware of any increase in his/her exposure to toxic substances.

8.5 Toxic Atmospheres and Materials

Personnel entering confined spaces may be exposed to a variety of toxic atmospheres and materials, resulting from conditions existing inside the confined space, from areas adjacent or connected to the space, or from materials brought in to perform work.

Personnel may be exposed through inhalation of gases, vapors or dusts; direct contact with skin or eyes; through inadvertent ingestion from lack of proper hygiene practices; or through injection of biologically-active materials.

The degree of toxicity depends on a number of factors including: the concentration of the contaminant; the length of exposure; and potential target organ of the contaminant. Other factors such as personal differences, environmental factors, and work rate can also affect the level of toxic action. Personal exposures (as determined through air monitoring of the confined space) can be compared to OSHA and other consensus standards as a starting

point in determining the potential for employee harm. Two of the most common toxins found in confined spaces are carbon monoxide and hydrogen sulfide.

Carbon monoxide (CO) is a hazardous gas that may build up in a confined space. This odorless, colorless gas that has approximately the same density as air is formed from incomplete combustion of organic materials such as wood, coal, gas, oil, diesel and gasoline; it can also be formed from microbial decomposition of organic matter in sewers, silos, and fermentation tanks. Carbon monoxide is an insidious toxic gas because of its poor warning properties. CO forms carboxyhemoglobin in the blood which prevents the distribution of oxygen in the body. Early stages of CO intoxication are nausea and headache, and it is considered dangerous at 25 ppm. Carbon monoxide may be fatal at 1000 ppm in air. NIOSH has established a 200ppm Ceiling Limit.

Hydrogen sulfide may be formed several ways, but the most common sources are microbial breakdown of organic material such as sewage, manure, garbage, etc., and process lines in plants such as oil refineries. Hydrogen sulfide can be detected at very low concentrations; however, it can also deaden the sense of smell. Because of this, cartridge respirators may not be used for protection from this chemical since detecting contaminant break though by odor may not occur.

9. MECHANICAL AND PHYSICAL HAZARDS

The following hazards must be identified prior to entry into a confined space:

- Mechanical hazards
- Thermal hazards
- Entrapment/engulfment hazards
- Physical hazards (falls, debris, slipping hazards)
- Electrocution
- Danger of unexpected movement of machinery
- Noise hazards

9.1 Mechanical Hazards

If activation of electrical or mechanical equipment would cause injury, each piece of equipment should be manually isolated to prevent inadvertent activation before workers enter or while they work in a confined space. Problems such as rotating or moving mechanical parts or energy sources can create hazards within a confined space. All rotating or moving equipment such as pumps, process lines, electrical sources, etc., within a confined space must be identified and a specific plan prepared for the isolation of this type of energized hazard from workers.

9.2 Energy Sources

Energy sources in confined spaces include process chemical and gas lines, natural gas, electrical, steam, pressurized water, and stored mechanical. Energy sources in confined spaces must be isolated or removed from service, and completely protect employees from the release of energy or materials into the space. Refer to the ITSI SWP Control of Energized Sources. This is accomplished by:

- Blanking, blinding, misaligning or removing sections of lines, pipes or ducts;
- A double block and bleed system;
- Lockout or tagout of all sources of energy, including mechanical, electrical, chemical, pressurized systems, thermal (e.g. systems which operate at a temperature, either hot or cold, that could cause physical injury upon contact) or potential (for example, elevated platforms that could shift and then lower upon an entrant);
- Blocking or disconnecting all mechanical linkages to prevent movement.

9.3 Entrapment

The space could have an internal configuration that could trap an entrant, e.g. inwardly converging walls or a floor that slopes downward and tapers to a smaller cross section.

9.4 Engulfment

Engulfment means that finely divided solids (e.g. grains or sand) or liquids are stored in a space that could surround and suffocate an entrant. Excavations could present the possibility of engulfment. Employees shall be protected from cave-ins by sloping, benching, or shoring systems when the depth of the excavation is more than four feet, in accordance with the OSHA Trench and Excavation Standard.

9.5 Thermal Hazards

Four factors influence the interchange of heat between people and their environment. They are: (1) air temperature, (2) air velocity, (3) moisture contained in the air, and (4) radiant heat. Because of the nature and design of most confined spaces, moisture content and radiant heat are difficult to control. As the body temperature rises progressively, workers will continue to function until the body temperature reaches approximately 102°F. When this body temperature is exceeded, workers are less efficient, and are prone to heat exhaustion, heat cramps, or heat stroke.

In a cold environment, certain physiologic mechanisms come into play, which tend to limit heat loss and increase heat production. The most severe strain in cold conditions is chilling of the extremities so that activity is restricted. Special precautions must be taken in cold environments to prevent frostbite, and general hypothermia.

Protective insulated clothing for both hot and cold environments will add additional bulk to the worker and must be considered in allowing for movement in the confined space and exit time. Therefore, air temperature of the environment becomes an important consideration when evaluating working conditions in confined spaces.

9.6 Noise

Noise problems are usually intensified in confined spaces because the interior tends to cause sound to reverberate and thus expose the worker to higher sound levels than those found in an open environment. This intensified noise increases the risk of hearing damage to workers which could result in temporary or permanent loss of hearing. Noise in a

confined space which may not be intense enough to cause hearing damage may still disrupt verbal communication with the emergency standby person on the exterior of the confined space. If the workers inside are not able to hear commands or danger signals due to excessive noise, the probability of severe accidents can increase.

9.7 Vibration

Whole body vibration may affect multiple body parts and organs depending upon the vibration characteristics. Segmental vibration, unlike whole body vibration, appears to be more localized in creating injury to the fingers and hands of workers using tools, such as pneumatic hammers, rotary grinders or other hand tools which cause vibration.

9.8 Other Hazards

Some physical hazards cannot be eliminated because of the nature of the confined space or the work to be performed. These hazards include such items as scaffolding, surface residues, and structural hazards. These hazards pose an almost unrecognizable threat when compared to threats posed by oxygen deficiency, combustible or lethal gas pockets, engulfment, entrapment, etc. These lesser problems, however, account for more injuries because of oversight. Examples of these problems are slips and falls, reaction of incompatible materials, improper scaffolding, electrical shock, etc. Because of these hazards, careful planning must be given to the relationship between the internal structure, the exit, and the worker.

The use of scaffolding in confined spaces has contributed to many accidents, which are caused by workers or materials falling, improper use of guard rails, and lack of maintenance to insure worker safety. The choice of material used for scaffolding depends upon the type of work to be performed, the calculated weight to be supported, the surface on which the scaffolding is placed, and the substance previously stored in the confined space.

Surface residues in confined spaces can increase the already hazardous conditions of electrical shock, reaction of incompatible materials, liberation of toxic substances, and bodily injury due to slips and falls. Without protective clothing, additional hazards to health may arise due to surface residues.

Structural hazards within a confined space such as baffles in horizontal tanks, trays in vertical towers, bends in tunnels, overhead structural members, or scaffolding installed for maintenance constitute physical hazards, which are exacerbated by the physical surroundings. In dealing with structural hazards, workers must review and enforce safety precautions to assure safety.

10. OTHER FACTORS IN HAZARD ASSESSMENT

10.1 Communication

Communication between the worker and personnel outside is of the utmost importance. If a worker becomes unconscious or suddenly feels distressed, an injury may quickly become a fatality without proper communication. Communications should include visual monitoring at a minimum. Frequently, there are situations where visual monitoring is impossible and communication by means of an electronic communication system will be necessary. All communication methods must be tested to prior to and during entry to ensure adequate reception.

10.2 Medical Requirements

Medical requirements of employees who enter a confined space must be taken into consideration due to the increased hazard potential. In this type setting, employees must rely more heavily upon their physical, mental, and sensory attributes, especially under emergency conditions.

10.3 Entry and Exit

The extent of the time required entering and exiting is of major significance as a physical limitation and is directly related to the potential hazard of the confined space. The extent of precautions taken and the standby equipment needed to maintain a safe work area will be determined by the means of access and rescue. The following should be considered:

- Type of confined space to be entered
- Access to the entrance
- Number and size of openings
- Barriers within the space
- Occupancy load
- Time required to exit confined space

11. PREVENTION OF UNAUTHORIZED ENTRY

Facilities are required to identify, classify and inventory all confined spaces on their property, and provide this inventory to contractors working in the area. ITSI will attempt to obtain this inventory to aid in project hazard assessment. If a location is encountered that appears to meet the definition of a confined space, and it is not posted as such nor does it appear on the inventory, site personnel should flag the area and report it to their supervisor.

Wherever feasible, all Permit-Required Confined Spaces will be secured (barriers, locks, etc.) to prevent unauthorized entry. In addition, unauthorized entry should be prevented by a combination of training, posting of warning signs. All workers shall be instructed by their supervisors that entry into a confined space is prohibited without an authorized permit and they will be removed from the project for violation of this rule.

All identified Permit-Required Confined Spaces will be posted with a sign stating:

DANGER
PERMIT-REQUIRED CONFINED SPACE
ENTRY BY PERMIT ONLY

12. PERMIT SYSTEM

All entries into Permit-Required Confined Spaces can only be made using a permit process. The permit authorizes entrants to enter Permit-required Confined Spaces safely only after the appropriate entry requirements have been met. Considerable coordination of those who are overseeing the work, those completing the work and those charged with the potential rescue of the entrants are just a few areas that must be resolved before entering a confined space.

12.1 Permit Contents

The entry permit authorizing entry into a permit space must contain the following information:

- The permit space to be entered.
- The purpose of the entry.
- The date and authorized duration of the entry permit. The duration of the permit may not exceed the time required to complete the assigned task or job identified on the permit in accordance with the purpose of the entry.
- The name of each authorized entrant.
- The name of each attendant, with a space for signature.
- The name of the entry supervisor, with a space for signature.
- The potential hazards of the space.
- The measures used to isolate the permit space and to eliminate or control hazards before entry such as lockout, block-out, or ventilation.
- The acceptable entry conditions.
- A checklist to certify that all entry conditions have been met.
- The times and results of pre-entry and periodic tests accompanied by the names or initials of the testers.
- The rescue and emergency services available and the means (such as the equipment to be used and numbers to call) for summoning those services.
- The communication procedures used by authorized entrants and attendants to maintain contact during the entry.
- Equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment to be provided.

- Any other information whose inclusion is necessary, given the circumstances of the particular confined space, in order to ensure employee safety.
- Any additional permits, such as for hot work, issued to authorized work in the permit space.

12.2 Permit Procedures

The entry requirements for Permit-Required Confined Spaces to be entered will be discussed in the Accident Prevention Plan, and detailed using the Confined Space Entry Permit, which is then reviewed by the SHO prior to entry. The entry permit shall authorize entry:

- Only by authorized and trained workers;
- Into a specific confined space;
- For a specific purpose;
- To a specific work crew for a period not to exceed one shift.

The following general procedures will be used as part of this Permit program:

- The Entry Supervisor/Competent Person is responsible for generating the permit, filling in and verifying the accuracy of all required information, and that all appropriate notifications have been made and that a rescue team is available prior to signing the permit and authorizing entry.
- The Entry Supervisor will ensure each Attendant and Authorized entrant signs the permit.
- The completed Entry Permit shall be made available at the time of entry to all personnel by posting it at the entry portal or by any other equally effective means, so that the entrants can confirm that pre-entry preparations have been completed.
- The Entry Supervisor shall terminate entry and cancel the entry permit when:
  - The entry operation covered by the entry permit has been completed.
  - A condition that is not allowed under the entry permit arises in or near the permit space.
- Any problems encountered during an entry operation shall be noted on the permit so that appropriate revisions to the Program can be made.
- Upon completion of the entry, the Permit will be canceled by the Entry Supervisor and returned to the Project Manager.
- The Project Manager shall retain each canceled entry permit with the project documentation.

13. AIR MONITORING

13.1 Purpose

Atmospheric testing of Permit-Required Confined Spaces is required for three distinct purposes:

- Evaluation of the hazards of the permit space prior to entry
- Verification that acceptable entry conditions for entry into the permit space exist
- Periodic testing to ensure continued absence of a hazardous atmosphere

13.2 Who Will Monitor

Only authorized personnel that have been instructed in and understand the proper use of the air monitoring equipment and its limitations as well as know how to interpret the data may perform the atmospheric testing.

13.3 Air Monitoring Equipment

- All monitoring equipment must be calibrated at the beginning of each day and/or prior to use.
- The monitoring equipment must be calibrated in a clean atmosphere using the appropriate manufacturer's calibration gas protocols to ensure its accuracy.
- The results of the calibration must be recorded on the permit.
- All of the manufacturer's operating instructions must be followed.

13.4 Air Monitoring Procedure

Confined spaces must be tested with a calibrated direct-reading instrument for the following condition in this order:

- *Oxygen deficient or enriched atmospheres.* Test for the oxygen concentration before (or at the same time as) performing the other tests. Atmospheres with less than 19.5% oxygen are deemed oxygen deficient, and concentrations above 23.5% are deemed oxygen enriched. Should oxygen concentrations read in levels below 20.9%, the flammability reading will be incorrect and cannot be used as a reference.
- *Flammable or explosive atmospheres*. Test for the percentage of the Lower Explosive Limit (LEL). Atmospheres that have greater than 10% of the LEL (or LFL, for dusts) are deemed potentially flammable or explosive.
- *Hazardous chemical concentration*. Test for the airborne concentration of the hazardous chemical within the confined space. Levels above the established exposure limits (Permissible Exposure Levels) set by Cal-OSHA, Fed-OSHA, or Threshold Limit Values (TLV) set by the American Conference of Governmental Industrial Hygienists (ACGIH) are deemed a health and/or physical hazard.

Initial monitoring should be performed without disturbing the space, if possible. Monitoring personnel must not enter the space to be tested; instead, the air monitoring device or probe should be placed over or into the opening of the area. Entry may only be performed after evaluation of the air monitoring results.

13.5 When to Monitor

Atmospheric testing must be conducted:

- During pre-entry and prior to mechanical ventilation ;
- After mechanical ventilation (if applicable);
- Before an employee enters the permit space;
- Periodically during entry and while work is conducted inside permit space; the space must be monitored continuously if the potential exists that the atmosphere may be outside of the acceptable entry conditions;
- During any conditions that may adversely affect air quality, such as changes in the use or configuration of the permit space;
- After long breaks (> half hour) such as lunch, complete testing for permit required confined spaces shall be performed again to determine if any atmospheric changes have taken place inside the confined space.

13.6 Where to Monitor

Monitoring must be performed to indicate both worst-case concentrations and personal exposures to hazardous gases and vapors. Because some gases are heavier or lighter than air and can settle to the bottom or rise to the top of a confined space, it is important to test all areas of a confined space (top, middle, bottom, about every 4 feet). Special attention should be paid to possible sources of contaminants; i.e., pipe openings, residues on surfaces, and near operations such as welding and in pockets above the space, like a honey-combed ceiling pattern in a fuel cell or precast building. Monitoring must also be performed in the breathing zone of Entrants in order to estimate employee exposures. Interconnected spaces that are blinded off as one unit shall be tested individually and the results recorded for each cell. The most hazardous condition found shall govern the procedures followed for the entire space.

13.7 Actions Based on Air Monitoring

The Entry Supervisor shall verify that the monitoring results are within the acceptable entry conditions specified on the Permit, and that the space is safe for entry. Certification of these conditions is made by signing the Permit.

If pre-entry testing results in a hazardous atmosphere, the space must be ventilated by the use of continuous forced air ventilation and re-tested before workers can enter. The air quality must be acceptable before personnel are allowed to enter or work in a confined space. If flammable, oxygen-deficient, oxygen-enriched, or IDLH atmospheres exist in the space even after ventilation, personnel will not be allowed to enter the space. If ventilation is not successful in eliminating toxic atmospheres, employees must be informed of the atmospheric hazards and equipped with the proper personnel protective equipment (e.g. respiratory protection and rescue equipment) prior to entry.

If a hazardous atmosphere is detected while entrants are in the permit space, then each employee will exit the space immediately, and the space will be re-evaluated to determine how the hazardous atmosphere developed. Corrective actions will be implemented and

atmospheric testing will be completed to verify the absence of the hazardous atmosphere before any subsequent entry.

13.8 Air Monitoring Documentation

- Air monitoring results must be documented on the Confined Space Entry Permit.
- Monitoring should be documented as often as necessary to reflect actual air quality within the confined space, but at least on an hourly basis.
- Affected employees and/or their representative shall be afforded an opportunity to review and record the testing results.

14. VENTILATION

Confined spaces may be required to be ventilated prior to entry and ventilated continuously while entry operations are taking place. The following parameters must be followed in ventilating a confined space:

- Forced air ventilation is required if the space poses an actual or potential atmospheric hazard(s) as determined by the hazard evaluation that includes the atmospheric testing results prior to ventilation, anticipated work to be conducted, and the configuration of the permit space to be entered.
- Ventilation must be performed prior to personnel entering the space, and must continue until all employees have exited.
- Best practice warrants the continuation of local ventilation once it has been initiated.

The following are practical considerations in ventilating a confined space:

- For ventilation purposes, it is best to open as many openings on the space as possible.
- It is best to blow air into the confined space and draw it out simultaneously. This procedure generally requires two or more openings.
- With a confined space that has only a single entry point or when only a single fan is available, air should be blown into the confined space. A flexible hose should be utilized to direct the air to the bottom of the confined space or to where personnel are working.
- The air supply must be from a clean source and must not increase the hazards of the space. In some cases, a portable gasoline or diesel-powered generator will be used to power the ventilation fan(s). The exhaust from the generator should be located as far as possible from the fan air intake. Motor vehicles or other internal combustion engines must not be allowed to operate with their exhaust pipes located near the air intakes.
- When using ventilation, it is important to have a rough idea of the volume of the confined space to be entered and know the rating of the ventilation fan.

When forced ventilation of a confined space is required, at least **five (5)** air changes should be provided before resampling and entry. Here is an example:

An underground fault is 10 feet wide by 8 feet high by 10 feet long. Multiplying these three dimensions yields 800 cubic feet. The fan to be used is rated for 400 cubic feet per minute.

$$\frac{\text{800 cubic feet}}{\text{400 cubic feet/minute}} = \text{one air change every 2 minutes}$$

Thus it will take the fan two minutes to provide one air change to the confined space. It will take 10 minutes to provide the necessary 5 air changes.

If, in the example, a blower is used that has a capacity less than 400 cubic feet per minute, then the ventilation times would need to be readjusted to provide the required air changes.

- If hazards–such as welding, solvents, etc.–are to be introduced into the confined space, ventilation rates must be increased to levels that will control the hazards.

NOTE: If drains in floor, sink, showers, etc., are present in the space, upon verification of acceptable conditions, the first man in will fill these drains to ensure the gas-trap is filled to eliminate the potential introduction of gases from the drain by the ventilation flows.

15. ISOLATION OF THE SPACE

Prior to personnel entering a confined space, the space must be isolated from energy sources and materials which could injure or engulf the entrants. Each contractor entering such a space will develop a plan for ITSI review for control of these hazards. That plan must meet or exceed this program, OSHA 1910.147, NFPA 70E, ANSI Z244.1 and A10.44, the USACE 385.1.1 Section 12 Control of Hazardous Energy and API 2015/2016. Some procedures which must be considered to accomplish this task include:

- Lock out/tag out of electrical sources, preferably at disconnect switches remote from the equipment
- Disconnecting belt and chain drives and mechanical linkages on shaft-driven equipment where possible
- Securing mechanical moving parts within confined spaces with latches, chains, chocks, blocks, or other devices
- Blanking and bleeding chemical, steam, water, pneumatic and hydraulic lines

15.1 Lockout/Tagout

If the activation of any electrical or mechanical equipment could cause injury to persons in a confined space, each piece of equipment shall be manually isolated and inactivated

(locked out) before workers are allowed to enter a confined space, utilizing the appropriate Lockout/Tagout procedures. In addition to locking out electrical energy, other forms of stored energy such as spring tension, momentum movement, and elevated equipment must be released or blocked out prior to personnel entering the space.

15.2 Block and Blind

To prevent vapor leaks, flashbacks, and other hazards, workers must completely isolate the space. To completely isolate a confined space, the closing of valves is not sufficient. All pipes must be physically disconnected or isolation blanks bolted in place. Other special precautions must be taken in cases where flammable liquids or vapors may re-contaminate the confined space. The pipes blanked or disconnected should be inspected and tested for leakage to check the effectiveness of the procedure. Other areas of concern are steam valves, pressure lines, and chemical transfer pipes. A less apparent hazard is the space referred to as a void, such as double walled vessels, which must be given special consideration in blanking off and inerting.

16. FIRE AND EXPLOSION PROTECTION

The following steps should be taken to reduce the risk of fire or explosion in a confined space:

- Eliminate or remove all potential fuel sources in the confined space.
- Compressed gas and fuel cylinders, such as oxygen and acetylene tanks, should not be brought into the space.
- Oxyacetylene cutting torches and lines should be removed from the space as soon as the work is finished, and during all breaks and lunch periods.
- Ignition sources such as cigarettes, matches, and lighters are not allowed in any confined space.
- Static can be produced during fluid and air flow through pipes or hoses. This spark potential should be controlled through bonding and grounding. When ventilating a confined space, the metallic parts of the ventilating device and duct work must be electrically bonded to the confined space being ventilated.
- In confined spaces where explosive atmospheres could develop, only explosion-proof equipment and tools must be used.
- During all hot work in confined spaces, continuous air monitoring must be conducted. If LEL readings exceed 10%, all work must stop until levels can be reduced through ventilation or other means.

17. PROTECTING FROM ROADWAY HAZARDS

The following precautions shall be used when entering a confined space (i.e.: manholes) located along a roadway, parking lot or any areas where traffic flow may cause a potential hazard.

NOTE: For work on some highways, coordination with the authority having jurisdiction is required to ensure access to the area.

Specific protocols may be needed including permits, certified traffic control management, vehicle attenuators, etc. No work on an active roadway can be performed, including an evaluation of a space without an approved traffic control plan. Following are only some considerations when working with such spaces:

- Approach the area cautiously and activate flashers upon approach to the confined area to be entered. A yellow rotating lamp must be on the roof. Ensure you have an ANSI-approved retro-reflective vest on and the classification matches conditions and the speed of the traffic.
- Park any vehicles in such a way that traffic will flow in the most unobstructed manner, and where possible, the vehicle should provide protection for the entry crew.
- Park the vehicle in such a manner that exhaust fumes are not drawn down into the manhole. If this is not possible, extend the exhaust stack above the vehicle.
- Before uncovering a manhole, place traffic safety cones around the manhole and vehicle, visible to traffic in all directions. Place cones to protect the crew and to channel traffic flow. The cones should be placed at sufficient distances and intervals to adequately warn oncoming traffic. A physical, fabricated steel manhole barrier is required for all such work including a 4" kick-plate at the base. Tape, rope or similar materials are not acceptable.
- In areas of high traffic volume or other sites warranting additional highly visible safety equipment, use illuminating traffic arrows, barricades, and "Men Working" signs.
- When placement of the vehicle creates a situation of having only one open lane of traffic in a congested area, use a certified flag person to direct traffic flow. When a flag person is necessary, an additional crew member is required to attend the employee in the manhole. Wear traffic safety vests or equivalent at all times when working on the street or easement surface in the field.
- In the case of opening or obstructions in the street or sidewalk being worked on or left unattended, effectively display danger signals such as warning signs, cones and flags. Under these same conditions at night, prominently display warning lights. Enclose excavations and openings with suitable physical barricades. Plastic caution or warning tape is not sufficient for a barrier.

18. TRENCH AND EXCAVATION PRECAUTIONS

Prior to trenching and excavating, a review of the area will be completed to determine if the space may be considered a permit-confined space. An evaluation will be completed using the ITSI Confined Space Evaluation tool and a determination made. Should conditions define a potential hazard; the space will be tested to verify if permit-required space exists. Regardless of the results of an evaluation, if at any time conditions (broken sewer, odors from the soil, etc.) change, work will stop and the site will be considered a permitted space until proven otherwise.

19. PERSONNEL REQUIREMENTS

Permit-Required Confined Spaces require an Entry Supervisor (Competent Person), Attendant, Secondary Attendant, and Entrant(s). In addition, personnel trained in confined space rescue are required to be available during the entire time entry is made. The Entry Supervisor, who may also act as the Secondary Attendant, authorizes the entry and ensures all necessary requirements are met prior to and during the entry. The Attendant is stationed outside of the space and monitors the Entrants and performs all duties described below. The Secondary Attendant must be in continuous communication with the Attendant, and will assist in case of an emergency.

19.1 Project Health & Safety Manager

The Health & Safety Manager is responsible overall implementation of the Confined Space Program. Specific duties include:

- Arrange and/or conduct confined space training for ITSI personnel (including rescue training) who may be required to enter the space for inspection or other tasks. ITSI may provide assistance during a rescue but will never serve as the primary rescue service for any entry.
- Recommend/specify the appropriate entry and rescue equipment.
- Review this program and entry permits to assure the appropriate procedures are followed in the field.
- Evaluate Rescue Teams/Service to ensure they are adequately trained and prepared.

  No entry will be allowed under any circumstance unless a rescue team has been agreed upon and they have been contacted to ensure prompt response and have the capability, training and equipment to provide a confined space rescue and are confirmed available during the permit period.
- Evaluate subcontractors' programs to ensure at least minimum compliance with the requirements of this program.
- Recommend to Entry Supervisors the proper work procedures and protective equipment required to perform the work safely.

19.2 Site Supervisors/Health & Safety Officers

Site Supervisors/Health & Safety Officers have overall responsibility of on-site safety, and must work with Entry Supervisors/CP to assure safe operations. Specific duties include:

- Perform an initial evaluation of potential confined spaces on site, and perform a hazard assessment of those spaces which may be entered, identifying which ones are Permit-Required.
- Coordinate with POC and/or Facility Operator to ensure other site operations do not negatively impact confined space entry operations.

- Work with Entry Supervisor/CP to coordinate communications and rescue services.

19.3 Entry Supervisors – Confined Space Competent Person

Entry supervisors have overall responsibility of each entry, and must coordinate all entry procedures, tests, permits, equipment and other relevant activities. The following Entry Supervisor duties are required:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Verify that all controls specified on the Permit are in place before signing the Permit.
- Terminate or cancel the Permit if a prohibited condition arises.
- Verify that rescue services are available and that then test the means for summoning them.
- Ensure that Material Safety Data Sheets are on hand for any substance for which one is required.
- Determine that entry operations remain consistent with terms of the Entry Permit and that acceptable entry conditions are maintained. They must visually check the operations prior to entry and periodically but at least once every 2-hour period thereafter for the duration the space is occupied.
- Cancel the Entry Permit once the work is completed.

19.4 Attendants

Attendants for Permit-Required Confined Spaces are responsible for the minute-to-minute safety of the entrants. As such, they must:

- Perform no other duty that might interfere with the attendant's primary duty to monitor and protect the authorized entrants. Attendants must remain at the space entrance, and not leave for any reason, no matter how short a time.
- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure.
- Continuously maintain an accurate count by name of authorized Entrants in the Entry Permit, and sign them in and out on the Permit.
- Remove unauthorized individuals who enter or who attempt to enter the space during entry.
- Communicate with authorized Entrants at least every two minutes to monitor their status.
- Monitor the space and alert Entrants of the need to evacuate the space if the Attendant:
    - Detects a prohibited condition;
    - Detects a situation outside the space that could endanger the authorized entrants;

- Detects the behavioral effects of hazard exposure in an authorized entrant;
- Cannot effectively and safely perform all the duties required by authorized Attendants.

- Summon the rescue team and emergency services as soon as they determine that Entrants may need assistance to escape from the space
- Perform non-entry rescues/retrieval
- Remain outside of the space during entry operations until relieved by another authorized attendant. *Attendants may enter the space to attempt a rescue ONLY if they are properly trained in rescue operations and are properly relieved by an authorized Attendant.*

19.5 Entrants

Entrants into Permit-Required Confined Spaces must:

- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of exposure
- Understand and properly use the air quality monitoring equipment, ventilating equipment, communication equipment, personnel protective equipment, lighting equipment, barriers, rescue and emergency equipment, and any other equipment necessary for safe entry into and rescue from permit spaces
- Ensure that they have signed in and out of the space on the Entry Permit
- Communicate with the attendant at least every two minutes..
- Alert the Attendant and exit from the space whenever the Entrant recognizes any warning sign or symptom of exposure to a dangerous situation, or detects a prohibited condition.
- Exit from the space as quickly as possible whenever an order to evacuate is given by the Attendant or the Entry Supervisor, or an evacuation alarm is activated.

19.6 Employees

All employees are responsible for protecting themselves and others by:

- Staying out of Permit Required Confined Spaces unless trained and authorized; and
- Reporting any previously unidentified hazards associated with a potential confined space.

20. TRAINING

All training in confined space entry must comply with the requirements of the 1910.146 (g) Training and API 2015/2016, as applicable for Tank Entry. Training must be completed prior to entry into spaces, and must be updated at least annually. Training content is based upon the roles and responsibilities each employee will have during the entry.

In addition to the training content outlined below, a pre-job briefing given by the Entry Supervisor is required prior to entering any Permit-Required Confined Space. All persons involved are required to attend including all authorized entrants, attendants and the entry supervisor. The rescue team must be briefed as to the nature and location of the entry and be in communication with the attendant or plant operations dispatch.

Subcontractors must submit proof of training to SHO.

20.1 All Personnel/Entrants

Personnel, who may be required to enter confined spaces using the Entry Permit procedure, including Entrants, Attendants, Entry Supervisors, and Rescue Personnel, must receive training that must include, at a minimum:

- The requirements of this program, including the Entry Permit System;
- The definition and identification of confined spaces including recognition of confined space hazards and Permit conditions;
- Conditions or work practices that may produce an additional hazard in a confined space that would require the space to be reassessed;
- Interpretation of air monitoring results;
- The use of all personal protective equipment required for entry into a particular space;
- The use of portable ventilation equipment;
- The use of the required safety and communications equipment;
- Entry procedures and precautions;
- How to respond to emergencies during confined space entry, including:
  - Evacuation requirements
  - Non-entry rescue methods and the use of retrieval devices
  - Procedures for calling rescue services
- Recognition of warning signs and symptoms of exposure in themselves and other entrants, and detection of prohibited conditions.

20.2 Attendants

Anyone who acts as an Attendant during confined space entry must be trained in the following areas in addition to the requirements for Entrants:

- Familiarity with signs and symptoms of exposure in the entrants;
- Basic operation of air monitoring devices and interpretation of the results;
- Acceptable entry conditions established on the entry Permit, and appropriate actions to take if conditions fall outside of those established;
- The necessity to enforce work rules, and remove entrants in cases of non-compliance;
- Procedures for coordination with rescue services;

- Prohibition against entry in emergency situations; and
- Entry and exit tracking of entrants.

20.3 Entry Supervisors/Competent Person

Personnel who act as an Entry Supervisor for a confined space entry must be trained in the following areas in addition to the requirements for Entrants:

- Advanced hazard assessment
- Completing the Entry Permit
- Verifying completion of controls (i.e., ventilation, lockouts, blocking and blinding)
- Coordination of rescue efforts, including outside responders

20.4 Rescue Team Members

Personnel who will respond to a confined space emergency and who may be required to enter the space for rescue purposes must be trained in the following areas in addition to the requirements of the Entrants:

- Advanced hazard assessment, including conditions under which entry is not acceptable;
- Use of the Entry Permit to evaluate hazards and controls;
- Advanced hazard control procedures;
- Team coordination;
- Victim packaging and extrication;
- First Aid/CPR; and
- Rescue drills performed with the equipment to be used in the field, at least once every 12 months, including hands-on drills in removal of victims from the specific opening size and configurations of the spaces to be entered.

21. REQUIRED EQUIPMENT

21.1 General

The ITSI HSM shall coordinate with the Site Supervisors/Health & Safety Officers to provide the following equipment, maintain that equipment properly, and ensure that employees use that equipment properly:

- Testing and monitoring equipment.
- Ventilation equipment/blowers.
- Communications equipment, including between Attendant/Entrants and Attendant/Rescuers.
- Low voltage portable lights must be used in spaces which do not have adequate lighting.
- Only explosion-proof power tools, lights and non-sparking hand tools may be used in potentially flammable atmospheres.

- Barriers and shields to prevent objects from entering occupied confined spaces or to prevent people from falling into open spaces.
- Equipment, such as ladders, needed for safe egress by authorized Entrants.
- All required rescue and emergency equipment, including harnesses, winches, tripods, backboards/Stokes baskets, and first aid equipment.
- Any other equipment necessary for the safe entry into and rescue from confined spaces.
- All necessary personal protective equipment, as outlined below.

21.2 Personal Protective Equipment and Respirators

Work inside confined spaces may require the use of personal protection equipment (PPE) such as boots, gloves, chemical-protective coveralls, eye protection, safety harness, lifeline, mechanical retrieval system, or respiratory protection to ensure worker safety. Selection of the proper personal protective equipment will be made according to the provisions of the Activity Hazard Analysis (AHA) and on the Confined Space evaluation, and specified on the Permit. The personal protective equipment to be used during a confined space entry may include:

- Hard Hat: to be worn at all times.
- Safety Glasses/Goggles: to be worn at all times if a full face-piece respirator is not donned.
- Safety Work Shoes/Boots: to be worn at all times.
- Hand Protection – specific to the task and conditions of the space.
- Chemical-protective coveralls: to be worn when contaminant contact may occur.
- Respirator: to be worn as determined by the APP and or AHA.
- Hearing Protection: to be worn when excessive noise requires a person to raise their voice to communicate from a distance of 3 feet.

Only air-supplied respirators (i.e. airline respirator or SCBA) will be used for potentially oxygen-deficient or IDLH atmospheres in confined spaces, or in unknown conditions where chemical concentrations may exceed the protection factor of cartridge respirators. Confined space entries involving the use of air-supplied respirators will be handled on a case-by-case basis, and may require entry by a specialized outside contractor experienced in working in confined spaces containing hazardous atmospheres. The use of respiratory protection will be in compliance with the Accident Prevention Program, AHA, ITSI Respiratory Protection Program and/or the exposing contractors program(s).

22. ENTRY PROCEDURES

22.1 General

General requirements *prior* to entry into a Permit-Required Confined Space are:

- The Entry Supervisor must complete the Entry Permit to the extent possible, including potential hazards, required protective equipment and hazard control procedures such as ventilation, identification of trained Entrants, and Attendants, and rescue considerations.
- The Entry Supervisor must advise the site supervisor/HSO of the planned entry.
- The Entry Supervisor shall give a pre-job briefing as required above.
- The Entry Supervisor shall ensure that all hazards are controlled as specified above.
- Any condition making it unsafe to remove an entrance cover shall be eliminated before the cover is removed.
- When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee in the space from foreign objects entering the space.
- Before an authorized entrant enters the space, the internal atmosphere shall be tested for oxygen content, flammable gases and vapors, and for potential toxic air contaminants. Various levels and areas within the space must be tested. The person making the initial survey shall sign the Entry Permit, and immediately provide the initial test result to the Entrant(s).
- The space must be ventilated for a least as long as the time specified in the Permit.
- The space should contain acceptable entry conditions prior to entry. Specific values for atmospheric hazards are printed on the Entry Permit and may be specific to the suspected contaminants. If these values cannot be met, then ventilation shall continue until acceptable entry conditions are met. If acceptable conditions cannot be met, ventilation and control methods should be re-evaluated in consultation with the HSM. .
- Retrieval equipment shall be in place. If the space has a greater than 6 foot vertical drop, then personal fall arrest controls must be implemented.
- The attendant shall be stationed.
- The entry supervisor shall authorize entry by signing and dating the Entry Permit which will then be reviewed by the SHO.

General requirements *during* entry into a Permit-Required Confined Space are:

- The maximum time an Entry Permit can be used is one shift. If work is not completed when the current Entry Permit has expired, a new Entry Permit must be issued and condition re-evaluated per shift.

- Continuous forced ventilation must be used in spaces with atmospheric hazards as long as the space is occupied, in accordance with the ventilation section. Should the ventilation system fail during the entry, the space will be vacated immediately.
- The atmosphere within the space must be tested continuously, and readings recorded at least hourly or as directed by the Entry Supervisor/CP on the Entry Permit.
- The attendant shall be stationed the entire time of entry. The attendant shall only be relieved by another authorized attendant with the knowledge of the entry supervisor.
- If a hazardous condition is detected during entry, all workers shall leave the space immediately. The HSM shall be contacted and an investigation as to how the hazardous atmosphere developed begun. Workers shall not be allowed to re-enter the space until the hazard can be eliminated and a new permit completed and all conditions for re-entry met.
- Upon completion of work, the space shall be cleared, the entrance placed in its original condition and the Entry Permit(s) canceled and filed with the site records.

22.2 Storm Sewers and Pipelines Entry

These entries have unique hazards which are listed below:

- There are some spaces, like a sewer manhole, that cannot be completely isolated. Other means of protection for entrants are then required. This may include diversion of flow, simple blocking of the lines upstream, or spotters and hi-level alarms upstream, should an unexpected flow occur. For entries where such conditions may exist, the exposing contractor(s) will include specific controls in their Confined Space Entry Program.
- The atmosphere may suddenly and unpredictably become hazardous from causes beyond the control of the Entrant or owner – like an upstream release or unexpected rainfall.
- Storm sewer crews require specific training in these unique hazards.

The following additional procedure should be used for storm sewer and pipeline entries:

- Coordinate entries with local utility companies, POCs and fire departments so that immediate notification may be given and work may be delayed or interrupted and entrants withdrawn whenever lines might be suddenly flooded, or whenever flammable or hazardous materials are released into storm sewers.
- Monitor weather conditions in order to reduce the risk of unexpected water flow from a rainfall event.
- Prepare and implement a traffic control plan to minimize disruption to traffic and to ensure safety for the work crews.
- Mechanical ventilation must be used to provide fresh air in sewer entries.

23. EMERGENCY RESPONSE

Appropriate response to emergencies in confined spaces is of critical importance, as a disproportionate number of injuries and fatalities in these situations are would-be rescuers. As many as 60% of all fatalities associated with confined spaces are Attendants and other non-Entrants. As such, the actual goals in emergency response must be clearly defined. These goals are in approximate chronological/priority order:

1. Protection of rescuers
2. Evacuation of personnel
3. Control of hazards in the space
4. Prompt removal of victim(s) from the space
5. Care of victim(s)
6. Delivery of victim(s) to advanced medical care
7. Protection of public, environment, and property
8. Reporting, recordkeeping, and investigation

23.1 Types of Confined Space Emergencies and Responses

Confined space emergencies can be grouped both by type of potential hazard to Entrants, and by the type of response required by outside personnel. Potential hazards or injuries include:

- Condition requiring evacuation: increased atmospheric hazard, equipment failure, or other hazard such as inrush of water;
- Personal exposure to atmospheric hazard: asphyxiation or toxic gas/vapor;
- Engulfment or entrapment;
- Personal injury, such as electrocution, fall, or mechanical; and
- Personal medical condition, such as heat stress or heart attack.

Types of responses to emergencies include:

- Evacuation (known as self-rescue) due to alarms, equipment failure, Attendant warning, or new or formerly unidentified hazards;
- Retrieval (known as “assisted rescue”);
- Assisted self-rescue, generally in the case of moderate injury and where no atmospheric hazard exists, where the victim is conscious, and entry is made to provide first aid; and
- Entry rescue.

23.2 Emergency Considerations

Critical factors to consider in responding to emergencies include:

- Communications: Attendants must be able to know when someone needs help, and know how and positively be able to contact outside responders;
- Untrained personnel must never enter;

- Victims should be retrieved from outside if at all possible, and
- Trained and designated rescuers who will enter must assess the hazards of the space before entry.

23.3 Attendants

Attendants are the critical first link in emergency response to confined space accidents. After Entrants, Attendants are the most likely to be injured/killed in confined spaces, mostly because they often enter when they shouldn't. Attendants' critical duties during an emergency include:

- Stay at the entry to the space, and never go in;
- Notify entrants to leave – the Attendant has the authority;
- Initiate rescue efforts and notify responders;
- Use retrieval devices as appropriate;
- Keep track of the Permit and inform responders of conditions and hazards in the space; and
- Account for entrants after evacuation.

23.4 Emergency Communications

Emergency communications consist of communication between Entrants and Attendants, and between the Attendant and both internal and outside responders. Communication between Entrants and the Attendant must be continuous, and the signal for evacuation must be mutually understood. Communication with responders must be POSITIVELY established prior to entry into the space. This includes knowing exactly who will respond and if they will respond; how the call will be placed (radios, land telephone lines, cellular telephones); and will the call be answered by the appropriate resource; what information needs to be relayed to the operator (location, type of emergency, what assistance is required); and what actions will take place after the call is made, i.e., who will meet the responders to guide them to the space. Pre-entry tests of the communications system must be completed; it must NEVER be assumed that the system will work.

23.5 Initial Emergency Response Procedures

In the event of an emergency in a confined space, the following emergency response procedures must be followed:

1. The Attendant must notify the workers in the confined space to evacuate.
2. The Attendant must notify the Secondary Attendant and other employees of the emergency.
3. The Attendant must NOT enter the confined space, unless participating in a rescue as part of the rescue team, with other qualified and trained responders standing by.
4. In the event of a retrieval, the Attendant should begin operating the retrieval device to remove the Entrant.

5. The Secondary Attendant must immediately contact the established rescue services, and provide the location of the space, nature of the emergency, assistance required, and other information requested by the operator. The caller should stay on the line until released by the operator.

23.6 Evacuation (Self-Rescue)

The best rescue option is a self-rescue by which the Entrant(s) exit the confined space, if possible, without the aid of the Attendant, rescue device, or entry rescue. In the event of any emergency requiring any type of rescue, the rescue team and emergency services will be notified, especially if an injury has occurred.

23.7 Retrieval (Assisted Rescue)

If the Entrant becomes unable to perform a self-rescue, the attendant shall attempt to rescue the Entrant by use of a mechanical device from outside the space, if such retrieval will not further injure the Entrant. If, for example, it is apparent that the Entrant has become incapacitated due to presence of a hazardous atmosphere, the Attendant may perform a non-entry retrieval. If, on the other hand, there is no possible atmospheric hazard and if it the Entrant may have a potential back injury, then the Attendant shall wait for the rescue team to make the extraction.

To facilitate non-entry rescue, retrieval systems or methods shall be used whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of entry or would not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements:

- Each authorized entrant shall use a full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level, or above the entrant's head, or at a place which presents a small enough profile for the successful removal of the entrant. The Entrant may unhook the retrieval line once in the space, if the line may become tangled in internal obstructions. Alternative rescue methods must be provided.
- The other end of the retrieval line shall be attached to a mechanical device or fixed point outside the permit space in such a manner that rescue can begin as soon as the Attendant becomes aware that rescue is necessary.
- A space that has at least a 5-foot vertical entrance must have a tripod and winch retrieval setup. If it has a horizontal entrance, then it should have, at a minimum, a rope attached to the harness so that the Attendant can attempt to pull the Entrant out.

23.8 Entry Rescue

Provisions must be made for entry rescue prior to entry into Permit-Required Confined Spaces. These services may be performed by either an internal rescue team, outside response teams, or a combination. Rescue services must be immediately available to respond to emergencies. During some entry conditions (i.e.: use of Supplied Air Respirators), the entry rescue team must be located at the entry site.

23.9 Internal Rescue Teams

Subcontractors providing their own internal rescue teams must submit their rescue plan, training records, etc., to ITSI for review prior to mobilizing to the site. All rescue team requirements must be in compliance with OSHA 1910.146, EM385 1-1, and ANSI Z17.1 Section 14, Emergency Responses.

23.10 Outside Rescue Services

Arrangements may be made with an outside organization to provide rescue services. These teams may include fire departments or private rescue companies. Advantages of using outside services are that these teams are generally better trained, equipped and organized to respond to emergencies, especially medical emergencies. Disadvantages are that the response time may be longer for the team to actually reach the space, the outside team will not be as familiar with the space and its hazards as company personnel, and many fire departments are often reluctant or outright refuse to enter confined spaces.

When arrangements are established to provide rescue services by an outside organization, the company shall:

- Positively document both the willingness and the capabilities of the outside organization to provide the services required. If using military installation's fire department, establish and document their willingness, qualifications and availability during the Pre-Con meeting.
- Inform the rescue service of the hazards they may confront when called on to perform rescue at the host employer's facility.
- Provide the rescue service with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations prior to any work.

Once a qualified outside response team arrives on the scene, they must be brief on the hazards and the services required. In most rescues, they will generally take control of the scene and all emergency services.

24. SUBCONTRACTORS

24.1 Company Responsibilities

When ITSI arranges to have a subcontractor perform work that involves confined space entry, the project team must:

- Inform the subcontractor in writing that the workplace contains confined spaces and that permit space entry is allowed only through compliance with a permit space program which meets or exceeds the minimum standards established by this Program, and which meets the requirements set forth by OSHA, EM 385, ANSI Z117.1 and API 2015/2016. The HSM will review the contractor's program to assure it meets basic minimum standards. This included verification of training and refreshers for those associated with the entry work.
- Apprise the subcontractor of the hazards identified in the space.

- Coordinate entry operations with the subcontractor and POC when both ITSI personnel and other contractors will be working in or near confined spaces.
- Debrief the subcontractor at the conclusion of the entry operations regarding the confined space program followed and regarding any hazards confronted or created during entry operations.

24.2 Subcontractor Responsibilities

Each subcontractor who is retained to perform work that will require confined space entry operations must:

- Obtain any available information regarding confined space hazards and entry operations from the company and submit their Confined Space Entry Program and Activity Hazard Analysis specific for each space to be entered. Should the spaces be similar in setting and condition like a row of new manholes, a single AHA may be presented.
- The sub must identify who will provide rescue services during the entry.
- Coordinate entry operations with the company when both the contractor and company personnel will be working in or near confined spaces.
- The contractor shall debrief the company at the conclusion of entry operations regarding any hazards confronted or created during entry operations.

25. RECORDKEEPING

All recordkeeping will be maintained in accordance with the procedures in the ITSI Recordkeeping Program. Each permit terminated or canceled by the Entry Supervisor will be retained on site for auditing purposes and filed with the project documentation.

26. PROGRAM REVIEW

The ITSI Corporate Director, Health & Safety, will review this program at least annually, or sooner if best practices, lessons learned, improvements or regulatory changes affect it.

Traffic Control
Safe Work Procedures

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1. REGULATIONS

- U.S. DOT Manual of Uniform Traffic Control Devices (MUTCD).
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), September 2008.
- American National Standards Institute (ANSI) Standard for high-visibility clothing.

2. PURPOSE AND SCOPE

ITSI, our subcontractors, and other site personnel perform many tasks on project sites where work must be performed in and around vehicles and equipment traffic patterns and puts personnel at increased risk from being struck. Many site activities also take place in or along the shoulder of active roadways on bases and highways. In addition, our activities may impact the safety of drivers, bicyclist and walkers using the roadways, due to unexpected roadway conditions, unclear traffic controls, emergency vehicle access to areas and collisions with our equipment, etc.

The following guidelines should be used to develop specific traffic control measures for field work, which will be detailed in a Traffic Control Plan (TCP), if required, for each project. The TCP will be designed and submitted prior to the commencement of any contract operations. ITSI and the exposing contractor will develop the proposed TCP for the safe passage of traffic through while providing safe access to the contract work area. ITSI will coordinate with the client and obtain approval from local authorities prior to closing or restricting any roads.

This SWP includes references to the Army Corps of Engineers USACE EM 385.1.1 (*Safety and Health Requirements Manual)*, but each contractor affected by the TCP must read and understand the entire "manual" and requirements. Should there be a conflict between a subcontractor's health and safety plan, the TCP, state or federal Manual of Uniform Traffic

Control Devices (MUTCD) and the USACE manual, the strictest guidance will apply. Host nation requirements must be included for OCONUS projects.

3. DEFINITIONS

- **Traffic Pattern** – overall pattern of controls, flaggers and devices to guide traffic through or around an entire work area. The area between the **CONSTRUCTION ZONE** signs.
- **Traffic Package** – specific deployment of a discrete set of controls within the traffic pattern, for example an area for trucks to enter a work area, midway, along the traffic pattern.
- **Reflective** – a surface where light will reflect but continue at that same angle (a mirror).
- **Retro-reflective** – occurs when light bounces from a surface that is engineered to return light in the direction of its source (like cat's eyes) at night or light from a safety vest reflective stripe.
- **Manual of Uniform Traffic Control Devices (MUTCD)** – nationally adopted standard for controlling traffic, shapes and colors of signs etc.

3.1 Personnel Qualifications

Each person whose actions affect temporary traffic control zone safety, from management through the site teams, must be trained appropriate to the job decisions each individual is required to make. Only those individuals, who are trained **from an accredited organization** in proper temporary traffic control practices, and work zone safety, flagging techniques, etc., and have a clear understanding of those principles, should design TCPs or work under the direction of the TCP. These accredited personnel shall also supervise the selection of control techniques, placement, and maintenance of temporary traffic control devices.

4. TRAFFIC CONTROL (INCLUDING USACE EM 385.1.1 SECTION 08 REQUIREMENTS)

Traffic control planning, lights, barricades, road markings, signs, and signalpersons for the safe movement of traffic shall be provided in accordance with the DOT Federal Highway Administration's "*Manual on Uniform Traffic Control Devices*" and this section. For OCONUS projects EM 385 1-1, host nation requirements and this section will be used.

The Contractor shall conduct his operations in such a manner as to offer the least possible obstruction to the safe movement of traffic over the existing roads during the life of the contract.

The Contractor shall be responsible for providing, erecting, maintaining, and removing all traffic signs, barricades, and other traffic control devices necessary for maintenance of traffic.

All barricades, warning signs, lights, temporary signals, other devices, flagmen, and signaling devices shall meet or exceed the minimum requirements of the MUTCD local DOT requirements.

Barricades, danger, warning and detour signs, as required, shall be erected before any roads are closed.

5. SITE OPERATIONS

In order to minimize the risk of struck-by accidents during site work, field personnel should consider the following guidelines when developing and implementing work site traffic control plans:

- Review the site specific safety plan and Activity Hazard Analysis (AHA) for any special traffic control details or hazards, like overhead power for the tasks that will be performed.
- Conflict avoidance planning. Keep people and machines apart by separating equipment and pedestrian routes, whenever possible, with barriers and install warning sign as needed. **Especially when workers cross equipment routes, for this is a continual high hazard condition**.
- Verify that all necessary traffic-control devices are available based on the approved TCP prior to installation of any traffic control pattern or "package" with that pattern.
- Using the traffic control devices, establish work zone as per the TCP and make any necessary adjustments based on traffic flow. Update the plan to reflect any changes in devices or controls.
- Attempt to set up control devices with field personnel facing/looking toward traffic, if possible have one person responsible to monitor that traffic (equipped with an air horn) to alert everyone in case of emergency (car enters pattern by mistake etc.)
- Consider blocking/warning vehicle or attenuator trucks when installing packages.
- Conduct a pre-job site safety meeting to ensure all workers are aware of site-specific traffic control measures and sign-off acknowledging that information.
- Assure that all personnel are wearing the appropriate high-visibility, retro-reflective garments. Colored shirts, etc., are not allowed in lieu of conventional safety vests.
- Wear the appropriate PPE for the work to be performed as indicated in the AHA with vests always closed, including retro-reflective striping on hardhats.
- When entering the site, get a feel for movement of vehicles before leaving your vehicle and ensure you have parked in a dedicated, protected area.
- Stay alert at all times, since vehicle or equipment traffic routes may change unexpectedly at any time. Be sure to look at all possible directions from which traffic may approach, including vehicles backing up. Never assume any established pedestrian pathway to be "safe."
- **Only perform work within the delineated work zone or traffic package.**
- Clear the work area and break down the traffic control system only after all work has been completed, and pick up the package only as specified in the TCP.

6. WORK ALONG ROADWAYS

Site work is dangerous but active public roadways increase risk based on the higher vehicle speeds and lack of control over those driving by. Whenever possible, replace people with a suitable device for traffic control to eliminate that threat. Per the USASE:

> *"A flag person or other controls shall be provided when operations or equipment on or next to a highway create a traffic hazard. An exception shall be made only when an adequate mechanical signaling or control device is provided for safe direction of the operation."*

Example - Effectiveness of Contrasting Color

EXAMPLE: Always consider (and test) how a driver views traffic controls. In this example a flagger wearing an orange vest, orange hard hat and carrying an *orange* flag stepped out from among orange warning signs and barrels, was not seen and struck by a car.

6.1 Primary Considerations

Road user movement should be inhibited as little as practical, based on the following considerations:

- Temporary traffic control at work sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so.
- **DO NOT FOLLOW** signs should be considered for trucks entering the package from uncontrolled roadway or public vehicle may follow them in.
- Avoid frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers.
- Provisions should be made for the reasonably safe operation of work, particularly on high-speed, high-volume roadways including the installation of solid barriers.
- Yellow beacons or warning lights high on vehicles shall be provided for those entering the traffic pattern and these activated **well before** turning into traffic and when leaving the public highway to the work areas.
- Road users should be encouraged to use alternative routes that do not include temporary traffic control zones.

- Bicyclists and pedestrians should be provided with access and safe passage through the temporary traffic control zone.
- Roadway occupancy should be scheduled during off-peak hours and, if necessary, night work should be considered.
- Physical solid, concrete barriers should be placed between traffic and those to be protected.

Uncontrolled, Unplanned and Unprotected Activity

6.2 Traffic Control

The following principles should be applied:

- Drivers, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and passing temporary traffic control zones.
- Adequate warning, delineation, and channelization should be provided to assist in guiding road users in advance of and through the temporary traffic control zone by using proper pavement marking, signing, lane widths or other devices that are effective under varying conditions.
- Temporary traffic control devices inconsistent with intended travel paths through temporary traffic control zones should be removed or covered. However, in intermediate-term stationary, short-term, and mobile operations, where visible permanent devices are inconsistent with intended travel paths, devices that highlight or emphasize the appropriate path should be used.
- Flagging procedures, when used, should provide clear guidance to road users traversing the temporary traffic control zone.
- Construction areas shall be posted with legible traffic signs at points of hazard in accordance with the MUTCD.
- Signs required to be seen at night shall be reflectorized.
- Traffic flagging procedures (and flag colors) shall be in accordance with the DOT Federal Highway Administration's MUTCD.
- Those involved in TCP maintenance shall not ride on equipment through the package unless designed for that task (cone truck).

- When roads are temporarily closed to public access, barricades or gates shall be used that are highly visible in day or night conditions. At a minimum, barriers shall be coated with reflective paint or be applied with highly reflective tape on both sides, and be signed with 'ROAD CLOSED'.
- Affected roads shall also be posted with appropriate warning signs a minimum of 100 ft before the barrier. Size and placement of signs depends on viewing distance and speed limit of roadway.

Uncontrolled Traffic Protection

NOTE: If a flagger is found using a hand-held device, like a cell phone or reading text messages, while controlling traffic, he or she will be removed from the site for the balance of the project.

6.3 Inspections and Updating of the Traffic Control Plan

To provide acceptable levels of operations, routine day and night inspections of temporary traffic control elements should be performed as follows:

- Individuals who are knowledgeable (for example, trained and/or certified) in the principles of proper temporary traffic control should be assigned responsibility for safety in temporary traffic control zones. The most important duty of these individuals should be to check that all temporary traffic control devices of the project are reasonably consistent with the temporary TCP and are effective in providing safe conditions for drivers, bicyclists, pedestrians, and our workers.
- As the work progresses, temporary traffic controls and/or working conditions should be modified in order to provide safe and efficient road user movement and to promote worker safety. The individual responsible for temporary traffic control should have the authority to halt work until applicable or remedial safety measures are taken.
- Temporary traffic control zones should be carefully monitored (by driving through the pattern) under varying conditions of road user volumes, light, and weather to check that applicable temporary traffic control devices are effective, clearly visible, clean, and in compliance with the temporary TCP.

- When warranted, an engineering study should be made (in cooperation with law enforcement officials) of reported crashes occurring within the temporary traffic control zone. Crash records in temporary traffic control zones should be monitored to identify the need for changes in the temporary traffic control zone.

6.4 Ongoing Considerations

Attention should be given to the maintenance of roadside safety during the life of the temporary traffic control zone by applying the following principles:

- To accommodate run-off-the-road incidents, disabled vehicles, or emergency situations, unencumbered roadside recovery areas or clear zones should be provided where practical.
- Channelization of road users should be accomplished by the use of pavement markings, signing, and crashworthy channelizing devices.
- Work equipment, workers' private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.
- As the work progresses, temporary traffic controls and/or working conditions should be modified in order to provide safe and efficient road user movement and to promote worker safety. The individual responsible for temporary traffic control should have the authority to halt work until applicable or remedial safety measures are taken.
- If troops are in formation along or within the confines of the traffic controls speeds, all vehicles shall be reduced to 5 mph and that warning posted.
- Should a driver threaten a flagger or anyone controlling traffic, including verbal threat, horn use, or the threatening advance of a vehicle, etc., the flagger shall:
    - Never physically or verbally engage the operator;
    - Contact their supervisor or ITSI immediately in regard to the incident as soon as practical;
    - Do not attempt to stop the vehicle;
    - Record the license number and description of the vehicle; and
    - ITSI or the flaggers supervisor shall contact authorities, not the flagger.

7. HAUL-ROADS – SITE OPERATIONS PLANNING

Prior to construction, ITSI will review the TCP and coordinate those controls with an Access/Haul Road Plan for review and acceptance by the client. Work on the haul road shall not commence until the client has accepted the Access/Haul Road Plan.

The Access/Haul Road Plan shall reference the TCP (common intersections etc.) and address the following items:

- Equipment usage, traffic density, and hours of operation;
- Road layout and widths, horizontal and vertical curve data, over-travel protection, and sight distances;
- Sign and signalperson requirements, road markings, and traffic control devices;

- Drainage controls;
- Points of contact between vehicles and the public, and safety controls at these points of contact;
- Maintenance requirements, including roadway hardness and smoothness and dust control;
- Hazards adjacent to the road, such as bodies of water, steep embankments, etc.
- Traffic control lights, barricades, road markings, signs, and signalpersons for the safe movement of traffic shall be provided in accordance with the DOT Federal Highway Administration's "*Manual on Uniform Traffic Control Devices*" and this section;
- Roadway hardness, smoothness, and dust control shall be used to maintain the safety of the roadway; and
- All roads shall be maintained in a safe condition and eliminate or control dust, ice, and similar hazards.

8. HIGH-VISIBILITY GARMENTS

A minimum of ANSI Class 2 (or equivalent) apparel (vests, coveralls etc.) shall be worn by all site workers unless they pose a hazard to a task, like working around rotating equipment.

If conditions warrant high-visibility apparel for workers; based on visibility, vehicle speeds, or related conditions, that determination shall be made by the SHO. Determination shall be based on a risk assessment, as to whether ANSI Performance Class 3 (or equivalent) is needed. If Class 3 apparel is determined to be needed, then it shall be worn.

No colored tees or similar non-reflective materials will be worn in lieu of ANSI apparel vests, and all reflective garments must be zippered, buttoned or otherwise closed whenever in use.

For early dawn and dusk operations, ANSI Class 3 level garments shall be worn, due to low light conditions. If nighttime work is anticipated, the TCP shall reflect an increased level of protection per the ANSI standard.

For operations within controlled zones or those directly involved with traffic control(s), reflective strips shall be worn on hardhats, per standard protocols.

ANSI class vests must be clean, undamaged, 100% of the original reflective surface intact, and less than three years in service or they will be removed from service.

8.1 Public Relations

Good public relations and protection should be maintained by applying the following principles:

- The cooperation of the various news media should be sought, as necessary, in publicizing the existence of and reasons for temporary traffic control zones – news releases can assist in keeping the road users well informed.
- The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made.

- The needs of railroads and transit, emergency service providers (police, fire, and medical) should be assessed and appropriate coordination and accommodations made.
- All temporary traffic control devices shall be removed as soon as practical. When work is suspended for short periods of time, temporary traffic control devices that are no longer appropriate shall be removed or covered.
- Temporary fence bases shall not intrude into public walkways.
- Stored materials cannot extend into public walkways.
- Where a sidewalk or travel route cross an active equipment crossing, warning sign well in advance of that intersect are needed. Additional controls like a flagger may be required based on site conditions like a nearby school.
- Where a fence runs along a sidewalk and it is covered, viewing slots shall be installed to allow those walking by and those approaching in vehicles increased visibility.

Public Trip Hazard

Public Trip Hazard

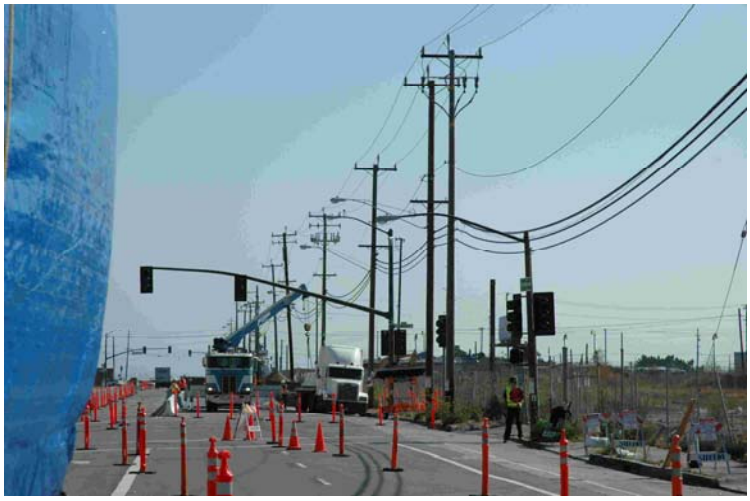
No Trip Fence Base

9. ADDITIONAL HAZARDS – OVERHEAD AND UNDERGROUND

Particular care to overhead power line and placement of traffic controls is critical. No telescoping or similar equipment shall be placed with 10 feet (distance over the highest piece of the equipment when operating) or within 10 feet of **utility line** when raised.

Signs will be posted highlighting overhead hazards where equipment crosses under or will park alongside.

Unsafe Placement of Light Set



Unsafe Installation of Traffic Barriers

Notification of underground utilities will be made (811 or host nation equivalent) before any sign or traffic control or marking stake is driven or anchored into the ground.

10. VERIFICATION OF CONTROLS – TRAFFIC CONTROLS

The following controls must be in-place prior to work:

- Assure that all personnel are wearing the appropriate high-visibility, retro-reflective garments. Colored shirts etc. are not allowed in lieu of conventional safety vests.
- Wear the appropriate PPE for the work to be performed as indicated in the AHA with vests always closed, including retro-reflective striping on hardhats.
- **Only perform work within the delineated work zone or traffic package.**
- Clear the work area and break down the traffic control system only after all work has been completed and pick up the package only as specified in the plan.
- **DO NOT FOLLOW** signs should be considered for truck entering the package from uncontrolled roadway or vehicle may follow them in.
- Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers should be avoided.
- Yellow beacons or warning lights high on vehicles shall be provided those entering the traffic pattern and these active **well before** turning into traffic and when leaving the public highway and entering the package.

- Road users should be encouraged to use alternative routes that do not include temporary traffic control zones.
- Bicyclists and pedestrians should be provided with access and reasonably safe passage through the temporary traffic control zone.
- Roadway occupancy should be scheduled during off-peak hours and, if necessary, night work should be considered.
- Physical solid, concrete barriers should be placed between traffic and those to be protected
- Individuals who are knowledgeable (for example, trained and/or certified) in the principles of proper temporary traffic control should be assigned responsibility for safety in temporary traffic control zones. The most important duty of these individuals should be to check that all temporary traffic control devices of the project are reasonably consistent with the temporary traffic control plan and are effective in providing safe conditions for drivers, bicyclists, pedestrians, and workers.
- Temporary traffic control zones should be carefully monitored (by driving through the pattern) under varying conditions of road user volumes, light, and weather to check that applicable temporary traffic control devices are effective, clearly visible, clean, and in compliance with the temporary traffic control plan.
- When warranted, an engineering study should be made (in cooperation with law enforcement officials) of reported crashes occurring within the temporary traffic control zone. Crash records in temporary traffic control zones should be monitored to identify the need for changes in the temporary traffic control zone.
- No colored tees or similar non-reflective materials will be worn in lieu of ANSI apparel
- To accommodate run-off-the-road incidents, disabled vehicles, or emergency situations, unencumbered roadside recovery areas or clear zones should be provided where practical.
- Channelization of road users should be accomplished by the use of pavement markings, signing, and crashworthy channelizing devices.
- Work equipment, workers' private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.
- All road signage shall be installed, in original condition and maintained to take any wind load including storm winds that may arise overnight or weekends.
- If troops are in formation along or within the confines of the traffic controls speeds of all vehicles shall be reduced to 5 mph and that posted.
- Should a driver threaten a flagger controlling traffic including verbal threat, horn use or threatening advance of a vehicle etc., the flagger shall:
    - Never physically or verbally engage the operator,
    - Contact their supervisor or ITSI immediately in regard to the incident as soon as practical,
    - Do not attempt to stop the vehicle by stepping in front,

  - Record the license number of the vehicle, and
  - ITSI or the flaggers' supervisor shall contact authorities, not the flagger.

- ANSI Class 2 (or equivalent) apparel (vests, coveralls etc.) shall be worn by workers all site workers unless they pose a hazard to that task like rotating equipment.
- If conditions warrant based on visibility, vehicle speeds or related conditions a determination shall be made by the SHO, based on a risk assessment, as to whether Performance Class 3 (or equivalent) high-visibility apparel is needed for higher visibility of workers and if so, they shall be worn.
- Vests and all reflective garments must be zippered, buttoned, or otherwise closed whenever in use.
- For early dawn and dusk operations ANSI Class 3 (or equivalent) level garments shall be work due to low light conditions. If nighttime work is anticipated, the TCP shall reflect the increase level of protection per the ANSI standard.
- For operations within, or those directly involved with, traffic control(s), reflective strips shall be worn on hardhats per standard protocols.
- ANSI class vests must be clean, undamaged, 100% of the original reflective surface, intact, and less than three years in service, or they will be removed from service.
- Particular care to overhead power line and placement of traffic controls. No telescoping or similar equipment shall be placed within 10 feet (distance over the highest piece of the equipment when operating) or within 10 feet of **utility line** when raised.
- Notification of underground utilities will be made (811 or host nation equivalent) before any sign or traffic control or marking stake is driven or anchored into the ground.
- Signs will be posting of overhead hazards where equipment crosses under or will park alongside.

Spill and Release Prevention, Response and Control
Safe Work Procedures

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1. PURPOSE AND SCOPE

This procedure describes minimum safety requirements for the elimination of conditions that may result in a spill or a release of controlled or hazardous materials. Should a spill occur, the following are guidelines to the response but specific spill information is provided by the manufacturer in the Materials Safety Data Sheet for the product.

This safe work procedure is targeted to small spills that may occur on a project and not operations that entail a formal response to a spill by others. The requirements of this program apply to ITSI employees who may be involved in a spill and that response on site. Contractors that have the potential to store (diesel tanks) or use such materials (line paint) must have a program that meets the minimum requirements outlined in this program in addition to any other regulation or standard that might apply.

2. REGULATIONS

- 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), November, 2008

Whenever a spill occurs, regardless of the quantity, the ITSI project superintendent shall be notified.

Containers and equipment that may spill materials on projects include:

Compressors - oil and contaminated condensate	**Elevators - hydraulic oil**	**Generator - fuel, oil, battery acid and coolants**
Oil/water separators	**Transformers – dielectric oil**	**Machinery - oil**
Under slab heating (offices) or cooling (cold storage buildings)	**Demolition materials like refrigerators – Ammonia and Freon**	**Vacuum truck contents**
Oil cooled switches – Dielectric oil	**Equipment like Drilling Rigs - fuel, oil, battery acid and coolants, transmission oil, hydraulic oil**	**Refrigeration and Cooling – Freon, Ammonia and Glycol**
Collected samples of groundwater from monitoring wells	**Chemicals being injected into contaminated subsurface**	**Equipment calibration standards**

3. DEFINITIONS

- *DOT* U.S. Department of Transportation
- *PPE* Personal Protective Equipment
- *SSHP* Site Specific Health and Safety Plan
- *APP* Accident Prevention Plan
- *AHA* Activity Hazard Analysis

4. RESPONSIBILITIES

4.1 Health and Safety Staff

The Health and Safety officer and ITSI site Supervisors/Superintendents are responsible for enforcing safe work practices and provide training and guidance for spill prevention and response activities.

4.2 Site Supervisors/Superintendents

Site Supervisors/Superintendents are responsible for verifying that contractors have a spill response protocol and that required training, PPE and spill response equipment is readily available to respond aggressively and successfully to a spill. Site Supervisors/Superintendents will oversee spill response activities and will observe operations for unsafe work practices. They will coordinate and perform other response or reporting activities with the owner/client. Superintendents will also schedule random drills to test the effectiveness of the response plan, availability of resources, etc.

4.3 Spill Response Personnel

All personnel involved in responding to a spill are responsible for complying with the Accident Prevention Plan, Activity Hazard Analysis and SSHP (if applicable) and safe work practices.

5. SPILL PREVENTION MEASURES

The goal on each project is zero spills. To reduce or eliminate the chance of a spill, the following must be considered:

- Ensure each piece of equipment or container with the potential to cause a spill is in good condition.
- Install barriers over manholes, floor-drains, sewers, etc., when working to confine a release.
- Consider fueling of equipment by service vehicles, rather than using skid-type fuel tanks and the hazards of that storage.

If materials of spill concern are stored, limit the amount on the project to what will be used for the following day. Per the USACE "*09.B.13 Flammable and combustible liquids in quantities greater than that required for 1 day's use shall not be stored in buildings under construction…*"

All sources of ignition must be prohibited within 50 feet of a combustible or flammable material.

Use self-closing containers to transport or store fuels or materials saturated with fuel. Only containers approved by a nationally-recognized testing laboratory (i.e.: UL, FM, etc.) shall be used for the storage of flammable and combustible liquids. Ordinary plastic containers are not allowed, due to their quick failure when exposed to a fire.

Portable tanks of less than 660 gallons shall be provided with emergency venting to limit internal pressure under fire conditions.

The design, construction and use of all storage tanks for flammable and combustible liquids must meet the requirements of NFPA 30.

Storage areas or tanks must be protected with a curb or other impermeable barrier to contain the contents of the liquids stored plus 10 percent. Provisions must be made to drain off rainwater to ensure their capacity to hold a spill is maintained.

All dispensers and tanks are to be protected against collisions by equipment with a physical barrier like a Jersey barrier or K-rail. Propane storage areas specifically must be protected by a substantial barrier to prevent contact and spilling of this fuel.

Should temporary heat be supplied by oil, all supply lines are to be inspected daily.

Fueling of equipment and devices shall not occur closer than 20 feet to a body of water, mechanical sump, monitoring well or drinking water well.

Owner/Client directed testing of petroleum lines with fuel provides the potential for a catastrophic release. Advise the owner/client of the hazards and recommend alternate, safer methods, like pressurizing with an inert gas or pulling a vacuum on the system.

Locks shall secure all fuel dispensers on mobile equipment or skid-type.

Clearly post emergency response phone numbers in all project fuel storage areas.

6. SPILL RESPONSE PROCEDURES

Specific spill response requirements for ITSI projects will be addressed in each SSHP and/or AHA. For fuel related work that response will also be coordinated with the owner/client. Each project site will have specific spill response protocols and these will be communicated to site workers during their site orientation. These spill response requirements will address spill hazards, control measures, spill containment clean-up procedures and reporting requirements. *In general*, spill response will be performed as follows:

The first step in spill response is to secure the affected area. This is especially important when dealing with flammable, corrosive, or toxic materials. Securing the area may include simply placing barricades around the spill area and restricting access to trained and authorized personnel only, or in the case of a severe emergency where bystanders in the area may be affected, evacuation may be necessary. In the case of severe emergencies or when the spilled/released material is unidentified, the owner/client will likely work with local regulatory agencies and emergency service agencies and may direct the overall response.

Proper PPE based on the material (consult MSDS and other references such as Quick Selection Guide to Chemical Protective Clothing, DOT Emergency Response Guide, etc.) and quantity spilled shall always be worn. PPE used by ITSI personnel for spill control of known materials may include levels D through Level B. ITSI personnel will not participate in spill response which would require Level A protection.

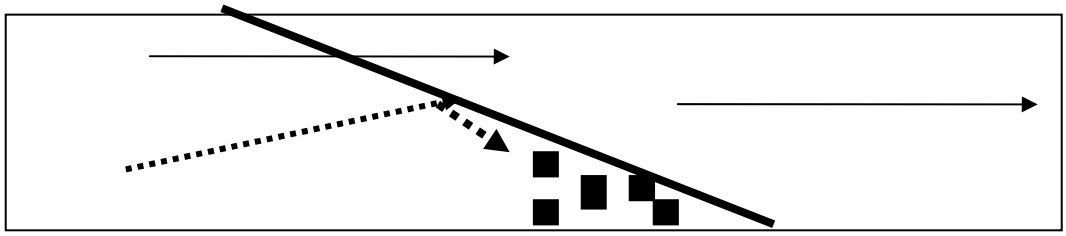
6.1 Spills to Ground

First, attempt to eliminate the source of the release. This may range from shutting a control valve to putting a bucket under a leaking hydraulic line. Second is to restrict the spill to the immediate area. This may include digging a small depression to catch the flow or a machine built berm around a storm drain to confine a larger release. Last is to collect the spilled material that is immediately available using sorbents and other methods. The type of spilled material may limit response (gasoline) due to the inherent dangers of the material. The MSDS will define a more specific response.

6.2 Spills to Water

A release to water is, in most cases, an emergency for the potential to spread to other receptors and environmental damage. Prompt reporting (as the response is conducted) is critical to muster other resources that may be needed. Note that a spill to water also includes releases into storm systems. Attempts to control the material to the area by booms or sorbents and booms is the best first step, but in some cases water-soluble materials like alcohol or glycol capture will be

impossible. Should moving water be affected and a boom deployed, it should be anchored well on both sides *but at an angle to the flow.* See diagram showing the boom installation and capture/sorbent area for floating liquids.



6.3 Spills in Structures

Due to the confining space of a structure, a spill of a flammable material or gas may pose a life safety threat. Based on the spilled material (LP-gas, gasoline, etc.) immediate evacuation may be necessary. If life safety is not a direct concern, first attempt to eliminate the source of the release. This may range from shutting a control valve to putting a bucket under a leaking coolant line. Second is to restrict the spill to the immediate area. This may include covering floor drains or applying spill materials like Spedi-Dri around the area. Depending on the material, ventilation may also be important to ensure vapors do not affect others from a toxicity concern or accumulate to a concentration which poses a flammability/explosive hazard.

Spill kits will be located near operations that have a spill potential. For example, if a line painting operations takes place on a taxiway, the spill kit shall be in the cab or on that equipment.

6.4 Spill Cleanup

The final step in spill response is removal of the spilled material, restoration of the area and waste disposal. Cleanup may require manual techniques (hand shoveling, wiping, etc.), mechanical techniques (excavators, loaders, etc.), or both. The cleanup may require owner/client or agency approval. Prior to any removal or disposal of any materials associated with a spill, ITSI will coordinate a meeting of all responsible parties to determine cleanup procedures, standards and approval of cleanup or remediation goals and waste material disposal processes. Approved (by DOT and the disposal facility) disposal containers will be utilized for collection of spill clean-up waste and materials. Containers must be compatible with the waste being generated.

Disposal of hazardous and/or radiological waste materials will be in accordance with all Federal, State and local regulations.

Hazardous and/or radiological waste manifests must only be completed by trained and authorized individuals. Typically, it is the owner/client who is authorized to sign Hazardous/Radiological Waste Manifests.

7. RECORDKEEPING

During spill response, a record should be generated which contains:

- Project site and location of spill;
- Type of material and estimated quantities released and to what media like soil, water, concrete floor, the mechanism of release and responsible contractor;
- Personnel present, including both ITSI, outside agencies, public, press, etc.;
- Response actions taken, with times;
- Air monitoring readings;
- PPE utilized by response personnel;
- Any exposures or reported symptoms; and
- Any other information which may be used later to assess the impact of the spill or evaluate response actions.

After spill response is complete, the record should be reviewed specifically for the purpose of evaluating the response, making any changes to the AHA and preparing a lesson learned.

Note: Should the owner decline to report a spill to a government agency ITSI may be required to. The ITSI project manager will oversee this notification or documentation of the occurrence.

ITSI
Hazardous Energy Control Program (HECP)
Safe Work Procedures

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Photo Submitted by: Chris Hollibaugh

Example of Panel Lock, Tag and Breaker Barrier Cable

1. REGULATIONS

- 29 CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout)
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), September 15, 2008 Section 12 Control of Hazardous Energy

2. INTRODUCTION AND SCOPE

This program describes minimum safe work practices to protect ITSI employees from the potentially harmful effects of uncontrolled hazardous energy. It details procedures for achieving a zero energy condition before employees perform any activities where the unexpected energizing, start-up, or release of stored energy could cause injury or damage.

Fundamental to this program is consistent communication and coordination between ITSI, the Government Designated Authority (GDA) or Owner, the creating, and exposing contractor(s) as well as notification of non-affected contractors or persons working in the area.

This safe work procedure applies to operations at work sites where hazardous energy must be controlled to prevent worker injury, including:

- During construction, renovation, servicing and maintenance of systems, utilities or facilities; and
- When testing systems as they are installed or later during commissioning.

This program does not apply to plug-connected electrical equipment when:

- All sources of hazardous energy are controlled by unplugging the cord, and
- The plug is under the exclusive control of the employee performing the work.

Subcontractors are required to provide their own HECP program that must meet or exceed this ITSI program, the regulations stated above, and any code or standard referenced. The HECP must be submitted to ITSI SHO at least 2 weeks prior to beginning work for our review prior to formal submittal to the client.

The HECP for any work must be submitted as part of the site Accident Prevention Plan to the GDA prior to any implementation for acceptance.

This program will be reviewed and updated whenever operations or regulatory standards change or best practices or lessons learned are incorporated. This program applies only to ITSI employees and USACE employees when ITSI, the contractor, and USACE employees are affected.

NOTE: ITSI will not work on energized systems and strives for a zero-energy state in all circumstances. During some portions of the work, like energization of a transformer or switching system, other standards may apply to the work, such as the National Fire Protection Association 70E for electrical safety. Each affected and exposing contractor must design their task specific HECP Plan and Activity Hazard Analysis to reflect the requirements of regulations, standards, codes and the manufactures installation policy.

3.0 DEFINITIONS

- *Affected Employees* are those employees who operate machinery or equipment upon which lockout or tagging out is required under this program.
- *Authorized Person* means a qualified person or employee delegated to perform specific duties under the conditions existing.
- *Barricade. A* physical obstruction such as tapes, screens or cones intended to warn and limit access to a hazardous area.
- *Barrier*. A physical obstruction which is intended to prevent contact with energized lines or equipment or controls.
- *Block:* Placing some physical barrier to prevent parts from moving, objects from falling or pressure from being released; in order to prevent the flow of hazardous energy from a hazard source to a person. A blocking device must be physically locked into place to positively prevent removal without the affected person knowing it.
- *Construction*: The erection of new wiring and equipment, and the alteration, conversion, and improvement of existing wiring and equipment.
- *Creating Contractor*. The employer that caused a hazardous condition that violates an OSHA standard
- *Controlling Contractor*. Controlling contractor means a prime contractor, general contractor, construction manager or any other legal entity that has the overall responsibility for the construction of the project, including its planning, quality and completion.
- *De-energized Parts.* Parts that have been previously energized and are now free from any electrical connection to a source of potential difference and from electrical charges.
- *Dissipate:* To release the hazardous energy by grounding electrical sources, allowing very cold or hot objects to come to room temperature, relieving pressure or vacuum until it reaches standard outdoor air pressure, stopping the mechanical motion of moving parts, or neutralizing hazardous chemicals.
- *Energized Parts (Live Parts)*: means parts that are of a potential different from that of the earth, or some conducting body which serves in place of the earth.
- *Energy, including:*
  - Mechanical motion;
  - Potential or stored energy due to pressure, vacuum, gravity or springs;
  - Electricity;
  - Hot and cold surfaces (thermal energy);
  - Chemical energy (flammables, corrosives, reactives).

- *Energy Control Point:* The location where hazardous energy can be positively blocked so it cannot cause injury or damage. The control point can be a circuit breaker, a valve, or a physical setup such as a misaligned pipe, a line blanking device or missing link. Energy control points must be physically locked into a safe position. There may be multiple energy control points that affect work in a hazard zone and they must all be identified and locked out.
- *Exposing Contractor:* An employer whose own employees are exposed to the hazard.
- *Guarded.* Covered, shielded, fenced, enclosed, or otherwise protected by means of suitable covers or casings, barriers, rails, or screens, mats, or platforms intended to prevent or impede the approach of persons or objects to a point of danger.
- *Hazardous Energy:* Energy that is not controlled and can cause injury, death or property loss
- *Hazardous Energy Control:* Hazardous energy is considered adequately controlled if it cannot be reactivated, mistakenly or intentionally, without the affected persons knowing it.
- *Interlock.* An electrical, mechanical, or key-locked device intended to prevent an undesired sequence of operations.
- *Isolate:* For electrical energy, blocking or breaking the energy path so that electricity cannot flow to cause electric shock. This is typically accomplished by turning off a circuit breaker or physically disconnecting electrical wires to break the current path.
- *Lockout/Lockout Device:* A device that uses a key or combination lock to positively prevent reactivation of hazardous energy. This may include a lockout plate or pliers for electrical sources, or a chain or bar for valves, pipes and mechanical parts. Lockout also applies to the use of a lock to hold a physical barrier in place. Related devices can be clamped over or around valve handles, electrical cord plugs, circuit breakers, fuses and other operating equipment. These devices are padlocked closed to prevent their operation during maintenance or servicing activities.
- *Tagout/Tagout Device:* The placement of an obvious warning tag or label at an energy control point to warn personnel not to reactivate the energy. This method does not provide positive hazard control and it should only be used when it is physically impossible to lock the energy control point.
- *Qualified Person.* A person who, by reason of experience or instruction, is familiar with the operation to be performed and the hazards involved.
- *Zero Energy:* The safe condition in which all hazardous energy sources are locked out of service.

4. RESPONSIBILITIES

4.1 Site Supervisors/Safety & Health Officers

On-site supervisors and site safety staff are responsible to coordinate with the GDA (or contract representative) and affected contractors in order to verify that all hazardous energy sources are locked out before work begins. The task specific Authorized Person is responsible for verifying that all lockouts are in place at the beginning, during the work as needed and end of each work shift. The ITSI on-site supervisor and SHO are also responsible for providing staff awareness level training on this SWP and ensuring documentation of that training.

A preplanning session is required with the GDA and all affected employees to understand and communicate the procedures specific to the energy source being controlled. Tis will be a specific agenda item and minutes and signatures of attendance are to be retained.

4.2 All Employees

Employees are responsible for knowing this HECP and strictly following it, and for notifying their supervisors of any questions, unsafe conditions, or non-compliance situations regarding plan procedures.

5. CLASSES OF EMPLOYEES

5.1 Authorized (Qualified) Employees

Authorized (Qualified) Employees are the only ones certified to lock and tagout equipment or machinery. Whether an employee is considered to be qualified will depend upon various circumstances in the workplace. It is likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" as to other equipment. An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person, is considered to be "qualified" for the performance of those duties.

5.2 Affected Employees

Affected Employees are those employees who will work directly with the equipment, etc., for upon which lockout or tagging out is required under this program. Training of these individuals is less stringent in that it includes the purpose and use of the lockout procedures.

6. ENERGY CONTROL PROCEDURES

6.1 Identification of Hazardous Energy Sources

All hazardous energy sources must be identified. Personnel will look for combinations of energy sources. Plans, prints, drawings, manuals, or schematics will be reviewed as necessary to help identify all energy sources and paths. Such evaluations will include a representative of the GDA or Owner who has an understanding of the facility and energy source to be controlled.

6.2 Identifying Energy Control Points

All control points must be identified for each energy source. This includes looking for circuit breakers, control valves, backup generators, uninterruptable power supplies (UPS), batteries, etc. Those energy control points that must be locked in a safe position to prevent re-accumulation of energy will be particularly marked or otherwise identified. These include vent valves, relief valves, and electrical shorting bars.

Specific care is needed when working in facilities with overhead gantry-type equipment due to the exposed energy in related buss-bars.

6.3 Verify Lockout Capability

The qualified person will evaluate each control point to verify that a lockout device can be physically put in place.

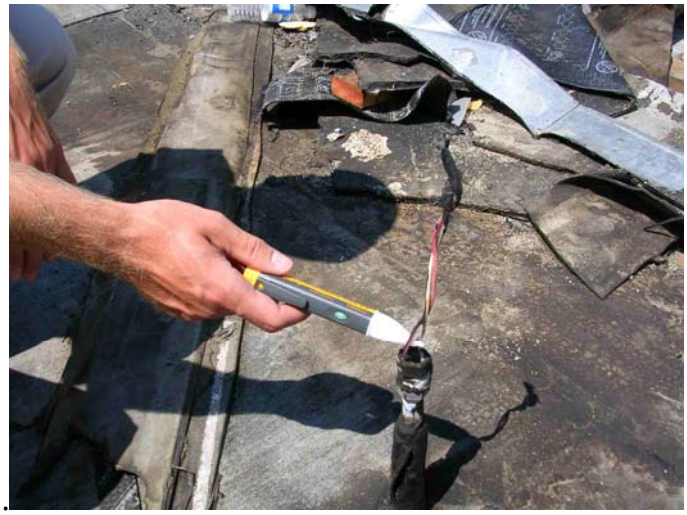
6.4 Preferred Method: Lockout

Prior to the application of physical controls to an energy source, a step-by-step procedure will be developed by the qualified person to define specific activities and the order of those steps for initial control and the later re-energization of the energy source if needed. This plan will be submitted in writing to the ITSI superintendent and SHO for their review prior to submitting it to the GDA.

If the control point can be locked out, the following steps may include, but will not be limited to, the following:

1. All affected employees must be notified of the shutdown and the reason. This must be communicated in a preplanning session coordinated with the GDA as a defined agenda item.
2. If the machinery is in operation, the equipment should be shut down by the normal operational controls, moving controls to OFF.
3. The energy source will be turned off at the control point(s). (Open circuit breakers, close valves, etc.)
4. A lockout plate and locks will be applied to each control point. Each person working on the equipment must apply his own lock. This is in addition to any locks already put in place by the GDA. Personnel will not rely on limit switches or interlock devices to shut down hazardous energy sources.
5. The control point(s) will be tagged with warning tags. The name of each person applying a lockout must be written on the warning tag, along with the date.
6. Stored energy will be dissipated. This includes any electrical energy that must be shorted or grounded, relieving pressure in fluid lines and springs, and blocking off mechanical devices. To prevent re-accumulation/recharging of energy, grounding and bonding cables may be applied per the protocols agreed upon during the preplanning session.
7. Any parts that may cause injury or damage, if accidentally applied, must be physically blocked in place for example an overhead door under repair. Blocking devices must be locked in place with padlocks when ever possible.

8. Mechanical links in systems will be broken or removed to block the flow of energy. This may include removing drive chains, links, rods or shafts. To break the energy flow path in piping systems the line must be split open at a joint or valve and the ends of the pipe must be physically misaligned. Blanking lines or closing valves alone is not adequate since blanks and valves may leak.The specific protocols shall establish each connection disabled to ensure system integrity prior to restoration.
9. The Qualified Person will then verify that all persons are clear of the area and attempt to restart the equipment that was locked out. This verification will include the GDA and all affected employees.
10. After the test, controls should be placed in the neutral or the off position.
11. Qualified personnel must verify that all circuits have zero energy with appropriate measurement tools.



Verification of De-energized Circuit

NOTE: In all public or public accessible areas, locks must always be used.

6.5 Least Desirable Method: Tagout

If it is physically impossible to lockout the control point, the control point must be tagged out. The control point must be secured in some obvious manner to prevent re-energizing. This may include removing fuses, disconnecting wires, taping circuit breakers open, etc. Such details will be included in the step-by-step plan created specific for the task.

A warning tag must be placed on the energy control point(s). The tag must specifically warn against restarting the system (i.e., "DO NOT START," "DO NOT OPEN," "DO NOT OPERATE"). This tag shall be located to the same location where a lock would have been applied.

All affected employees must be notified of the shutdown and the reason. This must be presented in a preplanning session coordinated with the GDA.

6.6 Lockout/Tagout Removal

Once the work is finished, the work area must be checked by the qualified person to verify that it is clean and clear of workers and tools before coordinating restoration of energy to the system. Prior to the removal sequence, a planning session will be held, including the GDA, to ensure all affected parties are aware of the re-energization and sequence of restoration. The removal of a lockout or tagout will be in reverse order of installing it. With the area still clear of workers, the restoration sequence will be conducted and the system will be reactivated and operationally tested under the control of the qualified person and per their written plan.

6.7 Temporary Work Interruptions

If an individual must leave the area before their work is finished, their lock must remain in place. The individual's lock may only be removed at this point if the project supervisor or site safety representative applies his own lock and tag to the energy control point and specific, verbal coordination and approval by the qualifed person is completed. Then the individual may remove his lock and tag. If a substitute worker completes the job, the substitute must put his own lock and tag on the energy control point before the supervisor's, qualified person or safety representative's lock is removed.

6.8 Lockout/Tagout Involving More Than One Employee

If more than one person is required to lockout or tagout equipment, each shall place his/her own lockout device on the energy isolating device(s). When an energy isolation device cannot accept multiple locks or tags, a multiple lockout hasp may be used. A single lock may be used to lockout the machine or equipment with the key being placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use his/her own lock to secure the box or cabinet. As each employee completes their task and no longer needs to work on the locked out system, they may remove their lock from the multi-lock hasp.

Typical Lock and Tag at Control Point

6.9 Concurrent Work Activities

If additional work must be done on the locked out equipment the HECP must be updated, any new personnel assigned to work on the equipment must put their own locks and tags on the energy control point. Newly affected personnel must be notified as well. The new personnel will NOT try to restart the equipment. They will coordinate.all work with the Qualifed Person.

6.10 Shift Changes

Work operations frequently take more than one shift to finish. In this case, the incoming worker will put his lock and tag on the energy control point BEFORE the outgoing worker removes his lock and tag. The outgoing worker must go over the entire job with the incoming worker and show him any blocking devices that were used to block off parts of the equipment and advise him of any changes to the planned protocols and those reasons.

6.11 Failure to Clear a Lockout

If an individual leaves work without exchanging locks and tags with his replacement, and the job is finished, the project supervisor or site SHO will try to contact that individual to resolve the issue. If the individual cannot be contacted, the project supervisor or site SHO are responsible for checking the equipment to be sure that all other blocking devices and lockouts have been removed and it is safe to re-activate the equipment. If a group lock is involved, reasonable effort to contact each member shall be conducted. The project supervisor or site SHO under the direction of the ITSI project manager and qualified person may then cut off the last lock and re-activate the equipment.

6.12 Emergency Procedures

Prior to implemention of the energy-specific control plan, procedures will be agreed upon between ITSI, the affected contractor and the GDA should access to the energy or equipment be required in an emergency. For example the use of a stand-by generator that would be required due to heavy snowstorms where work cannot be completed but the generator is required. A specific step-by-step protocol (if reasonable and safe) may be designed for review by all affected parties.

7. SPECIFIC APPLICATIONS

This Program must be followed whenever there is hazardous energy in the workplace that must be controlled to prevent injuries and property damage. A list of examples follows.

7.1 Equipment or Systems that May Retain Charges

Transformers, capacitors, computer systems and circuit breakers are examples of potential static charge sources.

7.2 Pressurized Systems

Work around pressurized systems includes hydraulic, steam or air-pressure (pneumatic), and compressed gases. Pressure-activated machinery, compressed gas lines, pressure vessels, backhoes, forklifts, lift gates on trucks, drum crushers and front end loaders are examples.

7.3 Inspection, Maintenance, Servicing, Repair, Troubleshooting, Setup or Clearing Jams on Machinery or Equipment

Note, these activities may require bracing or blocking moving parts to prevent workers from being caught or crushed in machinery.

7.4 Piping Systems Containing Hazardous Chemicals or Pressurized Fluids

Piping or containers that currently or previously held hazardous or pressurized chemicals, and that may have been out of service for long periods, may rupture explosively or release toxic gases and vapors. These lines must be properly drained, flushed, and de-energized before repairs or maintenance begins.

7.5 Piping or Containers Pressurized by Internal Evaporation of Contents

Piping and containers exposed to elevated temperatures may develop significant internal pressure that must be safely vented before work begins.

7.6 Systems that May Automatically Start Up

Coordination with the GDA is critical when working with such systems since they may start from a power failure (standby generator or battery storge), load requirements or automatically. This also includes conveyors, ventilation systems like smoke ejectors, sumps pumps and related liquid handling components.

7.7 Confined Space Operations

Workers in confined spaces must be protected from the hazards of engulfment or drowning if materials are allowed to reenter the confined space. Electrical equipment must also be de-energized and prevent from accidental restarting while workers are working in confined spaces.

7.8 Portable Tools and Equipment

Portable power tools, pressure-washers, and other equipment must be unplugged from power sources before repairs or maintenance are performed. The plug must remain in the exclusive control of the person doing the repair. If this cannot be done, a plug lockout device must be utilized.

7.9 Routine Maintenance and Machine Adjustments

During such operations, employees will not place hands, other parts of their body, or tools in areas where they may be exposed to hazardous energy, such as breaking the plane of a normally guarded area of the equipment.

8. REQUIRED EQUIPMENT

- Each individual working on a hazardous energy system will have their own unique lock and key or combination lock.
- Warning tags should be placed on all lockout devices. The tags should be plastic coated and reusable. These tags must contain at least the information shown below:

DANGER **DO NOT START** **EQUIPMENT LOCKED OUT** Name: Date:

- Danger tags must be used for tagout situations where a lockout device is physically impossible. These tags must contain at least the information shown above, as a minimum.
- Grease pens or other suitable waterproof markers are required for making legible entries on tags.
- Nylon cable ties are required for tying the tags onto control points.

- Lockout plates/pliers may be required where more than one worker must place his or her lock on the control point. These devices fit onto the control point and have several holes through them to accommodate multiple locks.
- Chains or bars may be required to block valves or turnstiles when locking out piping.
- Grounding and bonding cables and clamps will be required for dissipating electrical charges when dealing with electrical systems or flammable liquids.
- Line blanking devices may be required for blocking off pipes.

9. SUBCONTRACTORS

The on-site supervisor must be familiar with the scope of work for any sub-contractors on a job site. The on-site supervisor must be sure that contractors use proper lockout and tagout procedures. ITSI on-site supervisors should also put a lock and tag on any system that is locked out by a sub-contractor so that the contractor must check with the on-site supervisor before restarting the equipment.

10. TRAINING

The authorized (qualified) person shall be trained in the recognition of hazardous energy, possible sources in the workplace and how to safety control that energy.

Every affected employee required to perform repairs or maintenance on machines or equipment shall be trained on procedures for isolating hazardous energy and the step-by-step plan developed for each HEC activity.

Training will be provided by a competent or qualified person or vendor and documented. Training must consist of verbal instruction and hands-on demonstration of lockout and tagout procedures..

Written publications should be used only to supplement verbal instruction. Written documentation of all lockout/tagout training shall be maintained by the SHO and each subcontractor supervisor. The training will include:

- Need for energy isolation.
- Intended use and limitations of lockout/tagout equipment.
- Procedures for performing lockout/tagout.

The training shall be repeated as necessary, at least annually, to ensure that employees remain familiar with proper lockout/tagout procedures or when there is evidence based on performance that his or her training is inadequate.

11. INSPECTIONS AND PROGRAM REVIEW

A daily, documented inspection of the physical controls and verification of the agreed procedures and control will be conducted by the qualified person.

The SHO shall conduct periodic audits to the energy control procedures, as needed during the work, to ensure that the procedures, agreements and requirements of the plan are being followed. All affected contractors will be invited to participate in this audit. A summary defining who conducted the audit as well as the findings will be produced.

This HECP program will be reviewed at least annually by ITSI Corporate H&S staff to ensure it reflects existing regulations, standards and best practices.

ITSI Gilbane

Excavations and Trenching
Safe Work Procedures

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INTRODUCTION:

This safe work procedure (SWP) reflects the requirements of OSHA; the US Army Corps of Engineers; generally accepted work and engineering practices; and other recognized approaches for the removal of soil or other materials resulting in an excavation or a trench. Should manufactured components be used for this SWP (like a trench shield or hydraulic shores) the manufacturer's requirements shall also be met. If there is a conflict the most stringent would apply.

All plans must be designed to first eliminate the need to enter an excavation or trench or reduce that need to enter such a space. This may entail the use of cable-laying equipment or the assembly of components at grade (electrical and communication cables) and lowering these lines into the ground or alternate routing so excavations are as shallow as possible.

Proper planning is critical to excavation safety and incident prevention. An example of inadequate planning is shown below where protection is now needed for those applying waterproofing to a buildings foundation where the excavated soil now forms a "trench" The trench is formed by the new foundation wall and too-steep slope of the original excavation.

Slope determination of an excavation – now a trench due to inadequate planning

The scope of this SWP is not to re-state the existing requirements and regulations that apply but to highlight best practices and practical approaches to this work. In all cases the management team and those performing the work must be familiar with the regulations listed below and any other requirements or standards that apply.

DEFINITIONS

Cave in: the separation of amass of soil or rock material from the site of an excavation, or the loss of soil from under a trench shield or support system and its sudden movement

into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, or otherwise injure and immobilize a person.
Competent Person: one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them.
Excavation: Any man-made cut, cavity, trench or depression in an earth surface, formed by earth removal.
Trench: a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6m).

APPLICABLE REGULATIONS

- 29 CFR 1926, Subpart P, Excavations
- 8 CCR 1539 – 1543, Excavations
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), September 2008

PURPOSE AND SCOPE

This procedure describes minimum requirements for safe work practices during excavation and trenching operations. If there is a conflict in guidance the most stringent will apply. Subcontractors will comply with the requirements of this SWP as a minimum but must also provide a site specific Activity Hazard Analysis and Excavation Plan for ITSI Gilbane and client review.

NOTE: Per the USACE manual section 25.A.01 an Activity Hazard Analysis (AHA) an Excavation/Trenching Plan will be submitted and accepted by the Government Designated Authority (GDA) prior to beginning operations. This will be referenced as "the plan" in this SWP, this document provides the majority of the elements necessary for the development of that Excavation/Trenching Plan ("the plan").

Responsibilities:

Health & Safety Manager

The Site Health and Safety Manger is responsible for:

- Providing guidance on the implementation of this SWP to the SHO and subcontractors upon request
- Reviewing subcontractor's plan prior to submission to the GDA

The Site Health and Safety Officer is responsible for administering this procedure. Specific responsibilities include the following:

- Reviewing site specific plans submitted by contractors and forwarding to the HSM
- Assisting supervisors in implementing and maintaining an effective plan
- Coordinate training for employees and maintaining training records

Construction Site Supervisors/Competent Person

The contractor's site supervisors will often function as the Competent Person on site but may defer this responsibility. The competent person must be the same as identified in the plan submitted for review. Their responsibilities also include:

- Responsible for the work and accountable for it is being carried out safely based on the requirements of the plan, their firms health and safety requirements, this SWP and the AHA and to provide technical assistance for any modifications should conditions change
- Monitoring performance of personnel, ensuring conformance with safe work procedures
- Ensure the duties of the Competent Person are being executed

Employees

Employees are responsible for complying with the provisions of this procedure, the contractors excavation plan, their firm's health and safety plan and the AHA.

Competent Person

The Competent Person has responsibility for the safety of persons working in and around excavations on site and must be able to knowledgeable in many areas including;

- Soil characterization and understanding soil behavior
- Use of protective systems; and those requirements
- Recognition of the potential for a hazardous atmospheres or conditions and hazards like confined spaces and those interventions and controls
- Ability to anticipate and detect conditions that could result in cave-ins or failures in protective systems

INSPECTIONS

Inspections shall be made by a competent person, daily or more frequent depending on "weather and work" - and must be documented daily.

All equipment and devices shall be delivered in new or like new conditions and ready for use as certified in writing by the contractor or a vendor.

SOIL TYPES

Sloping, benching, and shoring requirements are based on the classifications of soils present at each work site. OSHA classifies soils into one of three types: A, B, or C, in addition to stable rock and layered systems.

In general most soil types encountered will be type-C. The expected soil type must be determined *prior to excavation* for development of the plan.

DETERMINATION OF SOIL TYPE

General

Soil classification must be done in accordance with methods described in the OSHA Excavation Standard and performed by a competent person. Should layering of soils be noted, these materials will be brought to the surface for classification, under no circumstances will soil type be investigated from within a trench or excavation.

CAVE-IN PROTECTION – PROTECTIVE SYSTEMS

Protective systems must comply with federal and state OSHA standards and must be based on an engineered system or specific shoring plan.

It should be noted that in most cases, the use of a shield or other suitable protection is more efficient (cheaper) than extensive excavations using shoring and sloping and contractors are encouraged to explore this option. ITSI can provide independent data on such alternatives.

MAXIMUM DEPTHS

Excavations less than 5 feet deep do not require sloping or shoring if a Competent Person examines the ground and finds no indication of a potential cave-in. This is a daily examination. Excavations greater than or equal to 5 feet deep must be sloped, benched or shored. It must be noted that some excavations at shallower depths fail and protection must then be supplied should this be discovered.

Failed excavation sidewalls – less than 2' below grade

Protective systems for excavations deeper than 20 feet must be designed and approved by a Registered Professional Engineering (RPE), licensed in the state where the work will take place and must be familiar with soil and protective systems.

SLOPING

Two primary means of excavation procedures are used to protect slopes from cave-in: sloping and benching. Sloping is based on the maximum allowable slope for the particular soil type of the sidewalls. Benching is based on the soil type, overall slope of the sidewall, and the bench configuration.

Note: Type-C soil does not allow for the use of benching

BENCHING

Benching is a method of protecting personnel from cave-ins by cutting a series of horizontal levels or steps in the sides of an excavation. Benching may only be used when soils have been classified as Type A or B according to the OSHA Excavation Standard.

SHORING

Shoring systems for excavations greater than 20 feet deep must be designed by a RPE. Protection and safe access such excavations must be planned and clearly defined.

Marina-type Gimbaled Portable Stairway

TRENCH SHIELDS

Trench shields are structures designed to prevent workers from being injured in a cave-in. These devices are reinforced metal boxes that are placed inside trenches and follow the work. Trench shields **will not** prevent cave-ins or provide support to the walls of the trench. They only protect workers inside the box if the walls should fail.

The top of the shield should extend at least 18 inches above the top of the excavation to provide a barrier to equipment and materials from traveling or rolling in. The base can be no more than 2' above the bottom – if soil condition allows. The ladders for access must be placed inside the trench shield, and must extend at least 3 feet above the top of the trench shield and secured.

The tabulated data specific for each shield must be available where the shield is used. Each shield must be serialized and match that data set.

Utilities and Permitting

A permit process is required for all penetrations into the earth including the driving of stakes or installation of fences. Note: Some states (MA) and localities require additional permits by law and code. The estimated location of all underground installations must be determined before digging begins and provided on a diagram of the work area – available for all contractors, not just those working below grade.

Underground Services Alert (811) or the local utility companies must be contacted **(regardless of where the site is in the US)** and requested to locate such underground public utilities at least two business days prior to the start of work. Property owners and facility operators must also be contacted prior to project startup, to locate underground private utilities and installations and add that location to the site plan diagram. Ground-penetrating radar or other equipment and specialized locating services may be useful in locating such utilities. Prior to contacting 811 the outline of the entire work area to be penetrated must be identified with white paint or white flags.

Above-Ground Structures and Landscaping (Surface Encumbrances)

If there are any nearby buildings, walls, sidewalks, trees, or roads that may be threatened or undermined by the excavation, where the stability of any of these items may be endangered by the excavation, they must be removed or supported by adequate shoring, bracing or underpinning.

Excavations may not go below the base of footings, foundations, or retaining walls, unless they are adequately supported or a RPE has determined that they will not be affected by the soil removal.

Temporary Spoil Piles and Equipment Location

Temporary spoil piles, materials, barriers and all equipment (including tools like generators) must be placed no closer than 2 ft (0.61 m) from the surface edge of the excavation, measured from the nearest base of the spoil to the cut.

Excessive load by spoils

Excessive load by concrete barriers

Permanent Spoil

Permanent spoil should be placed at some distance from the excavation and always greater than 2'. The improper placement of permanent spoil, i.e. insufficient distance from the working excavation, can cause an excavation to be out of compliance with the horizontal-to-vertical ratio requirement for a particular excavation. This can usually be determined through visual observation. Permanent spoils can change undisturbed soil to disturbed soil and dramatically alter slope requirements by the additional load.

Soils management must be detailed on the excavation plan including the soil balance of the project, spoil and permanent spoil handling and storage.

Surface Crossing of Trenches

Surface crossing of trenches should be discouraged; however, if trenches must be crossed a suitable walking surface with railings etc. will be installed.

Personnel Working on the Excavation Face

If personnel will be working on the excavation face at more than one level, they must be protected from falling rock or soil that may be generated by others working at levels above them. This may involve scaling or the face for loose materials, ice etc.

Perimeter Protection - Working in Proximity to Open Excavations

Plan development must include provisions for the installation of barriers as fall exposures are created. A hierarchy of controls is required based on those exposed like the public etc. See Appendix Q of the ACE 385.1.1 manual Perimeter Protection. This includes provisions for equipment and vehicle barriers. Fall protection requirements apply.

Isolated and protection of work areas

Unattended excavations and those in remote areas require barricades or covers with warning signs to prevent persons and equipment from falling into them. Covers must be able to support the at least twice weight of personnel or vehicles which may travel on them

Unprotected Fall Hazard

Isolated and protection of work areas – Cont.

Barriers with flashing warning lights may be used when excavations are left open after dark. The requirements of the Manual for Uniform Traffic Control Devices shall be considered the standard for deployment of barriers, cones, lights etc. on roads and like traveling surfaces.

Ingress and Egress

Trenches 4 feet or more in depth should be provided with a two maintained means of egress.

Exposure to Vehicles

Procedures to protect employees from traffic, on-site equipment activity must be incorporated into the excavation plan based on the ACE 385.1.1 requirement of Appendix Q. Levels of visibility protection for flaggers and their training must be based on the type of traffic, speed and expected light conditions expected for all seasons and hours of the work.

Exposure to Falling Loads

Employees must be protected from loads or objects falling from lifting or digging equipment including loads that are adjacent to the working areas.

Barriers for Mobile Equipment

An assessment must be included in the plan to eliminate struck-by incidents between man and machine and to keep machines and all equipment from traveling into any excavated area.

Hazardous Atmospheres, soils and Ordinance

A site assessment or other reasonable determination will be made to confirm or rule-out the potential presence of hazards in the excavation area ranging from soil and water contamination to underground storage tanks or vaults. In locations where oxygen deficiency or gaseous conditions are known or suspected, or in excavations 4 ft (1.2 m) or greater in depth, air in the excavation shall be tested prior to the start of each shift or

more often if directed by the Government Designated Authority (GDA) competent person, ITSI Gilbane or the Client. A log of all test results shall be maintained at the immediate work site.

Where excavations are to be performed in areas known or suspected to contain explosives, unexploded munitions, or military ordnance, surface and subsurface clearance by qualified explosive ordnance disposal (EOD) personnel shall be accomplished prior to any travel on or penetration of the earth including survey stakes and flags. Written certification is required as areas are screened and cleared for these hazards.

Standing Water and Water Accumulation

Procedures must be used to protect personnel entering excavations from water accumulation and potential instability in the excavation arising from water intrusion or excessive removal. These procedures must be designed by a qualified person and included in the excavation plan including after-hours monitoring and perhaps treatment of effluent of systems.

RECORDKEEPING

Records in relation to this procedure will be maintained in accordance with excavation plan and include items like: competent person and employee training and certification records, tailgate meetings, daily inspection logs by the competent person, including soils classification tests, records of any actions taken to correct excavation deficiencies, air monitoring records and any engineer supported documents used to create the plan. All changes to the AHA or the plan as the work proceeds must also be documented and available at the site.

END

Heat and Cold Stress Management
Safe Work Procedures

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1. REGULATIONS AND REFERENCES

- 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), November, 2008
- American Conference of Governmental Industrial Hygienist – Threshold Limit Values (Thermal Stress) – most recent edition.
- California Code of Regulations CCR Subchapter 7 , Section 3395- Heat Illness Prevention

2. INTRODUCTION AND SCOPE

Heat and cold-related illnesses are common occupational hazards related to physically-demanding work, and work in impermeable clothing. This program describes requirements for preventing and treating heat and cold-related health effects.

The heat stress provisions are particularly applicable to physically-demanding work, work in ambient temperatures greater than 70°F (21°C) with or without the use of impermeable clothing, and all work performed in impermeable clothing. The precautions and planning related to cold stresses are critical to understand for activities performed in temperatures less than 40°F (4°C) and work in inclement weather. If individuals are not acclimated to the temperatures they will be working in, existing guidelines will be used to help prepare them for the work.

Due to the varying condition that can be encountered on ITSI projects and the differing health of each worker, this SWP provides generally accepted guidance but cannot be prescriptive for all incidents. Always follow the instructions of a trained professional including 911 operators and volunteer emergency medical responders during an emergency.

This SWP also provides specific information for worksite orientations and tailgate meetings where heat and cold conditions have been recognized as a potential hazard.

3. RESPONSIBILITIES

3.1 Project Management

Project Managers are responsible for providing, to the extent feasible, a work environment that minimizes worker exposure to temperature and weather extremes and provides for worker protection from the elements and other protective measures. This includes:

- Planning work with consideration of the time of year and project location (i.e., avoiding desert work in mid-summer where possible, or shifting operations to nighttime work or arranging for strenuous work to be performed in the early morning rather than mid-day to avoid extreme heat).
- Assuring that protected break areas, shade from sun and wind, potable water, and weather-appropriate protective equipment are provided to employees when needed or when required by regulations.
- Preparing a monitoring scheme for those required to wear semi-impermeable or impermeable suits (like Tyvek) or other protective clothing.
- Assuring that everyone is familiar with heat and cold stress behaviors and symptoms, appropriate medical response is available, including trained first aid/CPR providers with the proper equipment, and reliable communications with outside responders
- Developing a site specific plan for managing temperature extremes.

3.2 Site Supervisors/Health & Safety Officers

Site Supervisors and Safety & Health Officers (SHO) are responsible for day-to-day compliance with this program, including, but not limited to:

- Training of employees on heat and cold illness prevention during site orientations and tailgate sessions.
- Providing employees ready access to potable water, shade and shelter. A source of shade is required adjacent to the working area whenever temperatures are anticipated to exceed 85^{0F} (30^{0C}). Air conditioned vehicles may be used for shade.
- Setting up work/rest schedules which are appropriate to expected conditions.
- Monitoring and identifying weather conditions which are hazardous to employees, and advising them to seek shelter during those times.
- Monitoring and measurement of employees for symptoms of heat- or cold-related effects, and providing for appropriate response to their conditions.
- The use and understanding of measurement devices including sling-psychrometers, Wet Bulb Globe Thermometers and anemometers.
- Understanding of the requirements of the ACGIH TLV Thermal Stress guidance and wind chill tables including the acclimation schedules for those new to the environment.

3.3 All Employees

All employees are responsible for complying with this procedure and for using the “buddy system” while working on project sites. Workers should monitor themselves and their

co-workers for signs and symptoms of heat or cold illness. Preventative recovery periods of at least 5 minutes will be given to workers upon request. Workers should not wait until they feel sick to request preventative recovery periods. If symptoms of heat or cold stress do arise, workers must immediately report them to the project supervisor or site SHO.

4. HEAT REGULATORY IN THE BODY

The body may gain or lose heat to the outside environment, depending on ambient conditions. In addition, wind and moisture will serve to increase evaporative cooling of the body. In hot conditions, this may be a benefit; however, in colder conditions this will be an extreme danger. When the humidity is high and the temperature is excessive severe injury may occur. Heat emergencies are typically life threatening. Human skin is the largest organ of the body and also waterproof so heating and cooling it can be difficult. Factors which affect heat regulation in the body include:

- Ambient temperature – defines how your body needs to cool or heat
- Humidity level – limits how much you can sweat
- Solar radiation – additional heat your skin adsorbs from the sun
- Wind speed – needed to help "cool" your skin and help evaporate sweat
- Precipitation – increases humidity and limits sweating
- Work activity and work rate – "working hard is working hot"
- Clothing worn, including impermeable protective clothing (Tyvek-type) – restricts cooling
- Acclimatization – The recognized need to get use to heat or cold slowly
- Personal health – If you are overweight or have medical issues, heat can affect you differently.
- Caffeine, prescription medications and alcohol intake – caffeine constricts blood vessels, alcohol causes dehydration and some medicines do both

5. HEAT STRESS

5.1 Heat-Related Health Effects

A number of health effects are associated with excess heat, ranging from organ failure to simple sunburn. These conditions are outlined below:

- *Heat rash*, also called prickly heat, is caused by continuous exposure to heat and/or humidity, and is aggravated by chafing of clothes (especially impermeable clothing) in contact with the skin. Signs and symptoms include tiny raised red blisters on affected areas with pricking sensations, or itching during heat exposure. Heat rash is usually a mild, temporary condition, although it decreases the body's ability to tolerate heat.
- *Heat cramps* are muscle spasms caused by the loss of electrolytes (salts) which occur during heavy sweating. In addition, inadequate electrolyte intake, as well as drinking large quantities of water (which dilutes electrolytes in the body), may worsen the condition.

- *Heat syncope* (fainting) is a condition caused by pooling of the blood in the extremities, usually related to activities where the person stands without moving for a period of time. The reduced blood volume to the head can cause fainting, which may in turn cause injuries from a fall.
- *Heat exhaustion or heat fatigue* is caused by dehydration and increased stress on various organs to meet increased demand to cool the body. Heat exhaustion is the condition most commonly associated with the term "heat stress." Symptoms of heat exhaustion include fatigue, headache, lack of coordination, dizziness, disorientation, nausea, moist and clammy skin, profuse sweating, rapid heart rate and breathing, and perhaps fainting. Serious injuries can occur if the worker faints while performing work in an elevated or hazardous location. In addition, heat exhaustion can rapidly progress to heat stroke if not corrected.
- *Heat stroke* is a life-threatening condition that occurs when the body is unable to regulate its core body temperature. The worker will have elevated body temperature (in excess of 103-104°F). Symptoms include hot, dry skin; no perspiration; weak, rapid pulse; mental confusion; nausea; dizziness; and seizures. Unconsciousness may occur. Heat stroke is considered an immediate, life-threatening emergency for which medical care is urgently needed. **When heat stroke occurs, the individual may only have minutes to live.**

5.2 Physiological Personal Monitoring – How You Feel When Working

This may include monitoring of body temperature, respiratory rate, or resting heart rates. Resting pulse rate monitoring, with subsequent adjustments to the work/rest schedule, should be performed by counting the wrist pulse during a 30-second (times 2) period as early as possible in the rest period. The following is a guide to your pulse:

If the heart rate exceeds 110 beats per minute (BPM) at the beginning of the rest period, shorten the next work cycle by one-third, and keep the rest period at 10 - 15 minutes
If the heart rate still exceeds 110 BPM at the next rest period, shorten the next work cycle by one-third and keep the rest period the same.
If the heart rate still exceeds 110 BPM at the next rest period, shorten the following work cycle by one-third and keep the rest period the same.

Note: this schedule is for work performed without impermeable protective clothing.

The simple measurement of the ambient and ITSI site worker temperatures provides exceptional information on the current heat risk and for adjusting the work/rest schedule. The forehead thermometer does not represent the body's core temperature but can serve as a predictor of the body's heat load.

Forehead Thermometer

5.3 Heat Stress Prevention – Best Practices

The following practices can be implemented in order to control heat stress hazards:

- On some projects where the tasks and conditions are a concern, medical evaluations or monitoring may be required to ensure people are fit for the working conditions, especially when wearing protective suits (i.e.: Tyvek, etc.).
- Training site workers to recognize high-hazard conditions, heat stress symptoms, and avoidance of food or drink that will increase the potential for a heat emergency.
- Workers must utilize the "buddy" system, and monitor themselves and each other for heat exposure.
- Encourage site workers to immediately report signs and symptoms of heat stress in themselves or their coworkers to their supervisor.
- Encourage workers to drink water before they are thirsty, and provide ready access to potable water at all times. Studies have shown intake of adequate quantities of water to be the most important factor in preventing heat illness. At least one quart of potable water per worker per hour must be provided during work situations where the potential for heat illness exists and urination (frequency and color) will help define if adequate uptake is taking place.
- Provide electrolyte fluids (like Gatorade), as needed, for extreme heat or work conditions.
- Adjust the time of operations (work schedule) to cooler periods whenever possible.
- Use mechanical equipment whenever possible in hot environments to reduce physical work load.
- Ventilated hard hats, light color for dark materials *attract* heat.
- Consider fans even outside to provide relief at work stations; but remember, fans do not cool radiant heat like the sun on skin.
- Don't eat hot meals or drink hot liquids.
- If on a prescription medicine, please ask your doctor if exposure to heat might have additional side effects and then notify your superintendent.
- Cooling devices, such as ice vests and cool deluge showers, may be implemented on a site-specific basis–like steam tunnel work.
- Provide shaded areas for breaks, and enclosed, air conditioned cabs for equipment.
- Rotate personnel in and out of physically-demanding jobs whenever possible.
- Adjust the work rate and break schedule according to ***ambient conditions**, workers' acclimatization, work load, and level of protective clothing/respirators. Unacclimatized workers should start at a lower work rate, and gradually increase each day**.**

- Ensure 1st aid responders are immediately available, prepared and equipped to deal with heat stress conditions.

The State of California has adopted *Heat Illness Prevention* regulations which are **mandatory** for all project sites in California and serve as a Best Practice for those sites outside of California and in all OCONUS locations. Key excerpts from the Cal/OSHA Regulation are as follows:

5.3.1 Access to Shade

(1) *Shade is required to be present when the temperature exceeds 85 degrees Fahrenheit.* When the outdoor temperature in the work area exceeds 85 degrees Fahrenheit, the employer shall have and maintain one or more areas with shade at all times while employees are present that are either open to the air or provided with ventilation or cooling. The amount of shade present shall be at least enough to accommodate 25% of the employees on the shift at any time, so that they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shaded area shall be located as close as practicable to the areas where employees are working.

(2) When the outdoor temperature in the work area does not exceed 85 degrees Fahrenheit, employers shall either provide shade as per subsection above (1) or provide timely access to shade upon an employee's request.

(3) Employees shall be allowed and encouraged to take a cool-down rest in the shade for a period of no less than five minutes at a time when they feel the need to do so to protect themselves from overheating. Such access to shade shall be permitted at all times.

Exceptions to ***Access to Shade*** provision above:

(A) Where the employer can demonstrate that it is infeasible or unsafe to have a shade structure, or otherwise to have shade present on a continuous basis, the employer may utilize alternative procedures for providing access to shade if the alternative procedures provide equivalent protection.

(B) Cooling measures other than shade (e.g., use of misting machines) may be provided in lieu of shade if the employer can demonstrate that these measures are at least as effective as shade in allowing employees to cool.

5.3.2 High-Heat Procedures

The employer shall implement high-heat procedures when the temperature equals or exceeds 95^{0F} (35^{0C}). These procedures shall include the following to the extent practicable:

(1) Ensuring that effective communication by voice, observation, or electronic means is maintained so that employees at the work site can contact a supervisor when necessary. An electronic device, such as a cell phone or text messaging device, may be used for this purpose only if reception in the area is reliable.

(2) Observing employees for alertness and signs or symptoms of heat illness.

(3) Reminding employees throughout the work shift to drink plenty of water.

(4) Close supervision of a new employee by a supervisor or designee for the first 14 days of the employee's employment by the employer, unless the employee indicates at the

time of hire that he or she has been doing similar outdoor work for at least 10 of the past 30 days for 4 or more hours per day.

6. HEAT STRESS FIRST AID

6.1 Sunburn Prevention

The heat from the sun and potential for sunburn should be minimized by covering your skin (including gloves) with a light colored breathable materials, wear a wide-brimmed hat or full brim hard hat (as required) with sunshade attachments, ANSI Z87 approved UV-protective sunglasses, sunscreen and, whenever you can, work out of direct sunlight (work under canopies, awnings, etc.).

6.2 Heat Stress First Aid (hot, cool or clammy skin)

First aid for heat stress consists of proper evaluation of the site worker's condition, cooling the victim down, and rehydration. Always offer the individual the chance for a medical evaluation. Specific actions which should be taken include:

1. First-aid trained persons should be summoned to assist in evaluation. Loosen the victim's clothing while you wait and get them into shade or where it's cool, and, if possible, take their temperature.
2. **If heat stroke is suspected, outside medical responders should be immediately summoned; this is a life-threatening condition.**
3. Impermeable clothing (ie: Tyvek) should be removed as fast as possible following the required decontamination steps, unless the delay could compromise the victim's health.
4. The victim's clothing should be loosened (heat exhaustion) or removed (heat stroke) to aid in cooling the skin.
5. The victim should be moved to a shaded, cooler location, preferably air-conditioned, perhaps a vehicle.
6. The victim should sit, or lie down if they are dizzy or at risk of losing consciousness. If faint, encourage them to lie down and elevate their feet above their head.
7. The victim should be encouraged to sip cool–but never cold–water, juice or Gatorade-type drinks if they are not nauseous or losing consciousness.
8. The victim may be cooled down further by moistening the head, neck and torso and fanning them gently. To minimize the risk of shock, do not drench them with cold water unless advised to do so by medical personnel. Care should be taken to flush hoses of potentially hot water in the line prior to use.
9. Persons suffering from heat stress, especially heat stroke, should not be allowed to return to work until after evaluation by a medical professional.

6.3 Heat Stroke First Aid (Hot and Dry Skin)

It is critical to understand that if someone is hot and they stop sweating, they could die within 4-10 minutes or suffer significant injury–like loss of organs. Warning signs may include:

- An extremely high body temperature (above 103°F)
- Red, hot, and dry skin (no sweating)
- Rapid, strong pulse
- Throbbing headache, dizziness, nausea, confusion, unconsciousness

NOTE: If you see any of these signs, you may be dealing with a life-threatening emergency.

6.4 Heat Stroke First Aid

1. Have someone call for immediate, professional medical assistance **while you begin cooling the victim.**
2. Get the victim to a shady, cooler area have them lay down.
3. Cool the victim rapidly using whatever methods you can. For example, immerse the victim in a tub of cool water; place the person in a decontamination shower; spray the victim with cool water from a hose; use the contents of a cooler, sponge the person with cool water; or if the humidity is low, wrap the victim in a cool, wet sheet and fan him or her vigorously. To cool faster focus on the side of the neck, under the arms, groin area and behind the knees. If it is best to remove someone's clothing to cool them off, do it, just discretely.
4. When towels, etc., get warm, swap them out for cooler ones immediately.
5. Monitor body temperature, and continue cooling efforts until the body temperature drops to 101 - 102°F.
6. **If emergency medical personnel are delayed, call the hospital emergency room for further instructions**.
7. Do not give the victim fluids to drink unless directed to by a health provider. Never give them ice to suck on. *Small* sips of fluids are ok if they are fully conscious and alert.
8. Get medical assistance as soon as possible.
9. Expect seizures. Sometimes a victim's muscles will begin to twitch uncontrollably as a result of heat stroke. If this happens, keep the victim from injuring himself, but do not place any object in the mouth, try to restrain the victim and do not give fluids. If there is vomiting, make sure the airway remains open by turning the victim on his or her side. Place a towel, shirt or something soft under the victims head only; keep cooling the victim.

7. COLD-RELATED HEALTH EFFECTS

7.1 Hypothermia

Hypothermia, or a drop in body core temperature, is a dangerous condition resulting from exposure to cold conditions. The sequential symptoms of hypothermia are as follows:

- The victim exhibits uncontrollable shivering and the sensation of cold.
- Heartbeat slows and may become weak or irregular, and blood pressure decreases.

- Lips (inside of lips on dark skinned individuals) and other areas may turn blue.
- As the body's core temperature drops, other signs may include cool skin, slow and irregular breathing, slurred speech, loss of coordination, and apparent exhaustion.
- The victim may become listless or confused, continue to exhibit severe shivering, and/or develop severe pain in the extremities.
- The advanced/final signs of hypothermia are a significant drop in blood pressure, fatigue, shallow respiration, coma, and death.

Risk factors related to hypothermia include the following:

- Prolonged exposure to cold ambient temperatures including work in waders or dive work in cold water.
- Precipitation and/or wind which increases evaporative cooling especially at or below 36 degrees F. This would include immersion in water.
- Improper clothing, which allows the person to become wet, keeps perspiration next to the skin, and/or allows wind to penetrate to the skin further cooling you.
- Poor physical condition.
- Alcohol intake, which dilates surface blood vessels, increasing the cooling effect.
- In addition, a lower body temperature can result in reduced mental alertness, which can reduce rational decision-making or cause loss of consciousness. The individual may not realize they are in a life-threatening situation.

7.2 Environment Monitoring – Refer Attached

To define the appropriate breaks and clothing worn, temperature must be tracked based on the following:

Temperature	Wind Speed	Frequency (or more often as warranted)
45 degrees and below		Every 8 hours
30 degrees to 45 degrees	YES	Every 4 hours
30 degrees and below	YES	Every 4 hours (more frequent if dropping)

7.3 Frostbite

Frostbite occurs when extremities exposed to cold do not get sufficient heat from within the body, allowing the tissue to freeze. This freezing can result in damage to and loss of tissue. The most vulnerable areas for frostbite are the nose, cheeks, ears, fingers, and toes. Skin and tissue damage from frostbite can result in scarring, tissue death, permanent loss of movement, or amputation. There are three degrees of frostbite:

- First Degree: freezing without blistering or peeling,
- Second Degree: freezing with blistering or peeling,
- Third Degree: freezing with skin tissue death and possible deeper tissue damage.

Symptoms of frostbite include the following:

- Skin color changes to white or grayish-yellow, then to reddish-violet, and finally, to black as tissue dies.
- The affected part may become cold or numb.
- Pain may be felt at first, but subsides as nerve cells die.

7.4 Cold Stress Prevention – Best Practices

Cold stress preventive measures should be implemented prior to the exhibition of any signs or symptoms. When the ambient air temperature (allowing for wind chill) falls below 40°F, the following requirements should apply:

- Medical evaluations for field employees may be completed to evaluate site worker's fitness for duty in cold environments.
- Train site workers to recognize high-hazard conditions, cold stress symptoms, and to avoid alcohol intake.
- Workers should utilize the buddy system, and monitor themselves and their co-workers for symptoms of cold stress.
- Adjust the time of operations to warmer (perhaps sunnier) periods, whenever possible.
- Utilize enclosed, heated cabs on equipment, whenever possible.
- Provide a warm and dry place of refuge to employees, and give them adequate opportunities to warm themselves during the work day, especially if their clothes become wet or if they exhibit symptoms of hypothermia or frostbite.
- If wind chill is a factor, provide a barrier, if possible.
- Ensure employees are attired in the weather-appropriate clothing. This includes:
  - Outer protective layer which is water and wind-repellant like a Gore-Tex, but provides for ventilation to allow perspiration to escape.
  - The use of heat packs in gloves, boots, pockets etc.
  - Insulating layer of wool or synthetic materials – never cotton.
  - Moisture-wicking layer next to the skin of materials such as polypropylene, especially the feet to insulate one from the ground.
  - Socks of materials such as wool or synthetic materials. Encourage site workers to bring extra socks as feet may become wet via water infiltration or perspiration.
  - Protect the face as necessary and always cover the neck with a high collar or scarf (if not near rotating equipment). Beware of hoods and those strings as well.
  - Consider non-steel toe and shank protective boots to reduce heat loss. ANSI Z41/ ASTM F2413 rated composite materials are available for protective toe protection
  - Gloves which protect from both wind and water including battery heated gloves
  - Hardhat liners to protect ears and minimize heat loss from the head. Ensure hardhats are non-vented.
  - Battery-heated socks/insoles which protect from water and insulate from the ground.

- Workers whose clothing becomes drenched in water should immediately be moved to a dry, warm location, where they should change into dry clothing, and be treated for hypothermia as necessary.
- Metal handles of tools and control bars should be covered by thermal insulating materials when temperatures fall below 30°F.
- Workers should eat proper meals and drink warm drinks as necessary.
- Monitoring cold conditions should be conducted following the American Conference of Governmental Industrial Hygienists (ACGIH) cold stress standard.

7.5 Cold Stress First Aid

Hypothermia is an immediate life-threatening condition. Frostbite can cause severe injuries. Early detection and treatment can prevent further serious illness or injury. Individuals expressing, or co-workers noting, symptoms of hypothermia or frostbite must notify the Site Supervisor or Health & Safety Officer immediately. When a cold-related illness or injury is identified, work activities should be halted and the affected individual treated.

The following specific actions should be taken to warm up the affected person's body while awaiting medical personnel or awaiting transport to a medical facility:

1. First-aid trained persons should be summoned to assist in evaluation of the victim's condition. If hypothermia or frostbite is suspected, outside professional medical responders should be immediately contacted
2. The affected person should be brought to a warm location; this may include a nearby vehicle or equipment cab.
3. Impermeable and wet clothing should be removed as soon as possible
4. The person should be provided with dry clothing and/or wrapped in warm blankets
5. If conscious, the person should drink warm liquids
6. If they cannot warm their hands as needed they can place their hands under another individuals clothing, against the skin for additional warmth.
7. If frostbite is suspected, the affected body parts should be warmed gently with room-temperature (never hot) water. NEVER rub frostbitten skin or rub it with snow.
8. For minor frostbite, the person may be transported to the nearest medical center by a trained first aid provider.
9. For hypothermia, qualified medical responders must determine if transport to a medical facility is necessary. In all potentially life or health-threatening situations, the person must be transported to a medical facility for evaluation/treatment prior to being released back to work.
10. Persons released back to work should be counseled about preventive measures and weather-appropriate clothing.
11. Other workers should also be checked for symptoms, and the site conditions reevaluated, prior to recommencement of work.

8. TRAINING

ITSI supervisors working in potential heat or cold stress conditions must be trained in this SWP, including, by not limited to, the following subjects:

- Physiology of heat regulation in the body.
- How to identify potential heat stress situations including how to monitor weather reports and how to respond to hot weather advisories.
- How to identify potential cold stress situations and use the wind chill and frostbite tables for information and recognition of dangerous conditions.
- Signs and symptoms of heat or cold stress disorders, and basic physiological monitoring.
- Measures to take to avoid heat and cold disorders, including the importance of drinking plenty of water, maintaining electrolyte intake, avoidance of alcohol and caffeine, weather-appropriate clothing, acclimatization and work rate adjustment.
- First aid for heat or cold illness and injuries.
- When and how to contact outside responders, and how to give clear directions for responders to find the work location.

Initial, documented training should be performed for new hires, during 40-hour hazardous waste operations (Hazwoper) training, and/or prior to placement in a potentially heat or cold-exposed work assignment. Refresher training should be accomplished during Hazwoper refresher classes, during First Aid/CPR classes, and during site-specific or tailgate safety meetings.

PLEASE POST

Wind Chill Temperature Table

Wind Speed (mph) ↓	Air Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	25	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
				LITTLE DANGER				INCREASED DANGER						GREAT DANGER				

GREEN – LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
YELLOW – INCREASED DANGER (Frostbite could occur in 45 minutes or less in dry, exposed skin)
RED – GREAT DANGER (Frostbite could occur in 5 minutes or less in dry, exposed skin)

Wet skin can significantly decrease the time for frostbite to occur

Cold Weather Management

TLVs Work/Warm-up Schedule for Outside Workers based on a Four-Hour Shift*

Air Temperature – Sunny Sky		No Noticeable Wind		Wind 8 km/h (5 mph)		Wind 16 km/h (10 mph)		Wind 24 km/h (15 mph)		Wind 32 km/h (20 mph)	
°C (approx)	°F (approx)	Max. work Period	No. of Breaks**	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm breaks) 1		(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4
-29°to -31°	-20°to -24°	(Norm breaks) 1		75 min.	2	55 min.	3	40 min.	4	30 min.	5
-32° to -34°	-25°to -29°	75 min.	2	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min.	3	40 min.	4	30 min.	5	Non-emergency work should cease			
-38° to -39°	-35° to -39°	40 min.	4	30 min.	5	Non-emergency work should cease					
-40° to -42°	-40°to -44°	30 min.	5	Non-emergency work should cease							
-43° & below	-45° & below	Non-emergency work should cease									

*2008 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices. Cincinnati: American Conference of Governmental Industrial Hygienists (ACGIH), 2008 – page 213

PLEASE POST

Wind Chill Temperature Table

Wind Speed (mph) ↓	Air Temperature (°F)																	
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10	34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15	32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20	30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25	29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30	28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35	28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50	26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95

RISK OF FROSTBITE (see times on chart below)

GREEN LITTLE DANGER (frostbite occurs in >2 hours in dry, exposed skin)
YELLOW INCREASED DANGER (frostbite could occur in 45 minutes or less in dry, exposed skin)
RED GREAT DANGER (frostbite could occur in 5 minutes or less in dry, exposed skin)

Time to occurrence of frostbite in minutes or hours

(In the most susceptible 5% of personnel.)

Wind Speed (mph) ↓	Air Temperature (°F)											
	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
0	*>2h*	*>2h*	*>2h*	*>2h*	*>2h*	*>2h*	*40*	*22*	*20*	*13*	*11*	*9*
5	>2h	>2h	>2h	>2h	31	22	17	14	12	11	9	8
10	>2h	>2h	>2h	28	19	15	12	10	9	7	7	6
15	>2h	>2h	33	20	15	12	9	8	7	6	5	4
20	>2h	>2h	23	16	12	9	8	8	6	5	4	4
25	>2h	42	19	13	10	8	7	6	5	4	4	3
30	>2h	28	16	12	9	7	6	5	4	4	3	3
35	>2h	23	14	10	8	6	5	4	4	3	3	2
40	>2h	20	13	9	7	6	5	4	3	3	2	2
45	>2h	18	12	8	7	5	4	4	3	3	2	2
50	>2h	16	11	8	6	5	4	3	3	2	2	2

WET SKIN COULD SIGNIFICANTLY DECREASE THE TIME FOR FROSTBITE TO OCCUR.

*Source: USARIEM Technical Note "SUSTAINING HEALTH & PERFORMANCE IN COLD WEATHER OPERATIONS," October 2001

Fire Prevention and Response
Safe Work Procedures

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1.0 EFFECTIVE REGULATIONS

- 29 CFR 1910, Subpart L, Fire Protection
- 29 CFR 1926, Subpart F, Fire Protection and Prevention
- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1) September 2008
- National Fire Protective Association (NFPA)

The above regulations and standards are to be followed and not completely specified here. In addition to local or owner fire codes, the International Building Code, local building codes, common or practices or protocols. Should a conflict in interpretation occur, the most stringent will apply.

2.0 INTRODUCTION AND SCOPE

The purpose of this Fire Prevention and Response Program is to reduce or eliminate the hazard of fires on ITSI projects and offices and to provide for effective response to a fire in order to protect people and minimize property damage. The specific goals of this program are to recognize fire hazards, recommend safe work procedures, and assign individual responsibilities for fire prevention. In addition, this program provides information on fire protective equipment, response and training.

Additional fire prevention requirements for temporary offices and field work sites will be covered as part of the Site Specific Safety and Health Plans (SSHP) or Accident Prevention Plans (APP) or included within an Activity Hazard Analysis (AHA).

Specific fire prevention plans have been prepared for ITSI each office locations.

3.0 FIRE PREVENTION PLANS

Fire Prevention Plans will be created specific for each project and those unique exposures and incorporated into the AHA or SSHP. They will conform to the requirements of the USACE 385-1-1 Section 9, Fire Prevention and Protection, and referenced regulations and standards.

Following are best practices or areas of focus to consider when drafting Fire Prevention and Protection Plans, working on your project or in our offices.

4.0 RESPONSIBILITIES

The following paragraphs describe the responsibilities of each employee on the site.

4.1 Corporate Director, Health & Safety

The Corporate Director, Health & Safety and staff is responsible for administering this Program; assists in developing fire prevention plans for fixed facilities, and for assuring procedures are included in SSHPs, APPs and AHAs. Individual fire prevention plans must be reviewed and updated at least annually for effectiveness.

Through this program, training and sharing of information (for example ITSI Monday Safety Topics), ITSI will assist and advise field and office teams of changes in regulations, best practices or company policy improvements.

4.2 Site Supervisors/Safety and Health Officers (SHO)

Supervisors/SHO's are responsible at the site level for fire prevention and coordinating response to fire and will ensure inspections, permitting and education of the contractors and staff is effective. This will include hands-on training on the use of fire extinguishers where possible, recognition of fire hazards, maintenance of fire protection systems and equipment, coordination of protection when existing systems are affected by the work and the scheduling of drills and training as needed. These specifics will be discussed at orientations with arriving ITSI employees and our subcontractors.

4.3 Emergency Coordinators – Fixed Offices

An Emergency Coordinator (EC) will be identified at each office. At project job sites, the Site SHO or Supervisor will function as the EC. The coordinator must be familiar with the fire prevention plans, location of emergency exits, fire extinguishers and first aid kit/AED specific for their location. This will include monitoring of workplace conditions (including emergency exits), gathering areas, maintenance of fire extinguishing equipment and drills to assure an active fire prevention culture.

4.4 ITSI Employees

Employees are responsible for understanding this program, recognition of fire hazards, knowing evacuation protocols and routes including gathering points and the use of fire extinguishers when trained and if appropriate.

When traveling, it is critical that each employee understands what to do should a fire occur wherever they are. This includes taking the time to examine lodgings for safe routes out in a fire and knowing gathering points on projects when visiting.

5.0 FIRE HAZARD ASSESSMENT

5.1 Sources of Ignition

A permit system for monitoring heat producing tasks will be agreed upon at the site during planning. ITSI has a zero-tolerance for violating of fire prevention protocols. This may be a "Permit" derived by ITSI, the subcontractor, or facility or other agreements. Please refer to last page for specifics on permit protocols and expectations.
Common sources of ignition are debris and building materials from open flame and hot work or smoking, when fueling hot equipment or fires associated with damaged electrical cords and arcs. Recognition of fire hazards will be ongoing by focusing on prompt removal or protection of combustibles, care in heat producing work and clear expectations of those on the site including strict discipline for non-compliance.

6.0 FIRE PREVENTION TECHNIQUES

6.1 Fire Safety Inspections/Housekeeping Protocols and Surveys

Supervisors/SHOs are responsible for conducting regular site surveys for compliance with this program specifically *daily* coordination of the permit system. Inspections including fire hazards must occur across the site at least weekly, be documented and include:

- Ensuring combustibles like stored materials and paper backed insulation are not accumulating and only one day of material is available for installation;
- Proper storage and protection of flammable liquids and materials;
- Read and comply with all MSDS for stored materials;
- Equipment working in dry grass or brushy areas will use spark-arrestors;
- Availability of fire extinguishers and their condition;
- When working near grass or wooded areas, a 3-foot soil break will be maintained;
- During construction, fire doors and doors to electrical and control rooms will be installed as soon as practical. Such doors, if they are equipped as self-closing, must be installed with those devices working;
- Ensure only fire resistant polyethylene sheeting (clearly marked on film) is used.

The ITSI project team will ensure consistent communication with all workers on the specifics of the fire prevention plan, including the requirements of this program. Any associated permits will be posted in a public area and distributed to all contractors before their arrival and again during orientation. See last page for specifics.

7.0 SMOKE DETECTORS AND ALARMS

All temporary offices for ITSI project, including our subcontractors', must conform to local codes and regulations of temporary facilities. In addition, these office and any enclosed break areas will require carbon monoxide and smoke detectors in each room.

7.1 Fire Reporting and Response

In an event, the site specific plan created for each project will be followed. This will clearly define who will meet the responders to guide them to the fire site and to ensure the evacuation of the area is executed safely. All fires, regardless of size, will result in notification of fire services. In case of a fire, those in the area will be alerted, 911 or the local access number, and the caller will:

State there is a fire,
Identify the project area and exact location of the fire,
Explain what is on fire and how big or small it is,
State if there are any injuries or people trapped,
Stay on the line until the operator says you can hang up.

8.0 FIRE EXTINGUISHING – INDIVIDUAL ACTIONS AND STANDPIPES

If a fire is small, an initial attempt to control the fire with a fire extinguisher may be attempted – after alerting others. Attempt to fight the fire ONLY if you are trained and feel you can extinguish the fire with no danger to yourself. Fire extinguishers will be sized and available, as defined by the task, but never more than 50 feet from any work. Portable fire extinguishers must be serviced annually by a licensed service company.

Where a hydrant system or manifold is required for the protection of building etc. including standpipes and risers, or sprinklers systems are impacted, coordination with the facility POC and local fire service will be arranged by ITSI for temporary systems or other protection(s) prior to mobilization. The NYC code offers guidance on the installation and monitoring of Temporary

Standpipes and may be used as reference to ensure the integrity of the system for the duration of its use or equivalent.

Fire hydrants and all connections shall always be kept clear of obstruction, working and available to apparatus.

Sprinkler Fire Truck Connections

Temp Standpipe Pressure Monitor and Alarm

9.0 EMPLOYEE EVACUATIONS

Equipment, planning and management of employee evacuations must comply with the provisions detailed in the site specific plan.

10.0 TRAINING

All personnel will receive training at least annually on fire prevention and basic fire safety and evacuation procedures. Evacuation drills should be held on at least an annual basis. Fire alarm locations, operating procedures and fire prevention plans will be reviewed with new employees during orientation with the Company. These elements will be reviewed with employees at least annually and after any updates or revisions.

At project locations, fire prevention and basic fire safety and evacuation procedures will be reviewed with all site workers during initial onsite orientation. Evacuation drills must be held periodically throughout the project and especially as new subcontractors mobilize to the site.

11.0 RECORDKEEPING

Recordkeeping for fire related inspections or activity will be maintained on the site.

ITSI Gilbane

Electrical Sources and Powered Tools
Safe Work Procedures

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1. REGULATIONS

- 29 CFR 1910, Subpart S, Electrical
- 29 CFR 1926, Subpart I, Tools – Hand and Power
- 29 CFR 1926, Subpart K, Electrical
- 8 CCR 2300 – 2599, Low-Voltage Electrical Safety Orders
- 8 CCR 1684-1692, Powder-Actuated Tools

- U.S. Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM-385-1-1), September 2008
- NFPA 70E, Electrical Safety Requirements for Employee Workplaces
- National Electrical Code (NEC)

2. PURPOSE AND SCOPE

Electricity has long been recognized as a serious workplace hazard, exposing ITSI employees and our subcontractors to such hazards as shocks, electrocution, arcing, fire and explosion. This safe work procedure is designed to prevent electrical injuries and property damage when working on our projects or using electrically powered tools or equipment. This procedure is also a resource for awareness training of employees to ensure they have the requisite knowledge understanding of electrical work hazards, common controls to those hazards and safe work practices. This Safe Work Procedure (SWP) does not address the Control of Hazardous Energy or satisfy the need for Hazardous Energy Control Program. The focus is on temporary power and powered tools on ITSI work sites. Should there be a conflict between any local or state regulation and code, the most stringent will apply.

3. RESPONSIBILITIES

The following describes the responsibilities of the Project Managers, superintendents and Site Safety and Health Officers.

3.1 Project Managers, Superintendents and Site Safety and Health Officers

Management and supervisors must:

- Plan for electrical use, its maintenance and controls prior to any mobilization of any trades.
- Ensure awareness training for those arriving at our job site regarding the electrical sources available, electrical hazards, and the expected use of temporary power supplies.
- Ensure anyone on the project understands they have the right to stop work and report any safety concern to their supervisor and any ITSI employee.
- Oversee and maintain a weekly cord inspection program for extension cords and devices that plug in.
- Conduct inspections to identify electrical safety deficiencies and correct all deficiencies promptly.
- Work with those designing the systems to ensure all new electrical installations meet the requirements of quality, codes and regulations.

3.2 Subcontractors, Supervisors and All Site Workers

Subcontractors are required to provide a qualified person with verifiable credentials such as state, national, host nation and/or local certifications or licenses, which a master or journeyman (or equivalent – OCONUS) electrician may hold, depending on the type of work to be performed. These qualifications should be specified in the site specific AHA.

Provide awareness training for those arriving on our project on the electrical sources available and their expected use including:

- Properly inspect all electrical equipment prior to use
- Never use electrical related devices that are not in new or like-new condition
- Report electrical deficiencies immediately to a supervisor
- Not work on electrical equipment unless authorized and trained
- Do not operate equipment if you suspect an electrical problem
- Hazards of water and electricity
- Even low voltages can kill or injure
- The dangers of using cords or plugs if the ground prong is missing
- Overloading electrical receptacles or use residential outlet strips for connecting

- If any worker or supervisor is found working with an electrical device that is not in obvious new or like-new condition, the appropriate level of retraining and discipline will be provided up to and including the potential for that person's removal from the site.
- There will be a zero-tolerance for egregious violations, like an unauthorized entry into a locked panel to obtain power or leaving an exposed and energized electrified panel unprotected.

4. HAZARD CONTROL

4.1 Engineering Controls

- A sketch of the proposed temporary power system and those components will be submitted to the client for review prior to that work, when required.
- Water tight enclosure shall be used where there is possibility of moisture entry either from operations or weather exposure. This includes rain in a building under construction.
- Sump-type pumps placement requires a specific plan for their construction, safe installation, protection and maintenance during use.
- No temporary covers for panel protection will be allowed
- Permanent and temporary electrical distribution areas will be guarded against accidental damage by locating in specifically designed rooms, use of substantial cabinets or physical barriers like a bollard or railings.
- A clear approach and minimum of 3 foot side clearance shall be maintained for all distribution panels.
- All conduit shall be fully supported throughout its length. Non-electrical attachments to conduit are prohibited.
- All cords from a fixed device (like a pipe-threading machine or panel) shall be provided strain relief when the cord is great than 2' from a support.
- All combustibles shall be kept at least 30' from distribution boxes and never allowed to accumulate in electrical rooms or vaults.
- All electrical distribution panels, breakers, disconnect, switches, junction boxes shall be completely enclosed.

Missing knock-out New Installation

Lesson learned – temporary power panels shall be inspected prior to energization to ensure all knock-out penetrations are covered with a blank.

4.2 Administrative Controls

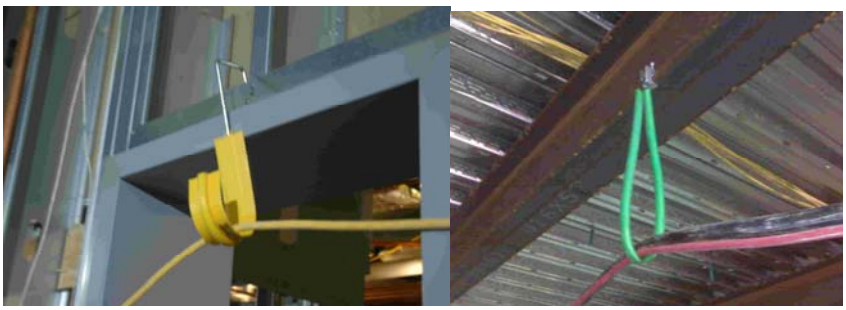
- An overall Hazardous Energy Control Program will be developed for each project. This SWP and that HECP will be coordinated by ITSI and the client in regard to energization of systems or devices and include methods of notification developed so each worker is aware of controls, barriers or energization.
- Only trained and authorized employees may conduct repairs to electrical equipment.
- Contractors performing electrical work must hold a state contractor's license for the rated work
- Access to electrical distribution rooms is limited to those employees who have a need to enter. Self-closing doors will be installed prior to energization of a room or vault and those doors secured with working locks.
- All electrical control devices shall be properly labeled
- Work on energized circuits is prohibited

4.3 Safe Work Procedures

- All qualified employees will follow established electrical safety procedures and precautions as dictated by code, generally accepted electrical procedures, or manufacturer's instructions.
- Only authorized and qualified persons shall make repairs or work on electrical equipment.
- Working surfaces shall be kept dry when working with or near electrical equipment.
- All circuits or apparatus shall be considered live and proven de-energized with a test instrument.
- Electrical source equipment or powered devices with damaged insulation, missing grounds, exposed wiring, or conductors shall not be used and immediately tagged out of service when discovered.
- Never use water to put out a fire around energized electrical equipment.

- The use of flexible cords in lieu of permanent wiring is prohibited. All cords are to be 12 gauge or larger and must be marked for medium or heavy duty.
- All cord tools shall have their grounds and polarity verified and GFCI's tested prior to the first use on the job.

Lesson learned – All flexible cords, leads and other conductors of power or grounds shall be kept off walking or working surfaces.



5. ELECTRICAL EQUIPMENT

5.1 Inspection

Electrical equipment shall be free from recognized hazards that are likely to cause death or serious physical harm to employees, grounded as required by the manufacturer, and in new or like-new condition. Safety of equipment shall be determined using the following considerations:

- Suitability for installation and based on durability, ease of use and expected weather conditions.
- Mechanical strength and durability, including, rugged parts designed to enclose and protect the device or equipment
- Electrical insulation.
- Heating effects under conditions of use.
- Arcing effects.
- Classification by type, size, voltage, current capacity, and specific use.
- Other factors which contribute to the practical safeguarding of employees using or likely to come in contact with the equipment.

Lesson Learned: The suitability of equipment for an identified purpose may be stated on the label, for example: "Not suited for commercial use." The light below may be suitable only for the hobbyist:

"Home Light"

5.2 Identification of Disconnecting Means and Circuits

All disconnects or switches shall be marked and of sufficient durability to withstand the environment.

Each disconnect switch or overcurrent device required for a service, feeder, or branch circuit must be clearly labeled to indicate the circuit's function, and the label or marking should be located at the point where the circuit originates. For example, on a panel that controls several temporary power outlets, each breaker must be clearly marked to indicate the specific set of outlets to which each circuit is connected and the main breaker the portion of the work area supplied.

6. ELECTRICAL LOCKOUT & TAGOUT REQUIREMENTS

All maintenance, adjustment, or repair work that could expose employees to hazardous energy sources, including electricity, must be conducted in accordance with the job specific Control of Hazardous Energy Safe Work Plan and the controls coordinated with the client and affected contractors covered by that specific plan. Energized work is prohibited.

7. WORKING AT ELEVATED LOCATIONS

Any activity that requires work at any height will require development of a Fall Prevention Plan specific to each task. This plan will be reviewed by ITSI prior to any work at height and must meet or exceed the Safety Work Plan for Fall Prevention.

8. WARNINGS AND BARRICADES

Warnings and barricades shall be employed to alert those working in areas where electrical systems are being energized. Distances shall be in accordance with NFPA 70E.

When work is being planned for energization of panels, for example, a step-by-step plan for that work would have been created by the Control of Hazardous Energy Plan and may include the installation of self-closing doors to the room containing the panels, and steps for covering of those panels prior to energization.

.

With the exception of overhead gantry rails or energization of overhead power lines, no energized systems or their components should result in exposure to individuals.

Lesson Learned: Energization of "house" power outlet and switches is not allowed unless they are installed and protected as required or the conductor (Plug Tail connection) not exposed.

Energized, Incomplete Switch

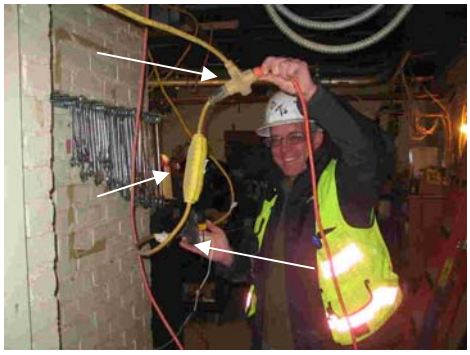
9. POWERED EQUIPMENT, POWER TOOLS – SOME PRECAUTIONS

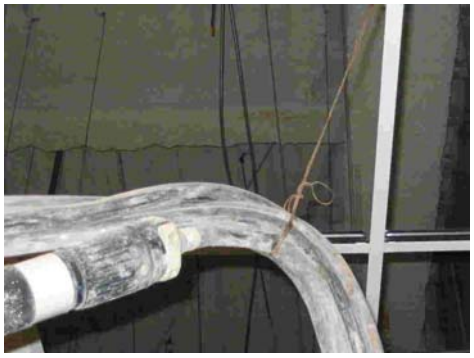
Electrical equipment is defined as cord or plug-type electrical devices which include the use of flexible or extension cords. Examples of portable electrical equipment included powered hand tools, powered bench tools, fans, radios, etc. **The use of battery-powered tools is encouraged to eliminate cord handling, maintenance and provisions for keeping them off walking and working surfaces.** The following safety rules apply to portable electrical equipment:

- Portable electrical equipment shall be handled in such a manner as to not cause damage.
- Portable electrical equipment shall be visually inspected for damage, wear, cracked or split outer jackets or insulation, etc., before use.
- Ground type cord sets may only be used with ground type receptacles when used with equipment requiring a ground type conductor.
- Attachment plugs and receptacle may not be altered or connected in a way that would prevent the proper continuity of the equipment grounding conductor. Adapters may not be used if they interrupt the continuity of the grounding conductor.
- Only portable electrical equipment or tools that are double insulated or designed for use in wet areas may be used in those conditions.
- The use of "power/outlet strips" is not allowed.
- If temporary power passed through a wall, that penetration must be designed to protect the conductor from damage.
- Electrical equipment or tools must be protected by a ground fault circuit interrupter.
- Locking-type connectors shall be properly secured after connection to a power source. Battery packs for tool power cannot be charged when directly placed on a concrete surface.

Lesson Learned: Do not plug another power strip or surge protector into an existing power strip or surge protector. This practice is called "piggybacking" or “daisy chaining” as shown.

Lesson Learned: Power cords may not be stapled or otherwise hung (non-conductive method) in a way that may cause damage to the outer jacket or insulation as shown.





10. VERIFICATION OF CONTROLS – ELECTRICAL SOURCES AND POWERED TOOLS

A Tool for Planning and Training

The following controls must be in place prior to work:

- Verify – A sketch of the proposed temporary power system and those components will be submitted to the client for review prior to that work.
- Verify – An overall Hazardous Energy Control Program (HECP) will be developed for each project. This SWP and that HECP will be coordinated by ITSI and the client in regard to energization of systems or devices and include methods of notification developed so each worker is aware of controls, barriers or energization.
- Verify – When work is being planned for energization of panels for example, a step-by-step plan for that work would have been created by the Control of Hazardous Energy plan and may include the installation of self-closing doors to the room containing the panels, and steps for covering of those panels prior to energization.
- Water tight enclosure shall be used where there is possibility of moisture.
- Sump-type pumps placement requires a specific plan for their safe installation
- No temporary covers for panel protection will be allowed
- Permanent and temporary electrical distribution areas will be guarded against accidental damage
- A clear approach and 3 foot side clearance shall be maintained for all distribution panels.
- All conduit shall be fully supported throughout its length.
- All cords from a fixed device (like a pipe-threading machine or panel) shall be provided strain relief when the cord is great than 2’ from a support.

- All combustibles shall be kept at least 30’ from distribution boxes and never allowed to accumulate in electrical rooms or vaults.
- All electrical distribution panels, breakers, disconnect, switches, junction boxes shall be completely enclosed.
- Establish and maintain a weekly cord inspection program for extension cords and devices
- Verify – Conduct inspections to identify electrical safety deficiencies and correct all deficiencies promptly
- Verify – Contractors performing electrical work must hold a state contractor’s license for the rated work
- New installations like electrical rooms or vaults will be sufficiently guarded with physical barriers, self-closing doors and warning signs to prevent unauthorized entry
- Access to electrical distribution rooms is limited to those employees who need to enter.
- Self-closing doors will be installed prior to energization of a room or vault with locks.
- All electrical control devices shall be properly labeled
- Work on energized circuits is prohibited
- All qualified employees will follow established electrical safety procedures
- Only authorized and qualified persons shall make repairs or work on electrical equipment.
- Working surfaces shall be kept dry when working with or near electrical equipment.
- All circuits or apparatus shall be considered live and proven de-energized with a test instrument
- Electrical source equipment or powered devices with damaged insulation, missing grounds, exposed wiring or conductors shall not be used and immediately tagged out of service when discovered.
- Never use water to put fire out around energized electrical equipment.
- A clear path to electrical panels, always
- The use of flexible cords in lieu of permanent wiring is prohibited.
- All cords are to be 12 gauge or larger and must be marked for heavy duty.
- All cords tools shall have their grounds and polarity verified and GFCI’s tested prior to the first use on the job. See Cord Inspection Program for additional details
- Warnings and barricades shall be employed to alert those working in areas where electrical systems are being energized.
- Lesson Learned – Energization of “house” power outlet and switches is not allowed unless they are installed and protected as required or the conductor (plug tail connection) not exposed.
- Portable electrical equipment shall be handled in such a manner as to not cause damage.
- Portable electrical equipment shall be visually inspected for damage, wear, cracked or split outer jackets or insulation, etc., before use.

- Portable electrical equipment that remains connected once energized (area fan) need not be inspected until relocated. Any defects; such as cracked or split outer jackets or insulation must be repaired, replaced or placed out of service.
- Ground type cord sets may only be used with ground type receptacles.
- Attachment plugs and receptacle may not be altered or connected in a way that would prevent the proper continuity of the equipment grounding conductor. Adapters may not be used if they interrupt the continuity of the grounding conductor.
- Only portable electrical equipment or tools that are double insulated or designed for use in wet areas may be used in those conditions.
- The use of “power/outlet strips” is not allowed
- If temporary power passed through a wall that penetration must be designed to protect the conductor from damage
- Electrical equipment or tools must be protected by a ground fault circuit interrupter.
- Locking-type connectors shall be properly secured after connection to a power source. Battery packs for tool power cannot be charged when placed on a concrete surface
- Lesson Learned – Do not plug another power strip or surge protector into an existing power strip or surge protector. This practice is called "piggybacking" or “daisy chaining” as shown below.
- Lesson Learned – Power cords may not be stapled or otherwise hung (non-conductive method) in a way that may cause damage to the outer jacket or insulation.
- Properly inspect all electrical equipment prior to use – see cord inspection program
- Never use electrical related devices that are not in new or like-new condition
- Report electrical deficiencies immediately to a supervisor
- Not work on electrical equipment unless authorized and trained
- Should any worker or supervisor be found working with an electrical device that is not in new or like-new condition the appropriate level of retraining and accountability will be provided up to and including the potential for removal from the site for egregious violations like an unauthorized entry into a locked panel to obtain power or leaving an unprotected, electrified panel unprotected.
- Do not operate equipment if you suspect an electrical problem
- Hazards of water and electricity
- Even low voltages can kill or injure you
- The dangers of using cords or plugs if the ground prong is missing
- Overloading electrical receptacles or use residential outlet strips for connecting

Color Coding of Inspected Cords

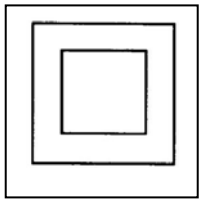
11. INSPECTION AND MAINTENANCE OF POWER CORDS AND TOOLS

Cords (and cords on equipment) are to be inspected before initial use at the task, whenever used. Once a week the each cord must be inspected and if intact, marked. A simple piece of colored tape will be wrapped around the male end of the cord to verify. Cords found not inspected (based on condition or color) will be removed from service. Inspection code will reflect:

Black	First Week of Month
Red	Second
Green	Third
Blue	Fourth
Yellow	Fifth

Cords shall be inspected per the manufacturer's guidance and that may include:

- The cord must be marked for medium or heavy duty use – S, ST, SO, and STO for hard service embossed on line or tagged and:
- Must be 12 gauge or larger
- Cord ends must not be pulled away from the conductor
- No exposed wiring, broken insulation or cords with broken or cracked insulation. No cuts through the insulation are allowed.
- Cannot be repaired with tape
- No evidence of any cord melting or arc damage
- Must have three wires cords are to be used
- Flexible cords, string lights and cables free of splices
- Clamps or other strain relief means provided on flexible cords or cables at plugs including receptacles, panels, tools, equipment, etc.
- If the cord is hanging from a fixture (like a panel) strain relief needed
- Is there a ground lug when needed on the line or cord to tools
- If the tool is double insulated is it marked as such →
- No cord can appear crushed
- Wiring correct for polarity and continuity of ground?
- Does the GFCI trip when tested?



APPENDIX D

FORMS

ITSI Gilbane

INCIDENT/ACCIDENT LOG

Office/Corporate: _____ Page: _____

Date of Incident	Employee(s) Involved	Type of Incident	Brief Description of Incident	OSHA notified	Insurance company notified	Accident Report form received	Workers' Comp Claim form received	OSHA 300 Log updated	Accident Investigation received and reviewed	Accident Investigation results publicized	Medical report received from physician	Final close-out of accident

Innovative Technical Solutions, Inc.

ACCIDENT/LOSS/NEAR MISS REPORT

This report must be completed and submitted to the H&S staff within 24 hours of the incident.
Verbal notification must be made immediately in case of serious accident or injury.
Complete Pages 1 & 3 for all incidents, and appropriate section(s) of Page 2.

GENERAL INFORMATION *(complete for all incidents)*

Report Completed by: _____ Title: _____

Date Completed: _____ Date Submitted: _____

Project Name: _____ Project Number: _____

Project Location: _____

Date & Time of Accident: _____ Work Activity: _____

Where Occurred: _____ ❑ On-Site ❑ Off-Site

Type of Incident: ❑ Personal Injury/Exposure ❑ Property Damage/Fire ❑ Vehicle Accident

ITSI Employee(s) Involved: _____

Subcontractor(s)/Visitor(s)/Third parties Involved: _____

Description of Incident/Event/Near Miss. *Describe any equipment or materials involved or damaged, or chemicals/hazardous materials involved or released. Attach additional pages and drawings as necessary.*

Diagram of Accident/Incident/Near Miss:

Notifications Made *(date & time):*

Project Manager: _____ Health & Safety: _____

Client: _____ Other (specify): _____

Agency Responding: _____ Report No. _____

Agency Responding: _____ Report No. _____

Photos taken? (Y/N, sent to): _____

Witnesses: *List below. Attach signed statements.*

Name: _____ Phone Number: _____

Employer: _____ Address: _____

Name: _____ Phone Number: _____

ACCIDENT/LOSS/NEAR MISS REPORT

Employer: Address:

PERSONAL INJURY/EXPOSURE *(complete only if injury/exposure occurred)*
Attach the doctor's report of medical treatment, with clearance to return to work as appropriate.

Employee's Name:
Employer: Job Title:
Employee Contact Phone Number:
Body part(s) injured/exposed:
Description of injury/symptoms:
Is this a recurring injury?:
First aid (description, given by):
Did employee go to hospital, clinic, doctor or other medical facility? (Y/N):
If no, was employee given the option of receiving medical attention? (Y/N):
Medical Facility Name:
Address:
Doctor Name/Phone Number:
Describe medical care given:
Was employee admitted to hospital (list hospital)?
Hospital Address:
Date employee returned to work, if known:
Employee normally works: days/week, hours/day
Work restrictions:
Is employee to return to see doctor? (Y/N): Date/Time:

PROPERTY DAMAGE/FIRE *(complete only if property damage or fire involved)*

Name of Employee Involved: Employer:
Other person involved, if any: Employer:
Equipment/property damaged:
Property owner:
Property owner's address/phone:
Describe damage:
Estimated cost of damage:

VEHICLE ACCIDENT *(complete only for vehicle accidents involving ITSI employees on public roads)*

Accident Type: ❑ Backing ❑ Rear end ❑ Head on ❑ Side swipe ❑ Other:
Injury (Y/N): Property Damage (Y/N):
If injury or property damage, fill out "Injury" or "Property Damage" section(s)
Violation/citation issued (Y/N): Violation/Citation Number:
Driver's Name: Driver's lic. number & state:
Seat belts worn?
Vehicle make, model, year: Lic. plate number & state:
Vehicle owner: Address:
Describe vehicle damage:
Other vehicle make, model, year:
Other vehicle license plate number & state:
Other vehicle driver:
Other vehicle driver's address/phone:
Describe damage to other vehicle:
Insurance:

Pedestrians/bystanders involved:

ACCIDENT/INCIDENT INVESTIGATION

Direct cause of accident/incident:

Contributing Factors *(Mark "yes" and explain **ALL** factors which contributed to the incident)*

Item	Yes	No	Explain
Safety policies/regulations – lack of understanding of policies or regulations. List applicable.			
Job hazard assessment – hazard assessment not performed, or hazards not identified.			
Safe work procedures – not developed for the operation or not adequate.			
Training – employees did not have the appropriate or updated training for the operation.			
Communication – hazards, safe work procedures, and/or work rules not communicated to workers.			
Enforcement – work rules not enforced adequately or consistently.			
Employee behavior - employee inattention, speeding, or horseplay involved in the incident.			
Housekeeping – housekeeping was not performed regularly or adequately on site.			
Inspections – site or equipment inspections not performed initially, regularly, and/or thoroughly.			
Maintenance – equipment not maintained regularly, proactively or adequately.			
Proper Equipment – the proper tools or equipment were not provided or not used for the operation.			
Equipment or material failure – equipment or material that failed contributed to incident.			
Personal Protective Equipment – not provided, not used, or not used properly by individual.			
Personal physical factors – such as strength, physical condition, prior injuries were a factor.			
Drugs or alcohol –drug or alcohol use may have been a factor in the incident.			
Environmental or chemical factors – vapors, dust, noise, glare, or heat/cold were a factor.			
Other:			

CORRECTIVE ACTIONS *(describe corrective actions which will address each item identified above)*

Action Item	Assigned To	Date Due	Date Completed

SIGNATURES

Employee: _____ Date: _____

Supervisor: _____ Date: _____

H&S Staff: Date:

ACCIDENT/LOSS/NEAR MISS REPORT

This report must be completed and submitted to the H&S staff within 24 hours of the incident.
Verbal notification must be made immediately in case of serious accident or injury.
Complete Pages 1 & 3 for all incidents, and appropriate section(s) of Page 2.

GENERAL INFORMATION *(complete for all incidents)*

Report Completed by: _____ Title: _____

Date Completed: _____ Date Submitted: _____

Project Name: _____ Project Number: _____

Project Location: _____

Date & Time of Accident: _____ Work Activity: _____

Where Occurred: _____ ❑ On-Site ❑ Off-Site

Type of Incident: ❑ Personal Injury/Exposure ❑ Property Damage/Fire ❑ Vehicle Accident

ITSI Employee(s) Involved: _____

Subcontractor(s)/Visitor(s)/Third parties Involved: _____

Description of Incident/Event/Near Miss. *Describe any equipment or materials involved or damaged, or chemicals/hazardous materials involved or released. Attach additional pages and drawings as necessary.*

Diagram of Accident/Incident/Near Miss:

Notifications Made *(date & time):*

Project Manager: _____ Health & Safety: _____

Client: _____ Other (specify): _____

Agency Responding: _____ Report No. _____

Agency Responding: _____ Report No. _____

Photos taken? (Y/N, sent to): _____

Witnesses: *List below. Attach signed statements.*

Name: _____ Phone Number: _____

Employer: _____ Address: _____

Name: _____ Phone Number: _____

ACCIDENT/LOSS/NEAR MISS REPORT

Employer: Address:

PERSONAL INJURY/EXPOSURE *(complete only if injury/exposure occurred)*
Attach the doctor's report of medical treatment, with clearance to return to work as appropriate.

Employee's Name:
Employer: Job Title:
Employee Contact Phone Number:
Body part(s) injured/exposed:
Description of injury/symptoms:
Is this a recurring injury?:
First aid (description, given by):
Did employee go to hospital, clinic, doctor or other medical facility? (Y/N):
If no, was employee given the option of receiving medical attention? (Y/N):
Medical Facility Name:
Address:
Doctor Name/Phone Number:
Describe medical care given:
Was employee admitted to hospital (list hospital)?
Hospital Address:
Date employee returned to work, if known:
Employee normally works: days/week, hours/day
Work restrictions:
Is employee to return to see doctor? (Y/N): Date/Time:

PROPERTY DAMAGE/FIRE *(complete only if property damage or fire involved)*

Name of Employee Involved: Employer:
Other person involved, if any: Employer:
Equipment/property damaged:
Property owner:
Property owner's address/phone:
Describe damage:
Estimated cost of damage:

VEHICLE ACCIDENT *(complete only for vehicle accidents involving ITSI employees on public roads)*

Accident Type: ❑ Backing ❑ Rear end ❑ Head on ❑ Side swipe ❑ Other:
Injury (Y/N): Property Damage (Y/N):
If injury or property damage, fill out "Injury" or "Property Damage" section(s)
Violation/citation issued (Y/N): Violation/Citation Number:
Driver's Name: Driver's lic. number & state:
Seat belts worn?
Vehicle make, model, year: Lic. plate number & state:
Vehicle owner: Address:
Describe vehicle damage:
Other vehicle make, model, year:
Other vehicle license plate number & state:
Other vehicle driver:
Other vehicle driver's address/phone:
Describe damage to other vehicle:

Innovative Technical Solutions, Inc. A Gilbane Company

ACCIDENT/LOSS/NEAR MISS REPORT

Insurance:
Pedestrians/bystanders involved:

ACCIDENT/INCIDENT/NEAR MISS INVESTIGATION

Direct cause of accident/incident:

Contributing Factors *(Mark "yes" and explain **ALL** factors which contributed to the incident)*

Item	Yes	No	Explain
Safety policies/regulations – lack of understanding of policies or regulations. List applicable.			
Job hazard assessment – hazard assessment not performed, or hazards not identified.			
Safe work procedures – not developed for the operation or not adequate.			
Training – employees did not have the appropriate or updated training for the operation.			
Communication – hazards, safe work procedures, and/or work rules not communicated to workers.			
Enforcement – work rules not enforced adequately or consistently.			
Employee behavior - employee inattention, speeding, or horseplay involved in the incident.			
Housekeeping – housekeeping was not performed regularly or adequately on site.			
Inspections – site or equipment inspections not performed initially, regularly, and/or thoroughly.			
Maintenance – equipment not maintained regularly, proactively or adequately.			
Proper Equipment – the proper tools or equipment were not provided or not used for the operation.			
Equipment or material failure – equipment or material that failed contributed to incident.			
Personal Protective Equipment – not provided, not used, or not used properly by individual.			
Personal physical factors – such as strength, physical condition, prior injuries were a factor.			
Drugs or alcohol –drug or alcohol use may have been a factor in the incident.			
Environmental or chemical factors – vapors, dust, noise, glare, or heat/cold were a factor.			
Other:			

CORRECTIVE ACTIONS *(describe corrective actions which will address each item identified above)*

Action Item	Assigned To	Date Due	Date Completed

SIGNATURES

Employee: _____ Date: _____

Supervisor: Date:

ACCIDENT/LOSS/NEAR MISS REPORT

H&S Staff:	Date:

ADDITIONAL INFORMATION:

ITSI Gilbane

AIR MONITORING LOG

Client Name _ ____ Date ________________

Project No.__ _____________________________ Page ________ of ________

Logged by__________________________________

Weather____

Instrument Type: _MultiRae Plus____

Calibration Standards Used____

Time	Location	Instrument Readings, (Units)					PPE Used	Activities, Remarks
		VOC (PPM)	CO (PPM)	O2 (%)	H2S (PPM)	LEL (%)		

ITSI Gilbane

AIR MONITORING LOG

Client Name _ ____ Date ________________

Project No.__ ________________________________ Page ________ of ________

Logged by____

Weather____

Instrument Type: _MultiRae Plus____

Calibration Standards Used____

Time	Location	Instrument Readings, (Units)					PPE Used	Activities, Remarks
		VOC (PPM)	CO (PPM)	O2 (%)	H2S (PPM)	LEL (%)		

ITSI Gilbane

VISITOR/VENDOR SIGN-IN LOG

Project: _____ Project No.: _____

Logged by: _____ Date: _____

I have been briefed on and agree to abide with the basic safety rules which may pertain to my visit to this site, including:

- Check in at the office trailer
- Speed limit discussed and parking areas approved (back in to spots)
- Stay on established routes always with ITSI escort
- Watch out for equipment and pedestrians
- On-site workers must wear ANSI-approved hardhats, safety glasses, reflective vests, and protective toed shoes or boots
- Other: _____

Name (Printed)	Signature	Company	Reason for Visit	Time In	Time Out

ITSI Gilbane

TAILGATE SAFETY MEETING

Date: _____ Time: _____ Page: _____ of _____
Customer: _____ Project: _____ Contract #: _____ Proj. #: _____
Work Description: _____

EMERGENCY PROCEDURES

Emergency Contact: _____ Emergency Number: _____
Hospital/Clinic: _____ Address: _____
Evacuation Procedures: _____

OTHER EMERGENCY CONTACTS

Name	Phone	Name	Phone

SITE HAZARDS

Physical Hazards	*Chemical Hazards (include chemical products)*

SITE ENTRY REQUIREMENTS

Check-In Procedures: _____
Training Requirements: _____
Minimum PPE Required: _____
Special Precautions: _____

TODAY'S SPECIFIC SAFETY ISSUES

Today's work: _____
Specific safety issues/work practices: _____

ATTENDEES

Name (print)	Signature	Company	Name (print)	Signature	Company

MEETING CONDUCTED BY

Health & Safety Officer: _____ (Name (printed)) _____ (Signature)
Site Superintendent: _____ (Name (printed)) _____ (Signature)

ITSI Gilbane

SITE SAFETY REQUIREMENTS

Project: _____ Project No.: _____

Superintendent: _____ Start Date : _____

- ❑ Project postings
  - o OSHA postings (Federal, and state as applicable)
  - o Labor law postings, including payday notice, Walsh-Healy Act, etc.
  - o Route to hospital & emergency contacts
  - o Client-required postings:_____
  - o Safe work practices
  - o OSHA 300 form
  - o Other: _____
- ❑ Safety signs
  - o Speed limit
  - o No trespassing/restricted area
  - o PPE required: hardhats, safety glasses, boots, vests
  - o Specific hazard warnings
  - o Other: _____
- ❑ Permits
  - o Excavation
  - o Air quality
  - o Noise
  - o Other: _____
- ❑ Health and safety plan and recordkeeping forms
- ❑ Medical monitoring and training documentation for all employees
- ❑ Chemical inventory, MSDSs for all chemical products, including gasoline & diesel
- ❑ Toilet
- ❑ Handwash
- ❑ Potable water
- ❑ Radios, means of charging: _____
- ❑ First aid kits: Qty: _____ Locations: _____
- ❑ Fire extinguishers (serviced): Qty: ____ Locations: _____
- ❑ Eyewashes: Qty: ____ Locations: _____
- ❑ Spill kits for diesel, gasoline, other: _____
- ❑ Protective equipment:
  - o Safety glasses
  - o Hardhats
  - o Reflective vests
  - o Earplugs
  - o Gloves
  - o Chemical protective clothing, type: _____
  - o Respirators: Type: _____ Cartridge type: _____
  - o Other: _____
- ❑ Monitoring equipment
  - o Confined space (oxygen, combustibles, CO, H2S)
  - o Organic vapor (PID or FID)
  - o Dust
  - o Other: _____
- ❑ Calibration gases: Type: _____
- ❑ Other: _____

ITSI Gilbane

SITE SAFETY INSPECTION

Project Name: _____ Date: _____

Project Number: _____ Inspector: _____

Instructions: Check off every item as "Yes", "No", or "Not Applicable". All "No" items must have an explanation of corrective actions undertaken to correct the problem.

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
Documentation, Signs					
Documentation such as Safety Plan, MSDSs, air monitoring logs, training records, and inspections are up to date					
Postings such as emergency numbers, hospital map, permits, OSHA poster, and speed limit signs are maintained					
Housekeeping/Work Areas					
Work areas are kept clean and orderly, and exits and walkways are not blocked					
Materials are stored in proper and stable configurations					
Hazards are not created by sharp surfaces, open pits, wet surfaces, or tripping hazards					
A clean break area is provided to employees					
Adequate lighting is provided indoors and for outdoor work after dark					
Employees are working carefully and without horseplay					
Emergency equipment such as eyewashes, first aid kits, and fire extinguishers are full, inspected and accessible					
Ladders & Scaffolds					
Ladders have no damage, defects, or missing parts, including support feet					
Ladders extend three feet above the top surface being climbed, and are secured at top and stable at bottom					
Only wooden or fiberglass ladders are used near electrical lines					
Scaffolds are on level, stable surfaces, floorboards are tight fitting, have no damage or missing parts,					
Employees working on platforms higher than 6					

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
feet are wearing properly secured lifelines and safety harnesses					
Personal Protective Equipment					
Employees are utilizing proper personal protective equipment and respirators based on hazards, and equipment is in good condition					
Chemical Storage/Fire Safety					
Chemicals, gases, and oily rags are stored properly in the appropriate labeled containers, and only with compatible materials					
Stored compressed gas cylinders are secured and upright, with caps on					
Chemicals are used with adequate ventilation					
Bonding/grounding is used during flammable liquid transfers					
Compressed gas cylinders are moved with caps on, with dollies whenever possible					
Flammable liquid storage areas have containment, and fire extinguishers within 25 feet					
Hot work (welding, cutting) is performed with permit, fire watch, extinguisher					
Air monitoring equipment is maintained and calibrated daily, and monitoring is performed and documented properly					
Vehicles/Heavy Equipment					
Vehicles and heavy equipment are in good condition, including tires, mirrors, windshields, and backup alarms					
Operators and ground personnel are cautious and maintain line of sight					
Seat belts are used by operators					
Equipment is parked with buckets/forks in the down position					
Drill rigs and cranes are moved with the boom down and rigging secured					
All chains, slings, and hoists are in good condition and are inspected before use					

SITE SAFETY INSPECTION

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
Gas or diesel machinery is only used with proper ventilation					
Electrical Safety					
Electrical equipment is in good condition, grounded, protected from damage, and protected by a Ground Fault Circuit Interrupter					
Lockout/tagout procedures are utilized whenever work is performed on electrical/mechanical equipment					
Excavations, Trenches, Confined Spaces					
The Competent Person has inspected all trenches and excavations at least every shift					
Excavations and trenches are adequately sloped, benched or shored based on soil conditions					
Shoring systems have been approved by a Registered Professional Engineer, and shoring design specifications are on site					
Soil stockpiles are placed no closer than two feet from the edge of excavations					
Excavations/trenches are protected from water by berms, drainage and/or pumps					
Underground utilities have been located, and exposed utilities are protected					
Underground Service Alert and all entities potentially affected by the excavation have been notified					
Excavations and trenches are protected by fencing, barricades, etc.					
Surface encumbrances such as buildings, roads, etc. have been protected					
Ladders are located in excavation so that employees have access to them within 25 feet at all times					
All excavations and trenches have been evaluated for confined space conditions, and a checklist/permit is utilized for all entries					

ITSI Gilbane	ITSI Gilbane Building Company	MultiRAE 4-Gas Plus PID Calibration Log

Location:

Serial Number:

Isobutylene: 100 ppm
4-Gas mix: CO - 50 ppm: H_2S - 25 ppm
LEL - 2.5% (50% Methane LEL); Air - Balance

	Volatile Organics			4-Gas Mixture					
Date	Initials	Bump/ Hard Value		Initials	Bump/ Hard	CO	H_2S	O_2	LEL

ITSI Gilbane

REFUSAL OF MEDICAL TREATMENT

I, _____, am refusing to receive medical treatment for a work-related injury.

By signing below, I certify that:

- I understand that medical treatment offered for occupational injuries or exposures will be paid for by the company.
- I understand that medical consequences may arise as a result of delay in treatment
- I understand that I may decide at a later time to go to a medical facility for treatment of my condition.

_____ _____
Signature Date

_____ _____
Witness Signature Date

ITSI Gilbane

CHEMICAL INVENTORY

Facility/Location: _____

Logged by: _____ Date: _____ Page: _____

Storage/Use Location	Product Name	Manufacturer	# of containers	Container Size/Type	MSDS Date

ITSI Gilbane

CHEMICAL EVALUATION FORM

Facility:	Date
Request the following new chemical be reviewed for use:	Chemical No.
Product Name	Container Size
Manufacturer Name, Address and Phone Number	
Part Number	

Purpose (check all that apply)

❒ New Process ❒ Better Material ❒ Lower Cost

❒ Sample to Try ❒ Sample Approved for Use

❒ Safer Material ❒ Other: _____

Projected Quantity Per Usage/Year (Note: sample purchase limited to minimum quantity required for testing)

Requestor	Location Where Used	
Specific Application		Department
Need Date	Shelf Life	
Supervisor Approval		Date
Chemical Safety Officer	❒ Approved ❒ Not approved	Date

If not approved, why not

Chemical & Physical Properties

Vapor Pressure (mm/Hg) :_____ Flash Point: _____ pH: _____ LEL: _____ UEL: _____

Incompatibilities _____

Exposure Limits _____

Target Organs/Symptoms _____

Special Precautions and Procedures

_____

_____

❒ Glasses/goggles type: _____	Respirators
❒ Faceshield: _____	❒ Dust Mask: ❒ N ❒ O ❒ P ❒ 95 ❒ 99 ❒ 100
❒ Glove type:_____	❒ Cartridge Respirator: ❒ Full-face ❒ Half-face
❒ Protective Clothing type: _____	Cartridge type: _____
	❒ Supplied air:_____

Distribution: **Original:** Safety Dept. Files **Copies**: Supervisor and Purchasing Department

ITSI Gilbane

MEDICAL CONSENT FOR BLOODBORNE PATHOGENS TESTING

To:_____ Date _____

From: Health & Safety Manager, (name) _____

Subject: Medical Consent for Bloodborne Pathogens Testing

During the course of your employment, a fellow company employee was exposed to your blood or other body fluids. Following the regulations of the Occupational Safety and Health Administration (OSHA), we request that you submit to blood tests for infectious bloodborne pathogens (HIV, Hepatitis A virus, and Hepatitis B virus) to which the employee may have been exposed. This request is not mandatory and will not affect your employment. All information gathered will be kept confidential.

Employee Affidavit

It has been recommended that, due to an occupational exposure of an employee to my blood and/or body fluid, I receive blood testing for the presence of the HIV antibody and/or the Hepatitis B antibody or antigen in order to assist the company to counsel or treat me. I have been informed about the nature of the blood tests and have been given the opportunity to ask questions about the tests. All of my questions have been answered to my satisfaction.

I understand that the blood tests for the viruses that cause Hepatitis A & B and AIDS are not 100% accurate, and these tests sometimes produce a false positive or false negative result. I further understand that the presence of the HIV antibody indicates that I have been exposed to the HIV virus, but does not mean that I have AIDS. Likewise, the presence of the Hepatitis B antibody indicates that I have been exposed to the Hepatitis B virus, but does not mean that I presently have active Hepatitis B. The presence of the Hepatitis B antigen means that I may be in the carrier state for the Hepatitis B virus.

I understand that the results of this testing will be reported to my employer and myself. I further understand that the results of these tests will be reported to the exposed employee, so that he/she may receive appropriate medical treatment. I understand that all tests and customary expenses will be paid by the company, that I will be informed of the test results, that my confidentiality will be maintained, and that I will be counseled regarding any further necessary evaluations and treatment (at my expense) if the results are "positive".

I, _____, _____consent _____ do not consent

to undergo these tests voluntarily, and I agree to allow _____ to draw my blood and submit it to an accredited laboratory for testing for infectious bloodborne pathogens (Human Immunodeficiency Virus, Hepatitis A Virus and Hepatitis B Virus).

_____ _____
Signature Date

_____ _____
Witness Signature Date

ITSI Gilbane

AUTHORIZATION FOR OUTSIDE MEDICAL TREATMENT

Name of Employee:	Date of Injury:
To: (clinic /hospital name and address)	

Workers' Compensation Information:

Insured by:

COMMERCE AND INDUSTRY INSURANCE COMPANY
Member Companies of American International Group
70 Pine Street
New York, N.Y. 10270

Policy No. WC 382-51-18

Agent:

Dealey, Renton & Associates
66 Franklin Street, Suite 210
Oakland, CA 94607
(510) 645-3090

Employer:

Innovative Technical Solutions, Inc.
2730 Shadelands Drive, Ste. 100
Walnut Creek, CA 94598
925-946-3100

Authorized by (Signature)	Date:

Distribution: **Original** – Clinic/Hospital; **Copy** – H&S Officer

ACCIDENT/LOSS/NEAR MISS REPORT

This report must be completed and submitted to the H&S staff within 24 hours of the incident.
Verbal notification must be made immediately in case of serious accident or injury.
Complete Pages 1 & 3 for all incidents, and appropriate section(s) of Page 2.

GENERAL INFORMATION *(complete for all incidents)*

Report Completed by: _____ Title: _____

Date Completed: _____ Date Submitted: _____

Project Name: _____ Project Number: _____

Project Location: _____

Date & Time of Accident: _____ Work Activity: _____

Where Occurred: _____ ❑ On-Site ❑ Off-Site

Type of Incident: ❑ Personal Injury/Exposure ❑ Property Damage/Fire ❑ Vehicle Accident

ITSI Employee(s) Involved: _____

Subcontractor(s)/Visitor(s)/Third parties Involved: _____

Description of Incident/Event/Near Miss. *Describe any equipment or materials involved or damaged, or chemicals/hazardous materials involved or released. Attach additional pages and drawings as necessary.*

Diagram of Accident/Incident/Near Miss:

Notifications Made *(date & time):*

Project Manager: _____ Health & Safety: _____

Client: _____ Other (specify): _____

Agency Responding: _____ Report No. _____

Agency Responding: _____ Report No. _____

Photos taken? (Y/N, sent to): _____

Witnesses: *List below. Attach signed statements.*

Name: _____ Phone Number: _____

Employer: _____ Address: _____

Name: _____ Phone Number: _____

ACCIDENT/LOSS/NEAR MISS REPORT

Employer: Address:

PERSONAL INJURY/EXPOSURE *(complete only if injury/exposure occurred)*
Attach the doctor's report of medical treatment, with clearance to return to work as appropriate.

Employee's Name:
Employer: Job Title:
Employee Contact Phone Number:
Body part(s) injured/exposed:
Description of injury/symptoms:
Is this a recurring injury?:
First aid (description, given by):
Did employee go to hospital, clinic, doctor or other medical facility? (Y/N):
If no, was employee given the option of receiving medical attention? (Y/N):
Medical Facility Name:
Address:
Doctor Name/Phone Number:
Describe medical care given:
Was employee admitted to hospital (list hospital)?
Hospital Address:
Date employee returned to work, if known:
Employee normally works: days/week, hours/day
Work restrictions:
Is employee to return to see doctor? (Y/N): Date/Time:

PROPERTY DAMAGE/FIRE *(complete only if property damage or fire involved)*

Name of Employee Involved: Employer:
Other person involved, if any: Employer:
Equipment/property damaged:
Property owner:
Property owner's address/phone:
Describe damage:
Estimated cost of damage:

VEHICLE ACCIDENT *(complete only for vehicle accidents involving ITSI employees on public roads)*

Accident Type: ❑ Backing ❑ Rear end ❑ Head on ❑ Side swipe ❑ Other:
Injury (Y/N): Property Damage (Y/N):
If injury or property damage, fill out "Injury" or "Property Damage" section(s)
Violation/citation issued (Y/N): Violation/Citation Number:
Driver's Name: Driver's lic. number & state:
Seat belts worn?
Vehicle make, model, year: Lic. plate number & state:
Vehicle owner: Address:
Describe vehicle damage:
Other vehicle make, model, year:
Other vehicle license plate number & state:
Other vehicle driver:
Other vehicle driver's address/phone:
Describe damage to other vehicle:

ACCIDENT/LOSS/NEAR MISS REPORT

Insurance:

Pedestrians/bystanders involved:

ACCIDENT/INCIDENT/NEAR MISS INVESTIGATION

Direct cause of accident/incident:

Contributing Factors *(Mark "yes" and explain **ALL** factors which contributed to the incident)*

Item	Yes	No	Explain
Safety policies/regulations – lack of understanding of policies or regulations. List applicable.			
Job hazard assessment – hazard assessment not performed, or hazards not identified.			
Safe work procedures – not developed for the operation or not adequate.			
Training – employees did not have the appropriate or updated training for the operation.			
Communication – hazards, safe work procedures, and/or work rules not communicated to workers.			
Enforcement – work rules not enforced adequately or consistently.			
Employee behavior - employee inattention, speeding, or horseplay involved in the incident.			
Housekeeping – housekeeping was not performed regularly or adequately on site.			
Inspections – site or equipment inspections not performed initially, regularly, and/or thoroughly.			
Maintenance – equipment not maintained regularly, proactively or adequately.			
Proper Equipment – the proper tools or equipment were not provided or not used for the operation.			
Equipment or material failure – equipment or material that failed contributed to incident.			
Personal Protective Equipment – not provided, not used, or not used properly by individual.			
Personal physical factors – such as strength, physical condition, prior injuries were a factor.			
Drugs or alcohol –drug or alcohol use may have been a factor in the incident.			
Environmental or chemical factors – vapors, dust, noise, glare, or heat/cold were a factor.			
Other:			

CORRECTIVE ACTIONS *(describe corrective actions which will address each item identified above)*

Action Item	Assigned To	Date Due	Date Completed

SIGNATURES

Employee: _____ Date: _____

Supervisor: Date:

ACCIDENT/LOSS/NEAR MISS REPORT

H&S Staff:	Date:

ADDITIONAL INFORMATION:

ITSI Gilbane

INCIDENT/ACCIDENT LOG

Office/Corporate: _____ Page: _____

Date of Incident	Employee(s) Involved	Type of Incident	Brief Description of Incident	OSHA notified	Insurance company notified	Accident Report form received	Workers' Comp Claim form received	OSHA 300 Log updated	Accident Investigation received and reviewed	Accident Investigation results publicized	Medical report received from physician	Final close-out of accident

ITSI Gilbane

LOCKOUT/TAGOUT PROCEDURE

Location: _____ Equipment Type/ID: _____

Lockout performed by: _____ Date: _____

Direct energy types & sources: _____

Stored energy types & sources: _____

Lockout/blockout devices to use: _____

Notes/special hazards or issues: _____

_____

_____

Emergency contact: _____

Shutdown SOP

- ❑ Identify direct and stored energy sources (see above)
- ❑ Notify affected employees (which equipment, when, why)
- ❑ Shut down equipment by normal procedures
- ❑ Isolate equipment from energy - turn off power at source
- ❑ Lockout/tagout energy source(s)
- ❑ Release or protect from stored energy
  - ❑ Electrical ground
  - ❑ Open hydraulic/pneumatic valves
  - ❑ Pipeline blanks
  - ❑ Bleed/flush systems, test downstream valves
  - ❑ Release spring tension
  - ❑ Dissipate heat & cold
  - ❑ Blockout
  - ❑ Shutdown adjacent machines if vibration is an issue
- ❑ Verify lockout effectiveness:
  - ❑ Test lock
  - ❑ Check with voltmeter if electrical
  - ❑ Clear employees from area
  - ❑ Turn equipment controls on
  - ❑ Turn equipment controls off

Startup SOP

- ❑ Make sure equipment is intact, guarding is in place
- ❑ Make sure employees and tools are at safe location
- ❑ Make sure equipment controls and valves are OFF
- ❑ Remove locks & tags
- ❑ Re-start equipment
- ❑ Check equipment operation
- ❑ Return locks and tags

ITSI Gilbane

JOB HAZARD ASSESSMENT

Area: _____ Task Description_____ Daily Task Duration: _____ hours

Prepared by: _____ Title: _____ Date Prepared: _____ Page 1 of 2

Reviewed by: _____ Title: _____ Date Reviewed: _____

Job/Task Description

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Physical Positioning and Demands

❒ Walking	❒ Twisting
❒ Climbing	❒ Reaching
❒ Standing	❒ Stretching
❒ Sitting	❒ Lifting
❒ Squatting	❒ Carrying
❒ Kneeling	❒ Grasping
❒ Stooping	❒ Pushing
❒ Bending	❒ Pulling

Job Hazards (check and describe specific hazards)

❒ Electrical (source, voltage): _____	❒ Head hazard: _____
❒ Mechanical: _____	❒ Falling/elevated work surface _____
❒ Moving machinery: _____	❒ Noise: source(s): _____
❒ Caught in or between: _____	❒ (Speech difficult at arm's length)
❒ Impact: _____	dBA @ 3 ft.: _____
❒ Chemical:_____	❒ Radiation: Source: _____
❒ Splash/Contact ❒ Airborne ❒ Flammable	❒ Ergonomic: _____
❒ Corrosive ❒ Reactive ❒ Toxic	❒ Vibration: _____
❒ Incompatibilities: _____	Environmental
_____	❒ Heat ❒ Cold ❒ Wet ❒ Outside ❒ Inside
❒ Eye/face hazard: _____	❒ Trip/slip/fall: _____
❒ Particles ❒ Splash ❒ Gases/vapors	❒ Confined space: _____
❒ Radiation (UV, laser, other _____)	❒ Other: _____
❒ Hand hazard: _____	❒ Other: _____
❒ Foot hazard: _____	❒ Other: _____

Engineering Controls

❒ Ventilation: _____	❒ Other: _____
❒ Shielding: _____	❒ Other: _____
❒ Guarding: _____	❒ Other: _____
❒ Other: _____	❒ Other: _____
❒ Other: _____	❒ Other: _____

ITSI Gilbane

JOB HAZARD ASSESSMENT

Area: _____ Task Description_____ Daily Task Duration: _____ hours

Prepared by: _____ Title: _____ Date Prepared: _____ Page 2 of 2

Reviewed by: _____ Title: _____ Date Reviewed: _____

Safe Practices and Procedures (attach additional page as necessary)	
❒ Lockout/Tagout (use LO/TO form)	❒ _____
❒ Monitoring: _____	❒ _____
❒ Bonding/grounding: _____	❒ _____
❒ Confined Space Permit	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____

Protective Equipment (list specific type)	
❒ Safety glasses, type: _____	❒ Other: _____
❒ Goggles: _____	❒ Other: _____
❒ Faceshield: _____	❒Other: _____
❒ Glove type:_____	Respirators
❒ Footwear: _____	❒ Dust Mask: ❒ N ❒ O ❒ P
❒ Protective Clothing type: _____	❒ 95 ❒ 99 ❒ 100
❒ Hardhat:: _____	❒ Cartridge Respirator: ❒ Full-face ❒ Half-face
❒ Earplugs: _____ NRR: ____dBA	Cartridge type: _____
❒ Earmuffs: _____ NRR: ____dBA	❒ Airline respirator:_____
❒ Harness/lanyard:	❒ SCBA: _____

Training	
❒ Basic Employee Safety Orientation	❒ Heat Stress
❒ Supervisor's Responsibilities	❒ Hot Work
❒ Asbestos Awareness	❒ Laboratory Safety
❒ Bloodborne Pathogens	❒ Ladder Safety
❒ Chemical Safety	❒ Lead Awareness
❒ Compressed Gasses	❒ Lockout/Tagout
❒ Confined Spaces	❒ Machine Shop Safety
❒ Electrical Safety	❒ Office Safety
❒ Emergency Response Team	❒ Personal Protective Equipment
❒ Ergonomics	❒ Power Tools
❒ Fall Protection	❒ Radiation
❒ First Aid/CPR	❒ Welding/Cutting
❒ Forklift Operation	❒ Other: _____
❒ Hearing Conservation	❒ Other: _____

ITSI Gilbane

EQUIPMENT & TRUCK INSPECTION CHECKLIST

Project: _____ Project No.: _____

Equipment: _____ ID Number: _____

Inspected by: _____ Date of Inspection: _____

Mark √ , No or N/A for inspection items. Explain any damage or defects, and what action was taken to correct them.

Inspection Item	OK? (√ , No or N/A)	Damage/Defects	Corrective Actions
Fire extinguisher			
Seat belts			
Gauges			
Battery charged			
Horn			
Brakes			
Steering			
Lights and signals			
Windshield wipers			
Windows clean			
Fluid levels full			
Engine belts			
Tire pressure and wear			
Steps, hand grips clean			
Back up alarm			
Tracks clean			
Guards on moving parts			
Load/lifting capacity marked			
Other:			
Other:			

ITSI Gilbane

EQUIPMENT INSPECTION TRACKING LOG

Project: ______________________________ Project No.: ____________________

Week of: ____________________________ Completed by: __________________________

Dates:							
Equipment							

ITSI Gilbane

DISCIPLINARY ACTION NOTICE

Employee's Name: _____ Date of Infraction: _____

Noticed filed by: _____ Title: _____

Nature of Infraction/Safety Rule Violated: _____

_____

_____

_____

_____

_____

_____

Violation: 1st 2nd 3rd (circle one) Date of first violation: _____

Disciplinary action to be taken as a result of this violation: _____

_____

_____

_____

_____

_____

_____

_____

Employee Signature: _____ Date: _____

Supervisor Signature: _____ Date: _____

Copy to:

Employee
Supervisor's file
Employee's permanent personnel file (for 2nd & 3rd violations

ITSI Gilbane

DEFECIENCY TRACKING LOG

Occupational Health Deficiency Tracking System
(Per USACE EM 385.1.1)

Date Identified	Description of Deficiency	To be Corrected By	Project Date of Correction	Date Corrected

This must be posted or a notice that it is available on your Job Board and Updated Daily by SSHO

ITSI Gilbane

DAILY HOT WORK PERMIT

This permit must be completed each time heat producing work is performed and is valid for one location and one shift only. This is in addition to any client facility permits and protocols that must be followed.

SITE: _____ **PROJECT#:** _____

ISSUED TO: _____

LOCATION: _____

DATE:

HOT WORK ACTIVITY (check appropriate box):

YES	NO	
		Welding (electric or gas)
		Oxy-acetylene torch
		Grinding/ Cutting (spark producing)
		Heat treatment/Plastic weld/Roofing
		Other (list activity) :

SAFETY CHECKLIST (check appropriate box):

		Material/Surface to be worked on has been evaluated for hazardous material (lead paint, asbestos, etc.)
		Paint removed from surface to be impacted.
		Work area, openings and below free of flammable or combustible materials (paper, cardboard, oily rags, chemical containers, etc.) or suitably protected (within 50')
		Fire extinguishers on hand (20# Min), inspected and charged.
		Fire watch posted (1 hr. required) Name:
		Emergency exit routes marked and clear
		Ventilation provided (if confined area or poor natural ventilation) and in place where necessary.
		Worker has appropriate eye protection, face shield, clothing, respirator, etc.
		Compressed gas cylinders are secured. (Cylinders are prohibited in confined spaces and excavations.)
		Equipment has been inspected and is free of defects, flash arrestors installed at the gauge end, gauges intact, etc.
		Others in immediate area have been notified of hot work activity
		Arc and Flash protection - Welding or cutting work performed behind shielding (where possible)
		Other threats from trade activities reviewed (paints, thinners, waterproofing, etc.)
		Respiratory Protection
		Fire services notification -sprinklers or fire sensing systems to impacted (covered) or taken off line

When applicable, this permit may be used in conjunction with a Confined Space Entry Permit.

Valid from: _____ **To:** _____

I have verified that all requirements of the ITSI Gilbane Hot Work SWP (2011), and client permits have been met and therefore issue this permit.

ISSUED BY:_____

Date:_____ Time: _____

ITSI Gilbane

CRANE SAFETY INSPECTION

Location: _____ Unit No.: _____ Owner: _____

Inspected by: _____ Title: _____ Inspection Date: _____

Instructions: Check off every item as "OK" or "Not OK". All "Not OK" items must have an explanation of corrective actions and date completed.

Inspection Item	Check	OK	Not OK	Corrective Actions	Date Corrected
Operating Mechanisms	Visual for function				
Limit Switches	Visual & operational for function				
Air Systems	Visual for leaks				
Hydraulic Systems	Visual for leaks				
Hooks	Visual for deformation and cracks				
Chains	Visual for wear, elongation and twist				
Wire Ropes	Visual for wear, broken wires, kinks				
Slings	Visual for wear, broken wires, kinks				
Rope Reeving	Visual for proper seating in drum and sheave grooves				
Chain Drive Sprockets	Check for wear; broken teeth				
Drive Chain	Check for stretch, deformation				
Brake System	Visual for operation brake drift (hoist)				
Sheaves	Lower block sheaves visual for wear				
Drums	Check for wear and cracks				
Fasteners	Check for tightness				
Electrical Apparatus	Check electrical components for function, loose connections & deterioration				
Lock and Clamp Mooring Devices	Visual for function and wear Check for wear, distortion and fractures				
Cab	Check hangers and fasteners				
Load, Wind and Other Indicators	Check for accuracy				
Power Plants	Performance and safety requirements				

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

Project: _____ Contractor: _____

Task: _____ Supervisor: _____

Task Description: _____

Equipment Used:
- ❑ Trucks
- ❑ Cranes
- ❑ Welding/torch cutting
- ❑ Chain saws
- ❑ Drilling equipment
- ❑ Earthmoving equipment
- ❑ Generators
- ❑ Other: _____

Hazards

- ❑ Environmental: ❒ Heat ❒ Cold ❒ Storms ❒ Lightning
- ❑ Trip/slip/fall
- ❑ Noise
- ❑ Hand hazard
- ❑ Foot hazard
- ❑ Head hazard/falling objects
- ❑ Eye/face hazard: ❒ Particles ❒ Splash ❒ Gases/vapors ❒ Radiation (UV, laser)
- ❑ Falling/elevated work surface
- ❑ Fire (source): _____
- ❑ Welding/torch cutting/grinding
- ❑ Manual material handling
- ❑ Confined space
- ❑ Excavation (depth): _____
- ❑ Underground utilities (types): _____
- ❑ Aboveground electrical lines (voltage): _____
- ❑ Other electrical (source, voltage): _____
- ❑ Mechanical/moving machinery
- ❑ Heavy equipment/vehicles
- ❑ Chemical: ❒ Splash/Contact ❒ Airborne ❒ Flammable ❒ Corrosive ❒ Reactive ❒ Toxic
- ❑ Biological hazards: _____
- ❑ Radiation: Source: _____
- ❑ Other: _____

Written Programs (to be submitted to ITSI prior to work)

- ❑ Site-specific H&S plan
- ❑ Chemical inventory, MSDSs for all chemical products, including gasoline & diesel
- ❑ Corporate safety program – hazard communication
- ❑ Corporate safety program – respiratory protection
- ❑ Corporate safety program – confined space
- ❑ Corporate safety program – lockout/tagout
- ❑ Corporate safety program – excavation
- ❑ Corporate safety program – hot work/fire prevention
- ❑ Corporate safety program – other: _____

Permits/Notifications

- ❑ Excavation permit

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

- ❑ Asbestos demolition notification
- ❑ Noise permit
- ❑ Hot work
- ❑ Other: _____

Project Postings

- ❑ OSHA & other required postings
- ❑ Safety signs – specify: _____

Training and Medical Monitoring

- ❑ Site-specific training
- ❑ Daily tailgate meetings
- ❑ First aid/CPR (at least 1 per work area)
- ❑ Hazardous waste (Hazwoper)
- ❑ Excavation competent person
- ❑ Confined space
- ❑ Fall protection
- ❑ Forklift
- ❑ Crane operator
- ❑ Lockout/tagout
- ❑ Other – specify: _____

On-Site Equipment

- ❑ Portable toilet
- ❑ Handwash
- ❑ Potable water
- ❑ First aid kits
- ❑ Fire extinguishers
- ❑ Eyewash
- ❑ Spill kits for diesel, gasoline, other: _____

Protective Equipment (minimum required)

- ❑ Level D (minimum for ALL site employees): hardhats, safety boots, safety glasses, reflective vest, plus hearing protection as necessary
- ❑ Modified D: Level D plus chemical-protective clothing
- ❑ Level C: Modified D plus cartridge respirator
- ❑ Level B: Modified D plus air-supplied respirator
- ❑ Level A: Fully-encapsulating suit plus SCBA
- ❑ Fall protection (harness/lanyard)
- ❑ Goggles
- ❑ Faceshield
- ❑ Glove (type): _____
- ❑ Other: _____

Monitoring Equipment

- ❑ Confined space (oxygen, combustibles, carbon monoxide, hydrogen sulfide)
- ❑ Organic vapor (PID or FID)
- ❑ Other: _____
- ❑ Calibration equipment for daily calibration

Inspection Requirements

- ❑ Daily site safety inspection by supervisor
- ❑ Daily inspection of equipment
- ❑ Monthly inspection of emergency equipment
- ❑ Weekly safety audit

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

- ❑ Daily excavation inspection by competent person
- ❑ Other: _____

ITSI Gilbane

AUTHORIZATION FOR OUTSIDE MEDICAL TREATMENT

Name of Employee:	Date of Injury:
To: (clinic /hospital name and address)	

Workers' Compensation Information:

Insured by:

COMMERCE AND INDUSTRY INSURANCE COMPANY
Member Companies of American International Group
70 Pine Street
New York, N.Y. 10270

Policy No. WC 382-51-18

Agent:

Dealey, Renton & Associates
66 Franklin Street, Suite 210
Oakland, CA 94607
(510) 645-3090

Employer:

Innovative Technical Solutions, Inc.
2730 Shadelands Drive, Ste. 100
Walnut Creek, CA 94598
925-946-3100

Authorized by (Signature)	Date:

Distribution: **Original** – Clinic/Hospital; **Copy** – H&S Officer

ITSI Gilbane

MEDICAL CONSENT FOR BLOODBORNE PATHOGENS TESTING

To:_____ Date _____

From: Health & Safety Manager, (name) _____

Subject: Medical Consent for Bloodborne Pathogens Testing

During the course of your employment, a fellow company employee was exposed to your blood or other body fluids. Following the regulations of the Occupational Safety and Health Administration (OSHA), we request that you submit to blood tests for infectious bloodborne pathogens (HIV, Hepatitis A virus, and Hepatitis B virus) to which the employee may have been exposed. This request is not mandatory and will not affect your employment. All information gathered will be kept confidential.

Employee Affidavit

It has been recommended that, due to an occupational exposure of an employee to my blood and/or body fluid, I receive blood testing for the presence of the HIV antibody and/or the Hepatitis B antibody or antigen in order to assist the company to counsel or treat me. I have been informed about the nature of the blood tests and have been given the opportunity to ask questions about the tests. All of my questions have been answered to my satisfaction.

I understand that the blood tests for the viruses that cause Hepatitis A & B and AIDS are not 100% accurate, and these tests sometimes produce a false positive or false negative result. I further understand that the presence of the HIV antibody indicates that I have been exposed to the HIV virus, but does not mean that I have AIDS. Likewise, the presence of the Hepatitis B antibody indicates that I have been exposed to the Hepatitis B virus, but does not mean that I presently have active Hepatitis B. The presence of the Hepatitis B antigen means that I may be in the carrier state for the Hepatitis B virus.

I understand that the results of this testing will be reported to my employer and myself. I further understand that the results of these tests will be reported to the exposed employee, so that he/she may receive appropriate medical treatment. I understand that all tests and customary expenses will be paid by the company, that I will be informed of the test results, that my confidentiality will be maintained, and that I will be counseled regarding any further necessary evaluations and treatment (at my expense) if the results are "positive".

I, _____, _____consent _____ do not consent

to undergo these tests voluntarily, and I agree to allow _____ to draw my blood and submit it to an accredited laboratory for testing for infectious bloodborne pathogens (Human Immunodeficiency Virus, Hepatitis A Virus and Hepatitis B Virus).

_____ _____
Signature Date

_____ _____
Witness Signature Date

ITSI Gilbane

CHEMICAL EVALUATION FORM

Facility:	Date
Request the following new chemical be reviewed for use:	Chemical No.
Product Name	Container Size
Manufacturer Name, Address and Phone Number	
Part Number	

Purpose (check all that apply)

❒ New Process ❒ Better Material ❒ Lower Cost

❒ Sample to Try ❒ Sample Approved for Use

❒ Safer Material ❒ Other: _____

Projected Quantity Per Usage/Year (Note: sample purchase limited to minimum quantity required for testing)

Requestor	Location Where Used	
Specific Application		Department
Need Date	Shelf Life	
Supervisor Approval		Date
Chemical Safety Officer	❒ Approved ❒ Not approved	Date

If not approved, why not

Chemical & Physical Properties

Vapor Pressure (mm/Hg) :_____ Flash Point: _____ pH: _____ LEL: _____ UEL: _____

Incompatibilities _____

Exposure Limits _____

Target Organs/Symptoms _____

Special Precautions and Procedures

_____

_____

❒ Glasses/goggles type: _____	Respirators
❒ Faceshield: _____	❒ Dust Mask: ❒ N ❒ O ❒ P ❒ 95 ❒ 99 ❒ 100
❒ Glove type:_____	❒ Cartridge Respirator: ❒ Full-face ❒ Half-face
❒ Protective Clothing type: _____	Cartridge type: _____
	❒ Supplied air:_____

Distribution: **Original:** Safety Dept. Files **Copies**: Supervisor and Purchasing Department

ITSI Gilbane

CHEMICAL INVENTORY

Facility/Location: _____

Logged by: _____ Date: _____ Page: _____

Storage/Use Location	Product Name	Manufacturer	# of containers	Container Size/Type	MSDS Date

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

Project: _____ Contractor: _____

Task: _____ Supervisor: _____

Task Description: _____

Equipment Used:
- ❑ Trucks
- ❑ Cranes
- ❑ Welding/torch cutting
- ❑ Chain saws
- ❑ Drilling equipment
- ❑ Earthmoving equipment
- ❑ Generators
- ❑ Other: _____

Hazards

- ❑ Environmental: ❒ Heat ❒ Cold ❒ Storms ❒ Lightning
- ❑ Trip/slip/fall
- ❑ Noise
- ❑ Hand hazard
- ❑ Foot hazard
- ❑ Head hazard/falling objects
- ❑ Eye/face hazard: ❒ Particles ❒ Splash ❒ Gases/vapors ❒ Radiation (UV, laser)
- ❑ Falling/elevated work surface
- ❑ Fire (source): _____
- ❑ Welding/torch cutting/grinding
- ❑ Manual material handling
- ❑ Confined space
- ❑ Excavation (depth): _____
- ❑ Underground utilities (types): _____
- ❑ Aboveground electrical lines (voltage): _____
- ❑ Other electrical (source, voltage): _____
- ❑ Mechanical/moving machinery
- ❑ Heavy equipment/vehicles
- ❑ Chemical: ❒ Splash/Contact ❒ Airborne ❒ Flammable ❒ Corrosive ❒ Reactive ❒ Toxic
- ❑ Biological hazards: _____
- ❑ Radiation: Source: _____
- ❑ Other: _____

Written Programs (to be submitted to ITSI prior to work)

- ❑ Site-specific H&S plan
- ❑ Chemical inventory, MSDSs for all chemical products, including gasoline & diesel
- ❑ Corporate safety program – hazard communication
- ❑ Corporate safety program – respiratory protection
- ❑ Corporate safety program – confined space
- ❑ Corporate safety program – lockout/tagout
- ❑ Corporate safety program – excavation
- ❑ Corporate safety program – hot work/fire prevention
- ❑ Corporate safety program – other: _____

Permits/Notifications

- ❑ Excavation permit

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

- ❑ Asbestos demolition notification
- ❑ Noise permit
- ❑ Hot work
- ❑ Other: _____

Project Postings

- ❑ OSHA & other required postings
- ❑ Safety signs – specify: _____

Training and Medical Monitoring

- ❑ Site-specific training
- ❑ Daily tailgate meetings
- ❑ First aid/CPR (at least 1 per work area)
- ❑ Hazardous waste (Hazwoper)
- ❑ Excavation competent person
- ❑ Confined space
- ❑ Fall protection
- ❑ Forklift
- ❑ Crane operator
- ❑ Lockout/tagout
- ❑ Other – specify: _____

On-Site Equipment

- ❑ Portable toilet
- ❑ Handwash
- ❑ Potable water
- ❑ First aid kits
- ❑ Fire extinguishers
- ❑ Eyewash
- ❑ Spill kits for diesel, gasoline, other: _____

Protective Equipment (minimum required)

- ❑ Level D (minimum for ALL site employees): hardhats, safety boots, safety glasses, reflective vest, plus hearing protection as necessary
- ❑ Modified D: Level D plus chemical-protective clothing
- ❑ Level C: Modified D plus cartridge respirator
- ❑ Level B: Modified D plus air-supplied respirator
- ❑ Level A: Fully-encapsulating suit plus SCBA
- ❑ Fall protection (harness/lanyard)
- ❑ Goggles
- ❑ Faceshield
- ❑ Glove (type): _____
- ❑ Other: _____

Monitoring Equipment

- ❑ Confined space (oxygen, combustibles, carbon monoxide, hydrogen sulfide)
- ❑ Organic vapor (PID or FID)
- ❑ Other: _____
- ❑ Calibration equipment for daily calibration

Inspection Requirements

- ❑ Daily site safety inspection by supervisor
- ❑ Daily inspection of equipment
- ❑ Monthly inspection of emergency equipment
- ❑ Weekly safety audit

ITSI Gilbane

CONTRACTOR SITE SAFETY REQUIREMENTS

- ❑ Daily excavation inspection by competent person
- ❑ Other: _____

ITSI Gilbane

CRANE SAFETY INSPECTION

Location: _____ Unit No.: _____ Owner: _____

Inspected by: _____ Title: _____ Inspection Date: _____

Instructions: Check off every item as "OK" or "Not OK". All "Not OK" items must have an explanation of corrective actions and date completed.

Inspection Item	Check	OK	Not OK	Corrective Actions	Date Corrected
Operating Mechanisms	Visual for function				
Limit Switches	Visual & operational for function				
Air Systems	Visual for leaks				
Hydraulic Systems	Visual for leaks				
Hooks	Visual for deformation and cracks				
Chains	Visual for wear, elongation and twist				
Wire Ropes	Visual for wear, broken wires, kinks				
Slings	Visual for wear, broken wires, kinks				
Rope Reeving	Visual for proper seating in drum and sheave grooves				
Chain Drive Sprockets	Check for wear; broken teeth				
Drive Chain	Check for stretch, deformation				
Brake System	Visual for operation brake drift (hoist)				
Sheaves	Lower block sheaves visual for wear				
Drums	Check for wear and cracks				
Fasteners	Check for tightness				
Electrical Apparatus	Check electrical components for function, loose connections & deterioration				
Lock and Clamp Mooring Devices	Visual for function and wear Check for wear, distortion and fractures				
Cab	Check hangers and fasteners				
Load, Wind and Other Indicators	Check for accuracy				
Power Plants	Performance and safety requirements				

Innovative Technical Solutions, Inc.
A Gilbane Company

HOT WORK PERMIT

SITE: _____ **PROJECT#:** _____

ISSUED TO: _____ Company: _____
LOCATION: _____
DATE: _____

HOT WORK ACTIVITY (check appropriate box):

YES	NO	
		Welding (electric or gas)
		Oxy-acetylene torch
		Abrasive Grinding or Grit-blasting
		Heat treatment
		Cutting
		Other

SAFETY CHECKLIST (check appropriate box):

		Base or Facility Permit approved
		Material to be worked on has been evaluated for hazardous materials like lead
		Work area free of flammable or combustible materials for 50’
		Barriers of fire resistant materials
		Fire extinguishers on hand, appropriate for work, inspected and charged
		Fire watch (1-hour) posted: Name: _____
		Emergency exit routes clear
		Ventilation provided (if confined area or poor natural ventilation)
		Worker has appropriate eye protection, face shield, clothing, respirator, etc.
		Compressed gas cylinders are secured
		Equipment has been inspected and is free of defects
		Others in immediate area have been notified of hot work activity
		Welding or cutting work performed behind shielding (where practical)
		Fall protection provided (where applicable)
		Potential hazardous atmospheres measured:
		_____ % LEL _____ % Oxygen

When applicable, this permit may be used in conjunction with a confined space Entry Permit and Plan

Valid from: _____ **To:** _____

I have verified that all requirements of the hot work procedure and permit have been met and therefore issue this permit.

Permit Completed By: _____

ISSUED BY: _____

TITLE: _____

DATE:

ITSI Gilbane

DEFECIENCY TRACKING LOG

Occupational Health Deficiency Tracking System
(Per USACE EM 385.1.1)

Date Identified	Description of Deficiency	To be Corrected By	Project Date of Correction	Date Corrected

This must be posted or a notice that it is available on your Job Board and Updated Daily by SSHO

ITSI Gilbane

DISCIPLINARY ACTION NOTICE

Employee's Name: _____ Date of Infraction: _____

Noticed filed by: _____ Title: _____

Nature of Infraction/Safety Rule Violated: _____

_____

_____

_____

_____

_____

_____

Violation: 1st 2nd 3rd (circle one) Date of first violation: _____

Disciplinary action to be taken as a result of this violation: _____

_____

_____

_____

_____

_____

_____

_____

Employee Signature: _____ Date: _____

Supervisor Signature: _____ Date: _____

Copy to:

Employee
Supervisor's file
Employee's permanent personnel file (for 2nd & 3rd violations

ITSI Gilbane

EQUIPMENT INSPECTION TRACKING LOG

Project: ______________________________ Project No.: ________________

Week of: ______________________ Completed by: _____________________

Dates:							
Equipment							

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EQUIPMENT & TRUCK INSPECTION CHECKLIST

Project: _____ Project No.: _____

Equipment: _____ ID Number: _____

Inspected by: _____ Date of Inspection: _____

Mark √ , No or N/A for inspection items. Explain any damage or defects, and what action was taken to correct them.

Inspection Item	OK? (√ , No or N/A)	Damage/Defects	Corrective Actions
Fire extinguisher			
Seat belts			
Gauges			
Battery charged			
Horn			
Brakes			
Steering			
Lights and signals			
Windshield wipers			
Windows clean			
Fluid levels full			
Engine belts			
Tire pressure and wear			
Steps, hand grips clean			
Back up alarm			
Tracks clean			
Guards on moving parts			
Load/lifting capacity marked			
Other:			
Other:			

ITSI Gilbane

JOB HAZARD ASSESSMENT

Area: _____ Task Description_____ Daily Task Duration: _____ hours

Prepared by: _____ Title: _____ Date Prepared: _____ Page 1 of 2

Reviewed by: _____ Title: _____ Date Reviewed: _____

Job/Task Description

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Physical Positioning and Demands

❒ Walking	❒ Twisting
❒ Climbing	❒ Reaching
❒ Standing	❒ Stretching
❒ Sitting	❒ Lifting
❒ Squatting	❒ Carrying
❒ Kneeling	❒ Grasping
❒ Stooping	❒ Pushing
❒ Bending	❒ Pulling

Job Hazards (check and describe specific hazards)

❒ Electrical (source, voltage): _____	❒ Head hazard: _____
❒ Mechanical: _____	❒ Falling/elevated work surface _____
❒ Moving machinery: _____	❒ Noise: source(s): _____
❒ Caught in or between: _____	❒ (Speech difficult at arm's length)
❒ Impact: _____	dBA @ 3 ft.: _____
❒ Chemical:_____	❒ Radiation: Source: _____
❒ Splash/Contact ❒ Airborne ❒ Flammable	❒ Ergonomic: _____
❒ Corrosive ❒ Reactive ❒ Toxic	❒ Vibration: _____
❒ Incompatibilities: _____	Environmental
_____	❒ Heat ❒ Cold ❒ Wet ❒ Outside ❒ Inside
❒ Eye/face hazard: _____	❒ Trip/slip/fall: _____
❒ Particles ❒ Splash ❒ Gases/vapors	❒ Confined space: _____
❒ Radiation (UV, laser, other _____)	❒ Other: _____
❒ Hand hazard: _____	❒ Other: _____
❒ Foot hazard: _____	❒ Other: _____

Engineering Controls

❒ Ventilation: _____	❒ Other: _____
❒ Shielding: _____	❒ Other: _____
❒ Guarding: _____	❒ Other: _____
❒ Other: _____	❒ Other: _____
❒ Other: _____	❒ Other: _____

ITSI Gilbane

JOB HAZARD ASSESSMENT

Area: _____ Task Description_____ Daily Task Duration: _____ hours

Prepared by: _____ Title: _____ Date Prepared: _____ Page 2 of 2

Reviewed by: _____ Title: _____ Date Reviewed: _____

Safe Practices and Procedures (attach additional page as necessary)	
❒ Lockout/Tagout (use LO/TO form)	❒ _____
❒ Monitoring: _____	❒ _____
❒ Bonding/grounding: _____	❒ _____
❒ Confined Space Permit	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____
❒ _____	❒ _____

Protective Equipment (list specific type)	
❒ Safety glasses, type: _____	❒ Other: _____
❒ Goggles: _____	❒ Other: _____
❒ Faceshield: _____	❒Other: _____
❒ Glove type:_____	Respirators
❒ Footwear: _____	❒ Dust Mask: ❒ N ❒ O ❒ P
❒ Protective Clothing type: _____	❒ 95 ❒ 99 ❒ 100
❒ Hardhat:: _____	❒ Cartridge Respirator: ❒ Full-face ❒ Half-face
❒ Earplugs: _____ NRR: ____dBA	Cartridge type: _____
❒ Earmuffs: _____ NRR: ____dBA	❒ Airline respirator:_____
❒ Harness/lanyard:	❒ SCBA: _____

Training	
❒ Basic Employee Safety Orientation	❒ Heat Stress
❒ Supervisor's Responsibilities	❒ Hot Work
❒ Asbestos Awareness	❒ Laboratory Safety
❒ Bloodborne Pathogens	❒ Ladder Safety
❒ Chemical Safety	❒ Lead Awareness
❒ Compressed Gasses	❒ Lockout/Tagout
❒ Confined Spaces	❒ Machine Shop Safety
❒ Electrical Safety	❒ Office Safety
❒ Emergency Response Team	❒ Personal Protective Equipment
❒ Ergonomics	❒ Power Tools
❒ Fall Protection	❒ Radiation
❒ First Aid/CPR	❒ Welding/Cutting
❒ Forklift Operation	❒ Other: _____
❒ Hearing Conservation	❒ Other: _____

ITSI Gilbane

LOCKOUT/TAGOUT PROCEDURE

Location: _____ Equipment Type/ID: _____

Lockout performed by: _____ Date: _____

Direct energy types & sources: _____

Stored energy types & sources: _____

Lockout/blockout devices to use: _____

Notes/special hazards or issues: _____

_____

_____

Emergency contact: _____

Shutdown SOP

- ❑ Identify direct and stored energy sources (see above)
- ❑ Notify affected employees (which equipment, when, why)
- ❑ Shut down equipment by normal procedures
- ❑ Isolate equipment from energy - turn off power at source
- ❑ Lockout/tagout energy source(s)
- ❑ Release or protect from stored energy
  - ❑ Electrical ground
  - ❑ Open hydraulic/pneumatic valves
  - ❑ Pipeline blanks
  - ❑ Bleed/flush systems, test downstream valves
  - ❑ Release spring tension
  - ❑ Dissipate heat & cold
  - ❑ Blockout
  - ❑ Shutdown adjacent machines if vibration is an issue
- ❑ Verify lockout effectiveness:
  - ❑ Test lock
  - ❑ Check with voltmeter if electrical
  - ❑ Clear employees from area
  - ❑ Turn equipment controls on
  - ❑ Turn equipment controls off

Startup SOP

- ❑ Make sure equipment is intact, guarding is in place
- ❑ Make sure employees and tools are at safe location
- ❑ Make sure equipment controls and valves are OFF
- ❑ Remove locks & tags
- ❑ Re-start equipment
- ❑ Check equipment operation
- ❑ Return locks and tags

ITSI Gilbane	ITSI Gilbane Building Company	MultiRAE 4-Gas Plus PID Calibration Log

Location:

Serial Number:

Isobutylene: 100 ppm
4-Gas mix: CO - 50 ppm: H_2S - 25 ppm
LEL - 2.5% (50% Methane LEL); Air - Balance

	Volatile Organics			4-Gas Mixture					
Date	Initials	Bump/ Hard Value		Initials	Bump/ Hard	CO	H_2S	O_2	LEL

ITSI Gilbane

REFUSAL OF MEDICAL TREATMENT

I, _____, am refusing to receive medical treatment for a work-related injury.

By signing below, I certify that:

- I understand that medical treatment offered for occupational injuries or exposures will be paid for by the company.
- I understand that medical consequences may arise as a result of delay in treatment
- I understand that I may decide at a later time to go to a medical facility for treatment of my condition.

_____ _____
Signature Date

_____ _____
Witness Signature Date

ITSI Gilbane

SITE SAFETY INSPECTION

Project Name: _____ Date: _____

Project Number: _____ Inspector: _____

Instructions: Check off every item as "Yes", "No", or "Not Applicable". All "No" items must have an explanation of corrective actions undertaken to correct the problem.

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
Documentation, Signs					
Documentation such as Safety Plan, MSDSs, air monitoring logs, training records, and inspections are up to date					
Postings such as emergency numbers, hospital map, permits, OSHA poster, and speed limit signs are maintained					
Housekeeping/Work Areas					
Work areas are kept clean and orderly, and exits and walkways are not blocked					
Materials are stored in proper and stable configurations					
Hazards are not created by sharp surfaces, open pits, wet surfaces, or tripping hazards					
A clean break area is provided to employees					
Adequate lighting is provided indoors and for outdoor work after dark					
Employees are working carefully and without horseplay					
Emergency equipment such as eyewashes, first aid kits, and fire extinguishers are full, inspected and accessible					
Ladders & Scaffolds					
Ladders have no damage, defects, or missing parts, including support feet					
Ladders extend three feet above the top surface being climbed, and are secured at top and stable at bottom					
Only wooden or fiberglass ladders are used near electrical lines					
Scaffolds are on level, stable surfaces, floorboards are tight fitting, have no damage or missing parts,					
Employees working on platforms higher than 6					

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
feet are wearing properly secured lifelines and safety harnesses					
Personal Protective Equipment					
Employees are utilizing proper personal protective equipment and respirators based on hazards, and equipment is in good condition					
Chemical Storage/Fire Safety					
Chemicals, gases, and oily rags are stored properly in the appropriate labeled containers, and only with compatible materials					
Stored compressed gas cylinders are secured and upright, with caps on					
Chemicals are used with adequate ventilation					
Bonding/grounding is used during flammable liquid transfers					
Compressed gas cylinders are moved with caps on, with dollies whenever possible					
Flammable liquid storage areas have containment, and fire extinguishers within 25 feet					
Hot work (welding, cutting) is performed with permit, fire watch, extinguisher					
Air monitoring equipment is maintained and calibrated daily, and monitoring is performed and documented properly					
Vehicles/Heavy Equipment					
Vehicles and heavy equipment are in good condition, including tires, mirrors, windshields, and backup alarms					
Operators and ground personnel are cautious and maintain line of sight					
Seat belts are used by operators					
Equipment is parked with buckets/forks in the down position					
Drill rigs and cranes are moved with the boom down and rigging secured					
All chains, slings, and hoists are in good condition and are inspected before use					

SITE SAFETY INSPECTION

Inspection Item	Yes	No	N/A	Corrective Actions	Date of Correction
Gas or diesel machinery is only used with proper ventilation					
Electrical Safety					
Electrical equipment is in good condition, grounded, protected from damage, and protected by a Ground Fault Circuit Interrupter					
Lockout/tagout procedures are utilized whenever work is performed on electrical/mechanical equipment					
Excavations, Trenches, Confined Spaces					
The Competent Person has inspected all trenches and excavations at least every shift					
Excavations and trenches are adequately sloped, benched or shored based on soil conditions					
Shoring systems have been approved by a Registered Professional Engineer, and shoring design specifications are on site					
Soil stockpiles are placed no closer than two feet from the edge of excavations					
Excavations/trenches are protected from water by berms, drainage and/or pumps					
Underground utilities have been located, and exposed utilities are protected					
Underground Service Alert and all entities potentially affected by the excavation have been notified					
Excavations and trenches are protected by fencing, barricades, etc.					
Surface encumbrances such as buildings, roads, etc. have been protected					
Ladders are located in excavation so that employees have access to them within 25 feet at all times					
All excavations and trenches have been evaluated for confined space conditions, and a checklist/permit is utilized for all entries					

ITSI Gilbane

SITE SAFETY REQUIREMENTS

Project: _____ Project No.: _____

Superintendent: _____ Start Date : _____

- ❑ Project postings
  - o OSHA postings (Federal, and state as applicable)
  - o Labor law postings, including payday notice, Walsh-Healy Act, etc.
  - o Route to hospital & emergency contacts
  - o Client-required postings:_____
  - o Safe work practices
  - o OSHA 300 form
  - o Other: _____
- ❑ Safety signs
  - o Speed limit
  - o No trespassing/restricted area
  - o PPE required: hardhats, safety glasses, boots, vests
  - o Specific hazard warnings
  - o Other: _____
- ❑ Permits
  - o Excavation
  - o Air quality
  - o Noise
  - o Other: _____
- ❑ Health and safety plan and recordkeeping forms
- ❑ Medical monitoring and training documentation for all employees
- ❑ Chemical inventory, MSDSs for all chemical products, including gasoline & diesel
- ❑ Toilet
- ❑ Handwash
- ❑ Potable water
- ❑ Radios, means of charging: _____
- ❑ First aid kits: Qty: _____ Locations: _____
- ❑ Fire extinguishers (serviced): Qty: ____ Locations: _____
- ❑ Eyewashes: Qty: ____ Locations: _____
- ❑ Spill kits for diesel, gasoline, other: _____
- ❑ Protective equipment:
  - o Safety glasses
  - o Hardhats
  - o Reflective vests
  - o Earplugs
  - o Gloves
  - o Chemical protective clothing, type: _____
  - o Respirators: Type: _____ Cartridge type: _____
  - o Other: _____
- ❑ Monitoring equipment
  - o Confined space (oxygen, combustibles, CO, H2S)
  - o Organic vapor (PID or FID)
  - o Dust
  - o Other: _____
- ❑ Calibration gases: Type: _____
- ❑ Other: _____

ITSI Gilbane

TAILGATE SAFETY MEETING

Date: _____ Time: _____ Page: _____ of _____
Customer: _____ Project: _____ Contract #: _____ Proj. #: _____
Work Description: _____

EMERGENCY PROCEDURES

Emergency Contact: _____ Emergency Number: _____
Hospital/Clinic: _____ Address: _____
Evacuation Procedures: _____

OTHER EMERGENCY CONTACTS

Name	Phone	Name	Phone

SITE HAZARDS

Physical Hazards	*Chemical Hazards (include chemical products)*

SITE ENTRY REQUIREMENTS

Check-In Procedures: _____
Training Requirements: _____
Minimum PPE Required: _____
Special Precautions: _____

TODAY'S SPECIFIC SAFETY ISSUES

Today's work: _____
Specific safety issues/work practices: _____

ATTENDEES

Name (print)	Signature	Company	Name (print)	Signature	Company

MEETING CONDUCTED BY

Health & Safety Officer: _____ (Name (printed)) _____ (Signature)
Site Superintendent: _____ (Name (printed)) _____ (Signature)

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DAILY HOT WORK PERMIT

This permit must be completed each time heat producing work is performed and is valid for one location and one shift only. This is in addition to any client facility permits and protocols that must be followed.

SITE: _____ **PROJECT#:** _____

ISSUED TO: _____

LOCATION: _____

DATE:

HOT WORK ACTIVITY (check appropriate box):

YES	NO	
		Welding (electric or gas)
		Oxy-acetylene torch
		Grinding/ Cutting (spark producing)
		Heat treatment/Plastic weld/Roofing
		Other (list activity) :

SAFETY CHECKLIST (check appropriate box):

		Material/Surface to be worked on has been evaluated for hazardous material (lead paint, asbestos, etc.)
		Paint removed from surface to be impacted.
		Work area, openings and below free of flammable or combustible materials (paper, cardboard, oily rags, chemical containers, etc.) or suitably protected (within 50')
		Fire extinguishers on hand (20# Min), inspected and charged.
		Fire watch posted (1 hr. required) Name:
		Emergency exit routes marked and clear
		Ventilation provided (if confined area or poor natural ventilation) and in place where necessary.
		Worker has appropriate eye protection, face shield, clothing, respirator, etc.
		Compressed gas cylinders are secured. (Cylinders are prohibited in confined spaces and excavations.)
		Equipment has been inspected and is free of defects, flash arrestors installed at the gauge end, gauges intact, etc.
		Others in immediate area have been notified of hot work activity
		Arc and Flash protection - Welding or cutting work performed behind shielding (where possible)
		Other threats from trade activities reviewed (paints, thinners, waterproofing, etc.)
		Respiratory Protection
		Fire services notification -sprinklers or fire sensing systems to impacted (covered) or taken off line

When applicable, this permit may be used in conjunction with a Confined Space Entry Permit.

Valid from: _____ **To:** _____

I have verified that all requirements of the ITSI Gilbane Hot Work SWP (2011), and client permits have been met and therefore issue this permit.

ISSUED BY:_____

Date:_____ Time: _____

ITSI Gilbane

VISITOR/VENDOR SIGN-IN LOG

Project: _____ Project No.: _____

Logged by: _____ Date: _____

I have been briefed on and agree to abide with the basic safety rules which may pertain to my visit to this site, including:

- Check in at the office trailer
- Speed limit discussed and parking areas approved (back in to spots)
- Stay on established routes always with ITSI escort
- Watch out for equipment and pedestrians
- On-site workers must wear ANSI-approved hardhats, safety glasses, reflective vests, and protective toed shoes or boots
- Other: _____

Name (Printed)	Signature	Company	Reason for Visit	Time In	Time Out