SFUND RECORDS CTR
2251080

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-10-D-0809
CTO NO. 0004

FINAL
EXECUTION PLAN
January 21, 2011

DCN: RMAC-0809-0004-0003

BASEWIDE RADIOLOGICAL SUPPORT
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DEPARTMENT OF THE NAVY
BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE RD, SUITE 900
SAN DIEGO, CA 92108-4310

Ser BPMOW.jhw/0217
JAN 21 2011

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 Execution Plan, Base Wide Radiological Support, Hunters Point Shipyard, San Francisco, California. This Execution Plan serves as the work plan for the operation of the Radiological Screening Yards (RSYs), and a sampling and analysis (SAP) for on-site and off-site laboratory services.

The Navy requests formal comments on the Final Execution Plan no later than Thursday February 17, 2011. If you have any questions regarding the enclosed document, please contact Mr. Jim Whitcomb at (619) 532-0916, 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 Execution Plan, Basewide Radiological Support , Hunters Point Shipyard, San Francisco, California, January 2011

Ser BPMOW.jhw/0217
JAN 21 2011

Copy to:

Diane Silva (2 Hard Copies, 1 unbound, CD)
NAVFAC Southwest (Code EV33)
Naval Base San Diego
2965 Mole Rd., Bldg. 3519
San Diego, CA 92136

Laurie Lowman (3 Hard Copies and 3 CDs)
Building 1971
NWS P.O. Drawer 260
Yorktown, VA. 23691-0260

Amy Brownell (CD Only)
SF Department of Public Health
1390 Market St., Suite 210
San Francisco, Ca 94102

Elaine Warren (CD only)
Office of the City Attorney
City Hall, Room 234
1 Dr. Carlton B. Goodlett Place
San Francisco, CA 94102-4682

Leslie Lundgren (Hard Copy and CD)
33 New Montgomery Street, Suite 2000
San Francisco, CA 94105

Dorinda Shipman (Hard Copy and CD)
Treadwell and Rollo
555 Montgomery St., Suite 1300
San Francisco, CA 94111

Stephen Proud (CD Only)
Lennar/BVHP
1 California St., Suite 2700
San Francisco, CA 94111

Stan DeSouza (CD Only)
1680 Mission St., First Floor
San Francisco, CA 94103-2414

Kristine Enea (CD Only)
951 Innes Avenue
San Francisco, CA 94124

Karla Brasaemle (Hard Copy and CD)
90 New Montgomery St., Suite 710
San Francisco, CA 94105

Ryan Miya (Hard Copy and CD)
Department of Toxic Substance Control
700 Heinz Avenue, Bldg. F, Suite 200
Berkeley, CA 94710

Michael Sharpless (CD Only)
Paul Hastings, et al.
55 2nd Street, 24th Floor
San Francisco, CA 94104-2635

Tamara Davidson (CD Only)
SF Health Department
101 Grove Street, Rm 217
San Francisco, CA 94102

Leon Muhammad (Hard Copy and CD)
5048 3rd Street
San Francisco, CA 94124

Linda Malvino (Hard Copy and CD)
Mactec Engineering and Consulting, Inc.
5341 Old Redwood Highway, Suite 300
Petaluma, CA 94954

Michael McGowan (CD only)
4634 3rd Street
San Francisco, CA 94124

Alex Lantsberg (CD Only)
991 Innes Avenue
San Francisco, CA 94124

Matt Hagemann (CD Only)
2503 Eastbluff Drive, Suite 206
Newport Beach, CA 92660

ED_004747_00027038-00003

Ser BPMOW.jhw/0217
JAN 21 2011

Randy Brandt (CD Only)
475 14th Street, Suite 400
Oakland, CA 94612

Sarah Kloss (CD Only)
75 Hawthorne Street
San Francisco, CA 94105

Janice Torbet (Hard Copy and CD)
100 Larkin Street
Gov. Information Ctr., 5th Floor
San Francisco, CA 94102

ED_004747_00027038-00004

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-10-D-0809
CTO NO. 0004

FINAL
EXECUTION PLAN
January 21, 2011

BASEWIDE RADIOLOGICAL SUPPORT
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: RMAC-0809-0004-0003

Prepared by:

TETRA TECH EC, INC.
1230 Columbia Street, Suite 750
San Diego, California 92101-8536

Prepared by: _____
Richard Weingarz
Technical Lead

Reviewed by: _____
Bill Dougherty
Project Manager

TABLE OF CONTENTS

PAGE

ABBREVIATIONS AND ACRONYMS iii

1.0 INTRODUCTION 1-1
- 1.1 SITE HISTORY 1-2
- 1.2 REGULATORY FRAMEWORK 1-2
- 1.3 REMOVAL ACTION OBJECTIVES 1-2
- 1.4 PROJECT POINTS OF CONTACT 1-2
- 1.5 PLAN ORGANIZATION 1-3

2.0 WORK IMPLEMENTATION 2-1
- 2.1 RADIOLOGICAL SCREENING YARD OPERATIONS 2-1
- 2.2 LABORATORY OPERATIONS 2-3
  - 2.2.1 Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys 2-4
  - 2.2.2 Gamma Spectroscopy 2-4
  - 2.2.3 Quality Control Checks 2-4
  - 2.2.4 Off-site Samples 2-5
- 2.3 BASEWIDE RADIOLOGICAL SUPPORT 2-5

3.0 ENVIRONMENTAL PROTECTION PLAN 3-1
- 3.1 SPILL/RELEASE PREVENTION, RESPONSE, AND REPORTING 3-1
  - 3.1.1 Spill/Release Prevention 3-1
  - 3.1.2 Spill/Release Response 3-1
  - 3.1.3 Spill/Release Reporting 3-1
- 3.2 FUGITIVE DUST CONTROL MEASURES 3-2
  - 3.2.1 Soil Transport and Stockpile Management 3-2
  - 3.2.2 Air Monitoring 3-2
- 3.3 STORMWATER POLLUTION PREVENTION 3-3
- 3.4 WASTE MANAGEMENT PRACTICES 3-3

4.0 REFERENCES 4-1

TABLE OF CONTENTS
(Continued)

PAGE

TABLE

Table 2-1 On-Site Laboratory Instrumentation 2-3

FIGURES

Figure 1-1 Project Organization Chart

Figure 2-1 Radiological Screening Yard Location Map

Figure 2-2 Areas Requiring Radiological Support

Figure 3-1 Radiological Screening Yard Air Monitoring Locations

Figure 3-2 Location of RSY Operations within Parcels D-1 and E

ATTACHMENTS

Attachment 1 Basewide Radiological Support Sampling and Analysis Plan

Attachment 2 Project Contractor Quality Control Plan

Attachment 3 Final Radiation Protection Plan (on CD only)

Attachment 4 Final Basewide Dust Control Plan, Revision 1 (on CD only)

Attachment 5 Final Stormwater Pollution Prevention Plan (on CD only)

Attachment 6 Waste Management Plan

ABBREVIATIONS AND ACRONYMS

ASCII	American Standard Code for Information Interchange
BRAC	Base Realignment and Closure
CSO	Caretaker Site Office
CTO	Contract Task Order
DoD	Department of Defense
DON	Department of the Navy
EPA	U.S. Environmental Protection Agency
FSS	Final Status Survey
HPS	Hunters Point Shipyard
IR	Installation Restoration (Program)
LLRW	low-level radioactive waste
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
PDF	portable document format
PjM	Project Manager
QC	quality control
RASO	Radiological Affairs Support Office
ROC	radionuclide of concern
RPM	Remedial Project Manager
RRO	radiological remedial objective
RSO	Radiation Safety Officer
RSY	radiological screening yard
SAP	Sampling and Analysis Plan
SFRA	San Francisco Redevelopment Agency
SWPPP	Stormwater Pollution Prevention Plan
TA	TestAmerica Laboratory
Triple A	Triple A Machine Shop
TtEC	Tetra Tech EC, Inc.
WMP	Waste Management Plan

This page intentionally left blank.

1.0 INTRODUCTION

The Department of the Navy (DON) contracted with Tetra Tech EC, Inc. (TtEC) to provide basewide radiological support under TtEC's United States Nuclear Regulatory Commission Service Provider Radioactive Materials License. In support of the ongoing chemical and radiological remediation work at Hunters Point Shipyard (HPS), TtEC will operate three Radiological Screening Yards (RSYs), provide on-site and off-site radiological laboratory services, and provide radiological support to contractors performing work in radiological impacted areas. This work will be conducted under Contract No. N62473-10-D-0809, Contract Task Order (CTO) No. 0004.

To perform this work, the following plans will be used in conjunction with the site-specific information provided in this Execution Plan:

- **Base-wide Radiological Work Plan**: Final Base-wide Radiological Work Plan, Revision 1, dated October 5, 2007 (TtEC 2007)
- **Base-wide Storm Drain and Sanitary Sewer Removal Work Plan**: Final Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Revision 4, dated July 30, 2010 (TtEC 2010a)
- **Health and Safety Plans**: Final Accident Prevention Plan/Site Safety and Health Plan, Basewide Radiological Support, dated January 7, 2011 (TtEC 2011)

This Execution Plan provides site-specific information in addition to the above-referenced plans. The site-specific information addresses:

- Dust control and air monitoring requirements specific to these work locations
- Spill prevention, response, and reporting
- Stormwater pollution prevention
- Waste management practices

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

- Basewide Radiological Support Sampling and Analysis Plan (SAP) (Attachment 1)
- Project Contractor Quality Control Plan (Attachment 2)
- Radiation Protection Plan (Attachment 3)
- Basewide Dust Control Plan (Attachment 4)
- Stormwater Pollution Prevention Plan (SWPPP) (Attachment 5)
- Basewide Radiological Support Waste Management Plan (WMP) (Attachment 6)

1.1 SITE HISTORY

HPS is located in the southeastern part of San Francisco on a long promontory that extends east into San Francisco Bay. Presently, HPS encompasses approximately 866 acres, including approximately 420 acres on land. 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 when the DON deactivated HPS. From 1976 to 1986, the DON leased HPS 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, HPS 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 HPS. Essentially, this may entail removal of buildings and structures, including subsurface systems, as well as removal of contaminated materials. HPS was divided into 11 parcels, A, B, C, D-1, D-2, E, E-2, F, G, UC1, and UC2. Parcel A, consisting of the most inland 75 acres, was transferred to the San Francisco Redevelopment Agency (SFRA) in 2004. The remainder of HPS will be conveyed to the SFRA once the environmental cleanup is complete.

1.2 REGULATORY FRAMEWORK

Environmental investigation and remediation activities are being conducted at HPS under the Department of Defense (DoD) Installation Restoration (IR) Program in accordance with Comprehensive Environmental Response, Compensation, and Liability Act 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

Consistent with the NCP requirements in Title 40 *Code of Federal Regulations*, Part 300.415(b)(2), the removal action objectives for this removal action are to implement the Action Memorandum (DON 2006) and protect public health and welfare and the environment by physically removing and disposing of radioactive contamination that exceeds the radiological remedial objectives (RROs) presented in Table 1 of the Action Memorandum (DON 2006).

1.4 PROJECT POINTS OF CONTACT

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

1.5 PLAN ORGANIZATION

This Execution Plan is organized as follows:

- **Section 1.0** provides the introduction, site history and current operations, regulatory framework, RROs, project points of contact, and report organization.
- **Section 2.0** describes the work implementation for the RSYs, laboratory, and radiological contractor support.
- **Section 3.0** describes site-specific requirements for dust control during implementation of the site work, waste management practices, and spill/release prevention, response, and reporting.
- **Section 4.0** lists the references cited in the text.
- **Figures** are included after the text.
- **Attachment 1** presents the Basewide Radiological Support SAP. This plan details both on-site and off-site laboratory operations that will support the survey activities. Included are updated procedures for the on-site laboratory including 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 (QC) system to ensure the quality of all work performed by TtEC and its subcontractor personnel during the implementation of the fieldwork.
- **Attachment 3** presents the Radiation Protection Plan. This previously approved plan will be used for performing work under this CTO. 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 Basewide Dust Control Plan, Revision 1. This plan was updated to address multiple contractors working at HPS. 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 SWPPP. This plan was prepared to ensure construction activities comply with the substantive requirements of the National Pollutant Discharge Elimination System program, specifically the General Construction Activity Stormwater Permit program as set forth by the California Regional Water Quality Control Board General Permit No. CAS000002, "Water Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction and Land Disturbance Activities." This plan provides details for implementing best management practices during field activities.
- **Attachment 6** presents the Basewide Radiological Support WMP. This plan presents the waste management practices and procedures to be followed, and identifies the types of waste expected to be generated during the CTO.

This page intentionally left blank.

2.0 WORK IMPLEMENTATION

The following sections discuss the requirements of documents and procedures for performing the radiological release of radiologically impacted soil, operation of the on-site gamma spectroscopy laboratory, and providing radiological support to other contractors.

2.1 RADIOLOGICAL SCREENING YARD OPERATIONS

Excavated soil will be transported by the remediation contractor to an RSY to be scanned, surveyed, remediated, and radiologically cleared for either reuse or disposal.

Under this CTO, TtEC will operate three RSYs (Figure 2-1) to conduct the scanning and surveying of other contractor's excavated material:

- RSY-2 has 36 screening pads and 2 decontamination pads.
- RSY-3 has 10 screening pads.
- RSY-4 has 29 screening pads and 2 decontamination pads.

Prior to the excavation of any soil, the contractor will contact the RSY Manager (or designee) to determine which RSY will be used so that the screening pad and unique stockpile number can be provided to the contactor.

Excavated soil entering an RSY must be accompanied by a truck ticket. This ticket will provide the RSY staff the following information:

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

After the RSY staff reviews the truck ticket to ensure the proper information is provided, they will then direct the driver to the appropriate screening pad. No soil will be accepted from trucks without a completed truck ticket. TtEC will return the truck ticket to the remediation contractor within 48 hours and identify the screening pad the soil was placed on and a unique stockpile identification number for tracking purposes.

To facilitate the Multi-Agency Radiation Survey and Site Investigation Manual Final Status Survey (FSS) to radiologically clear the material for reuse as backfill, the excavated soil will be spread out in lifts approximately 6 inches in height and up to 1,000 square meters in surface area. As necessary, the material will be allowed to dewater before radiological surveys are performed.

The radiological surface survey (towed array survey) will consist of a high-density gamma scan supported by Global Positioning System equipment. The high-density survey process will result in a 100 percent surface scan survey, as detailed in Section 4.0 of the Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Revision 4 (TtEC 2010a). Areas having radiation levels greater than the established 3 sigma of the mean background area level will be evaluated further for the presence of radioactive material and may include additional biased sampling.

FSS soil samples will be collected based on sample spacing using Equation 4-2 from the Base-wide Radiological Work Plan, Revision 1 (TtEC 2007), using the most current version of Visual Sample Plan. FSS soil sampling procedures are described in the Basewide Radiological Support SAP (Attachment 1). The samples will be screened at the on-site radiological laboratory by gamma spectroscopy. Excavated soil determined to have residual radioactive contamination below the RROs after a single phase of systematic sampling may be used as backfill, pending additional chemical analysis and Radiological Affairs Support Office (RASO) concurrence as discussed below.

Excavated soil generated from an IR site will also require chemical sampling. Material that does not exceed the IR site chemical cleanup goals and does not exceed the RROs may be used as backfill pending RASO concurrence. Analysis will be based on the contaminants of concern for each site as indentified in the Basewide Radiological Support SAP (Attachment 1).

Material exceeding the RROs will be removed and placed in appropriate containers for subsequent transport and disposal under the direction of the DON low-level radioactive waste (LLRW) Disposal Program as directed by the RASO. Chemically and non-radiologically impacted material that does not meet the HPS Backfill Acceptance Criteria will be staged for pickup by the Navy's non-LLRW disposal contractor. The appropriate analytical data will accompany the transfer of both the LLRW and non-LLRW materials.

Radiological surveys of excavated soil in the RSYs are an iterative process that may involve soil characterization, remediation, and postremediation sampling, as appropriate, prior to the actual FSS activities. This iterative process will be considered complete only after the postremediation sample results indicate radioactivity is below the RROs. The FSS will be considered complete when the 18 systematic "screening" samples submitted to the on-site laboratory are below RROs.

TtEC will submit the screening sample results to the RASO for concurrence to stage the soil in an area designated by the DON Caretaker Site Office (CSO) pending receipt of additional off-site data.

Subsequently, TestAmerica (TA) St. Louis will be used to perform gamma spectroscopy analysis to generate "definitive sample results" for FSS samples and provide data packages from a Department of Defense and California Department of Public Health-accredited laboratory for submission to the regulatory agencies and provide quality assurance check of the on-site laboratory's results for nondefinitive sample results. TA St. Louis will also be used to perform additional radiochemical analysis (such as strontium-90 and alpha spectroscopy) that the on-site laboratory does not perform.

Once the off-site data are received and TtEC has determined the soil meets the HPS Soil Acceptance Criteria, a second e-mail will be sent to the RASO for concurrence to use the soil as backfill material. A copy of RASO's concurrence and all the analytical data will be provided to the remediation contractor.

2.2 LABORATORY OPERATIONS

On-site laboratory equipment will be used to analyze most radiological samples collected in the field. Table 2-1 lists the types of measurements and laboratory equipment to be used on-site to support the survey activities.

TABLE 2-1

ON-SITE LABORATORY INSTRUMENTATION

Laboratory Instruments				
Measurement/ Technique	**Type of Instrumentation***	**Typical Background**	**Typical Efficiency (%)**	**Detection Sensitivity**
Gamma spectroscopy	High-purity germanium detector	N/A	40 to 60	0.05 pCi/g (for ^{137}Cs) 0.5 pCi/g (for ^{226}Ra)
Gross alpha and beta/gamma on swipes (swipes)	Protean IPC9025 low-background gas-flow proportional counter	1–5 cpm β 0–0.5 cpm α	~62 β ~27 α	4–10 dpm/100 cm^2 β 2–5 dpm/100 cm^2 α

Notes:
* or equivalent
Types of radiation: α – alpha, β – beta

Abbreviations and Acronyms:
cm^2 – square centimeter
cpm – counts per minute
^{137}Cs – cesium-137
dpm – disintegrations per minute
N/A – not applicable
pCi/g – picocuries per gram
^{226}Ra – radium-226

ED_004747_00027038-00016

2.2.1 Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys

Swipe samples will be processed using a Protean IPC 9025 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 Basewide Radiological Support SAP (Attachment 1).

2.2.2 Gamma Spectroscopy

Gamma spectroscopy analysis is performed on soil samples using hardware features that include a high-purity germanium gamma photon detector supported by Ortec software. Instrument hardware is calibrated using a multi-energy National Institute of Standards and Technology-traceable source ranging from 10 kiloelectron volts to 2 millielectron volts. Data results will undergo a QC review and be reported in units of picocuries per gram. 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 radionuclides of concern (ROCs). A spectral region of interest results around a specified energy range allows for identification and quantification of associated nuclides and daughter products. Procedures for gamma spectroscopy analysis are presented in the Basewide Radiological Support SAP (Attachment 1).

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 Laboratory Coordinator who will be responsible for ensuring that the laboratory results (both as ASCII and PDF files) are submitted electronically in a timely manner to the appropriate remediation contractor. If gamma results are below the established ROC, 100 percent of the FSS sample set will be sent off-site to TA St. Louis, a DoD ELAP-certified radiological laboratory, for analysis.

2.2.3 Quality Control Checks

QC checks will be performed on laboratory instrumentation to ensure proper operation and to maintain calibration. The quality checks will be documented, reviewed, and maintained. 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 Basewide Radiological Support SAP (Attachment 1).

2.2.4 Off-site Samples

Chemical analyses of selected alpha, beta, and gamma analyses for QC purposes will be analyzed at off-site laboratories in accordance with the Basewide Radiological Support SAP (Attachment 1).

The off-site analytical results will be provided electronically to the appropriate remediation contractor as a PDF of an EPA Level III- or IV-equivalent data package and a DON electronic data deliverable compatible file.

2.3 BASEWIDE RADIOLOGICAL SUPPORT

Under this contract, TtEC will provide radiological screening support to non-radiological remediation contractors performing work within areas defined in the Memorandum of Understanding (TtEC 2010b) for HPS. Figure 2-2 details the impacted areas requiring radiological support.

In support of the basewide radiological scope of work, TtEC will:

- Perform incoming and outgoing construction equipment surveys.
- Provide thermoluminescent dosimeters for staff and non-radiological remediation contractors performing work in radiologically impacted areas.
- Institute radiological controls and postings in impacted areas not covered by an on-site radiological remediation contractor.
- Conduct routine radiological surveys.
- Prepare and/or update HPS standard operating procedures and develop work instructions.
- Operate an on-site portal monitor for incoming and outgoing trucks.
- Conduct radiological awareness briefings for non-radiological remediation contractors executing work in radiologically impacted areas.

TtEC will also provide rapid response to support the DON's need to quickly assess and address off-site remedial needs. This will include:

- Assessment of the situation and development of the remedial approach
- Expedited chemical/radiological characterization
- Performance of the remediation and management of the waste as directed by the DON

This page intentionally left blank.

ED_004747_00027038-00019

3.0 ENVIRONMENTAL PROTECTION PLAN

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

3.1 SPILL/RELEASE PREVENTION, RESPONSE, AND REPORTING

3.1.1 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.
- **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.

3.1.2 Spill/Release Response

In the event of a release of hazardous material into the environment, per the Health and Safety Plan (TtEC 2011), TtEC 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 HPS must be reported to the Remedial Project Manager (RPM) and CSO. In addition, all spills involving radioactive material must be reported to the Radiation Safety Officer (RSO) and the RASO. Absorbent pads, shovels, and 55-gallon drums 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, which is provided as Attachment 6.

3.1.3 Spill/Release Reporting

The steps below outline the chain of communications that will be followed if a significant spill of any hazardous substance occurs. 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 Superintendent, who will notify the Project Manager (PjM), Project Environmental Safety Manager, and RSO (if radioactive material is involved). The TtEC Project Superintendent or PjM will contact the RPM and CSO. The RSO 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 PjM 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 a 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.

3.2 FUGITIVE DUST CONTROL MEASURES

Work activities will follow procedures and controls set forth in the Basewide Dust Control Plan, Revision 1 (Attachment 4). This section identifies site-specific requirements not presented in it.

3.2.1 Soil Transport and Stockpile Management

Fugitive dust emissions from soil transport, loading, and stockpiling will be controlled using the following methods:

- Soil will be wetted on an as-needed basis during all loading and stockpiling activities.
- The height from which the soil is dropped either to trucks, stockpile, or pads will be minimized.
- Trucks shall be equipped with tarping systems to cover the loads during soil transportation.
- A soil stabilizer will be applied to storage piles when not actively handled (no activities in 7 days).

3.2.2 Air Monitoring

Air monitoring will be conducted during RSY activities, as detailed in the Basewide Dust Control Plan, Revision 1 (Attachment 4). Three types of air monitoring to be conducted are:

- Upwind and downwind air quality monitoring
- ROC air monitoring

- Personnel monitoring (as needed)

During prolonged precipitation events (greater than 8 hours of precipitation in a 24-hour period), the air monitoring units will not be operated. If an air monitoring station or individual units are inoperable, construction activities will still continue at the associated work site.

Figure 3-1 shows the air monitoring locations.

3.3 STORMWATER POLLUTION PREVENTION

A separate SWPPP (Attachment 5) provides details for implementing best management practices during field activities. Figure 3-2 shows the locations of the three RSYs to be operated under this CTO. RSY-2 is located within Parcel D-1 and RSYs-3 and -4 are located within Parcel E. The sediment risk level calculations presented in Appendix F of the SWPPP shows that operation of these three RSYs fall under the low Site Sediment Risk Factor as the watershed erosion estimates were below 15 tons/acre:

- Parcel D-1 – 11.99 tons/acre
- Parcel E (including UC3) – 13.45 tons/acre

As the receiving water risk remains low, the stormwater monitoring and management requirements for these three work areas remain in the Risk Level 1 category and will be based on the Risk Level 1 requirements presented in Appendix B of the SWPPP (Attachment 5).

3.4 WASTE MANAGEMENT PRACTICES

Waste management will follow the procedures presented in the Basewide Radiological Support WMP (Attachment 6). The WMP presents the waste management practices for the types of waste expected to be generated, waste minimization approach, disposal options, and general management practices associated with the operation of the RSYs.

This page intentionally left blank.

4.0 REFERENCES

DON (Department of the Navy). 2006. Final Base-wide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco, California.

TtEC (Tetra Tech EC, Inc.). 2007. Final Base-wide Radiological Work Plan, Revision 1, Hunters Point Shipyard, San Francisco, California. October 5.

————. 2010a. Final Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Revision 4, Hunters Point Shipyard, San Francisco, California. July 30.

————. 2010b. Modification of the Memorandum of Understanding, Hunters Point Shipyard, San Francisco, California. October 7.

————. 2011. Accident Prevention Plan/Site Safety and Health Plan, Basewide Radiological Support, Hunters Point Shipyard, San Francisco, California. January 7.

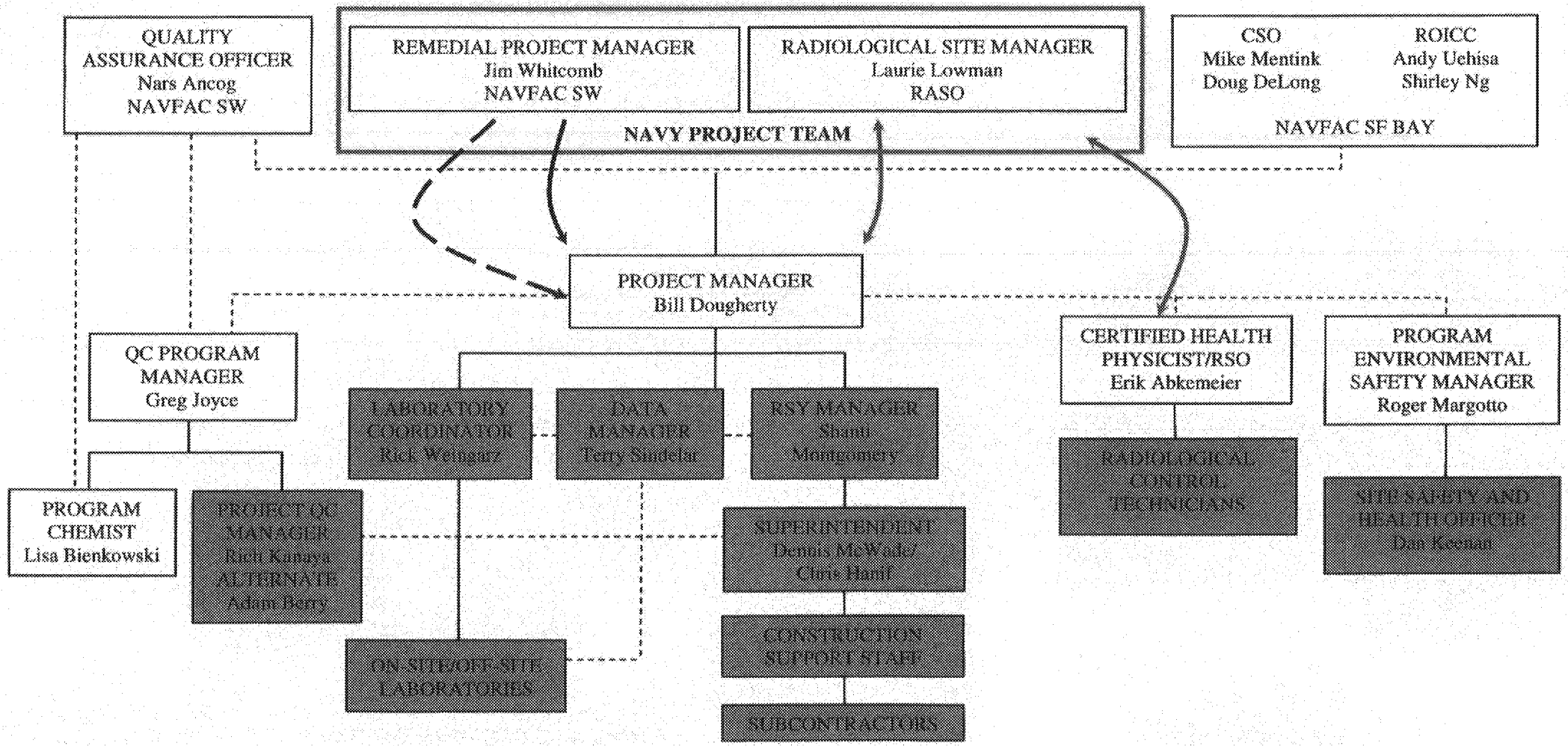
This page intentionally left blank.

FIGURES

This page intentionally left blank.

FIGURE 1-1

PROJECT ORGANIZATION CHART



Abbreviations and Acronyms:
CSO – Caretaker Site Office
HPS – Hunters Point Shipyard
NAVFAC SW – Naval Facilities Engineering Command Southwest
RASO – Radiological Affairs Support Office
ROICC – Resident Officer in Charge of Construction
RSO – Radiation Safety Office
RSY – Radiological Screening Yard
QC – Quality Control
SF – San Francisco

Legend

Formal reporting relationship

Supporting relationship

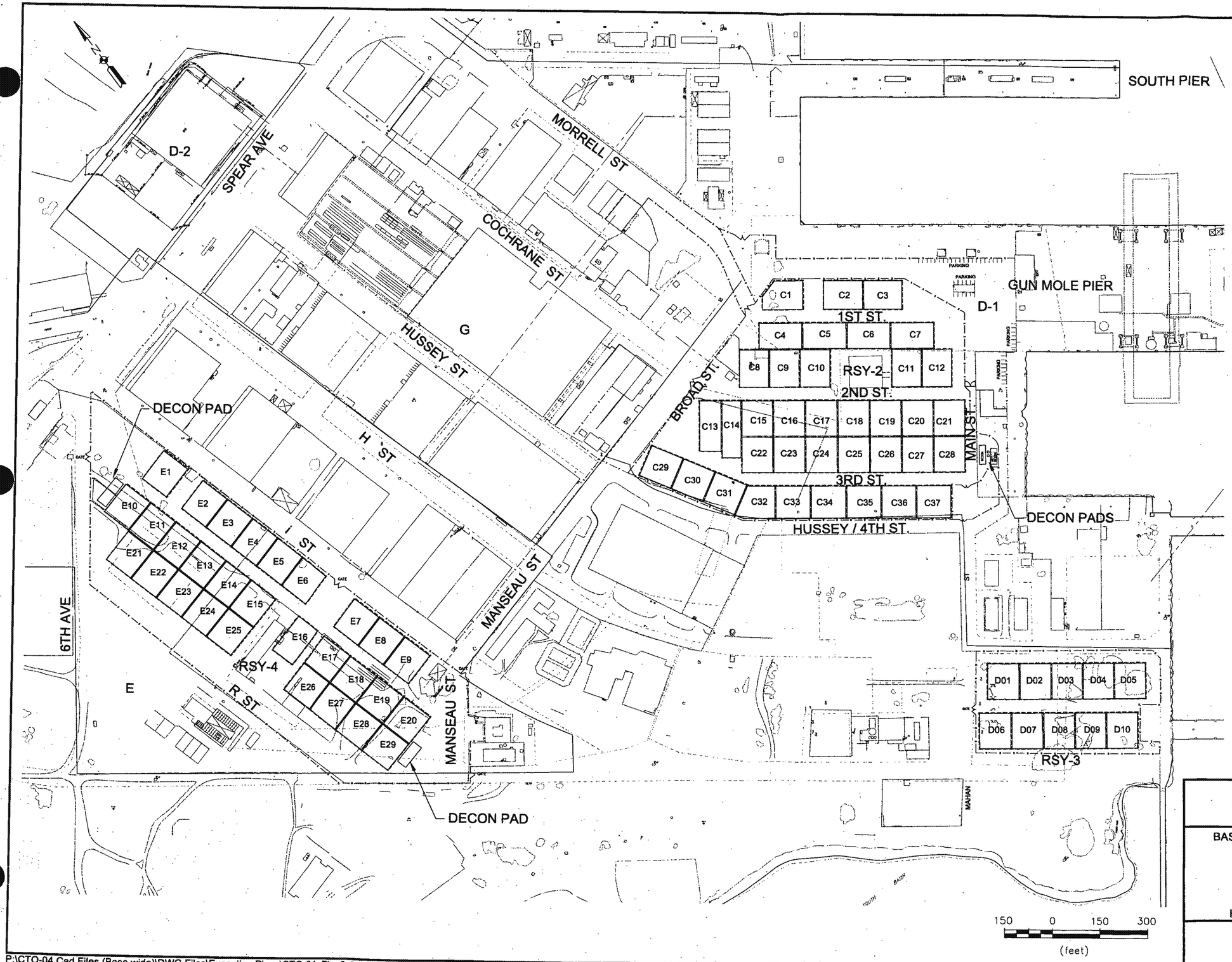
Primary lines of technical communication

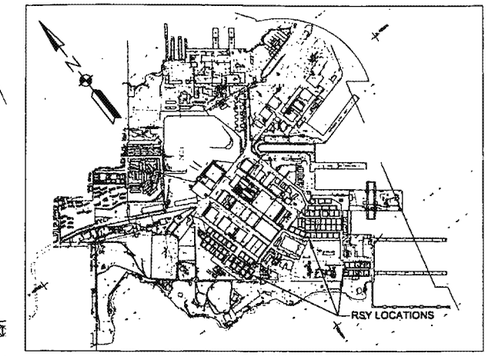
Line of technical direction (alternate where dashed)

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

The Construction Manager (Jeff Bray) has overall responsibility for coordinating the activities of on-site technical staff.

Final Execution Plan
Basewide Radiological Support
Hunters Point Shipyard, San Francisco, California
DCN: RMAC-0809-0004-0003
CTO No. 0004





SITE LOCATION MAP

LEGEND

PARCEL BOUNDARY

C01 RSY-2, -3, -4 SCREENING PADS

BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE RADIOLOGICAL SUPPORT EXECUTION PLAN

FIGURE 2-1

RADIOLOGICAL SCREENING YARD
LOCATION MAP

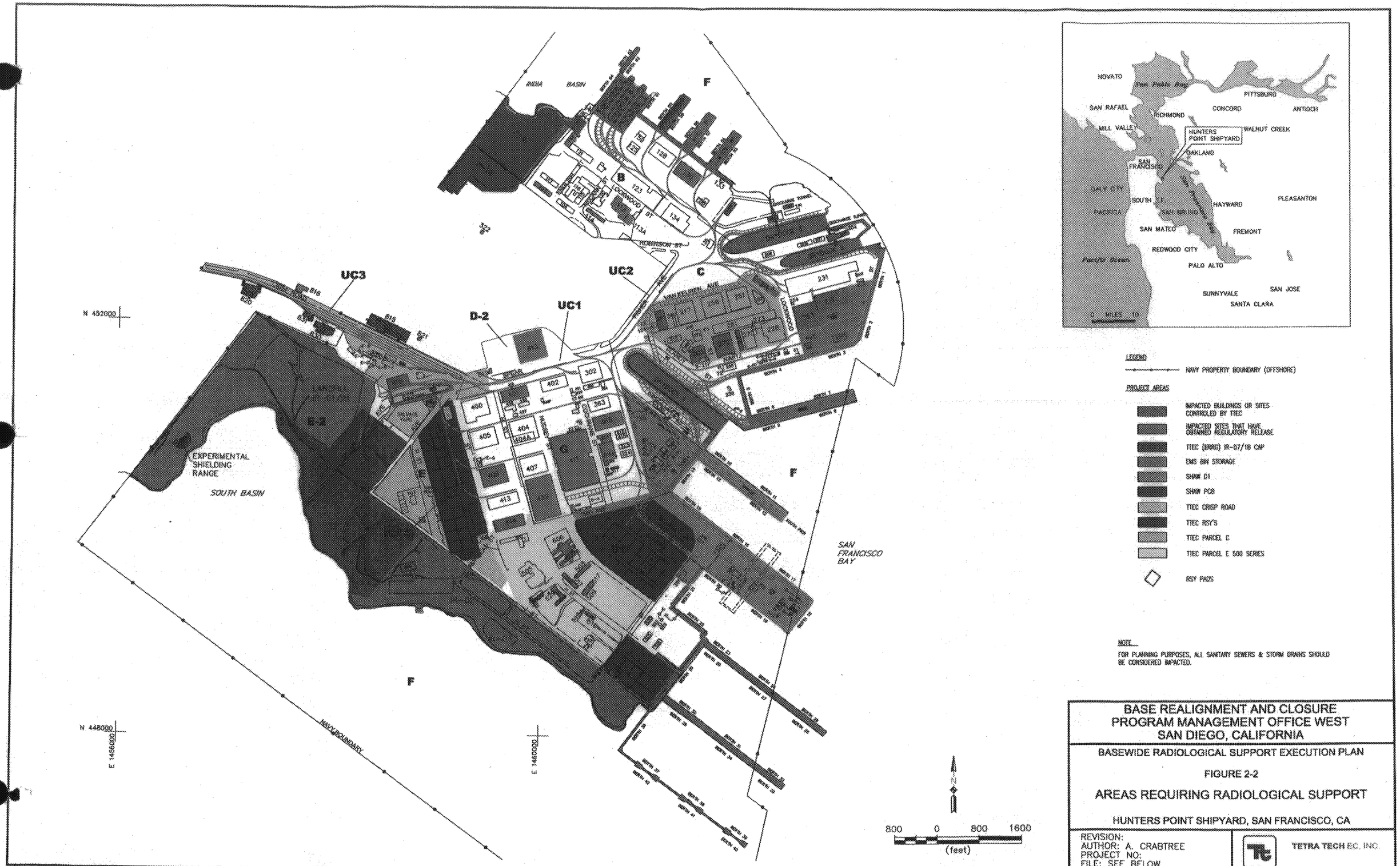
HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

REVISION: 0
AUTHOR: A. CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

P:\CTO-04 Cad Files (Base wide)\DWG Files\Execution Plans\CTO-04_Fig 2-1.dwg

11/29/10



BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE RADIOLOGICAL SUPPORT EXECUTION PLAN

FIGURE 2-2

AREAS REQUIRING RADIOLOGICAL SUPPORT

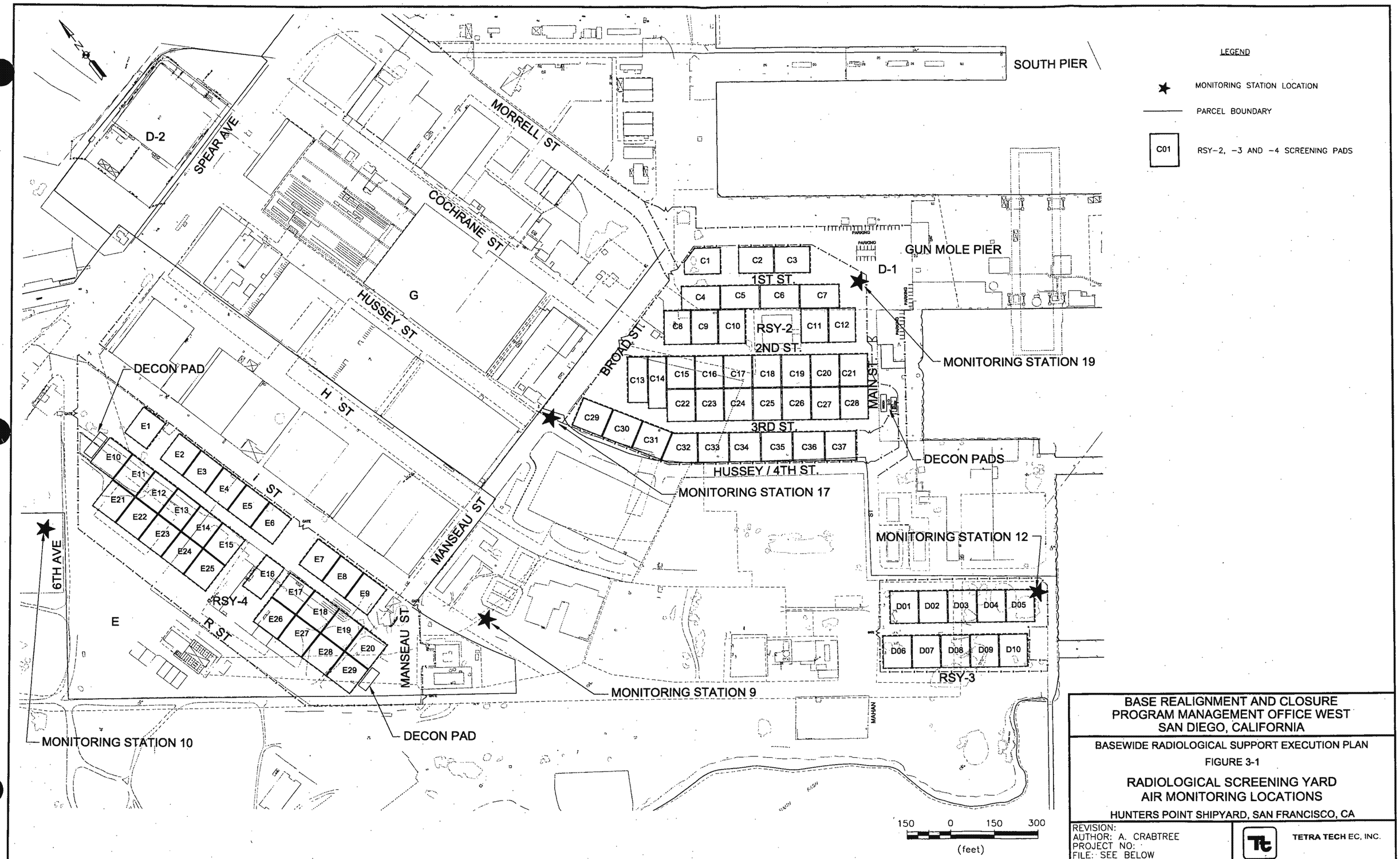
HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

REVISION:
AUTHOR: A. CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

P:\CTO-04 Cad Files (Base wide)\DWG Files\Execution Plans\CTO-04_Fig 2-2.dwg

11/29/10



BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE RADIOLOGICAL SUPPORT EXECUTION PLAN

FIGURE 3-1

RADIOLOGICAL SCREENING YARD
AIR MONITORING LOCATIONS

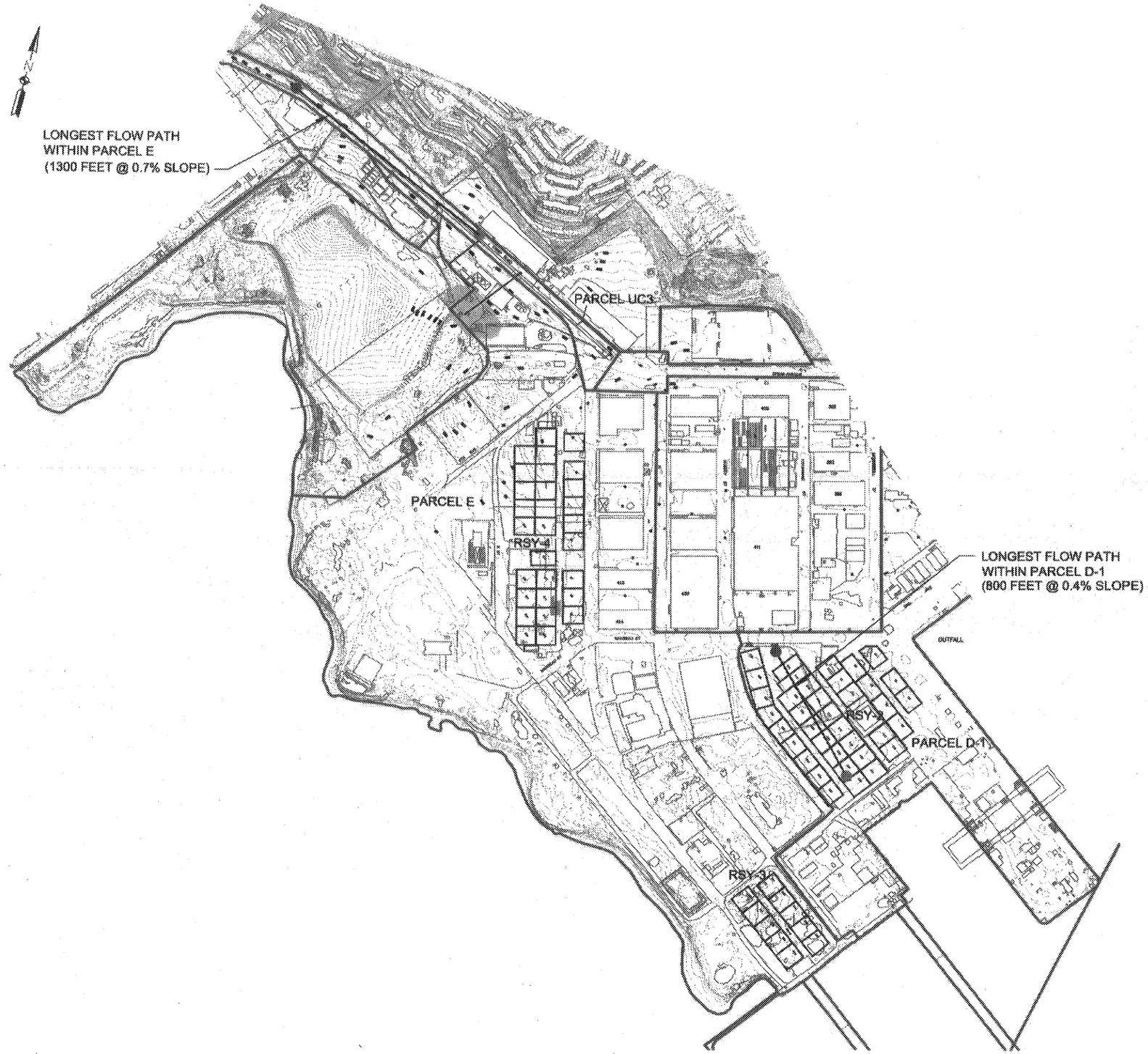
HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

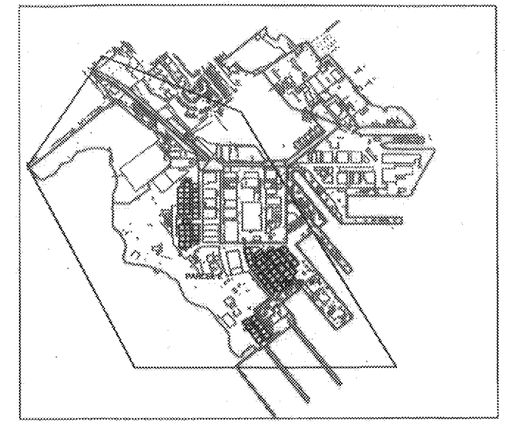
REVISION:
AUTHOR: A. CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

\\Ecisfofile1\projects\CTO-04 Cad Files (Base wide)\DWG Files\Execution Plans\CTO-04_Fig 3-1.dwg

11/29/10





KEY PLAN

LEGEND

PARCEL BOUNDARY
PROPOSED SWALES
CONTOUR LINES
SHEET FLOW LENGTH

ELEVATION:

HIGH POINT
LOW POINT

NATURAL LOW AREA TO BE USED FOR STORMWATER HOLDING AND INFILTRATION

300 0 300 600
(feet)

BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
SAN DIEGO, CALIFORNIA

BASEWIDE RADIOLOGICAL SUPPORT EXECUTION PLAN

FIGURE 3-2

LOCATION OF RSY OPERATIONS
WITHIN PARCELS D-1 AND E

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

REVISION:
AUTHOR: A. CRABTREE
PROJECT NO:
FILE: SEE BELOW

TETRA TECH EC, INC.

P:\CTO-04 Cad Files (Base wide)\DWG Files\Execution Plans\CTO-04_Fig 3-2.dwg

11/29/10

ATTACHMENT 1

BASEWIDE RADIOLOGICAL SUPPORT SAMPLING AND ANALYSIS PLAN

This page intentionally left blank.

SAP Worksheet #1 – Title and Approval Page

ATTACHMENT 1

FINAL

SAMPLING AND ANALYSIS PLAN

(Field Sampling Plan and Quality Assurance Project Plan)
January 2011

BASEWIDE RADIOLOGICAL SUPPORT
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

Prepared for:
Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

Prepared by:
Tetra Tech EC, Inc.
1230 Columbia Street, Suite 750
San Diego, California 92101
(619) 234-8696

Prepared under:
Contract No. N62473-10-D-0809
DCN: RMAC-0809-0004-0003
CTO No. 0004

Review Signature: [signature] for 01/05/11
Gregory Joyce — Date
TtEC Quality Control Program Manager

Approval Signature: [signature] 1/14/2011
Narciso A. Ancog — Date
NAVFAC SW Quality Assurance Officer

This page intentionally left blank.

EXECUTIVE SUMMARY

The Department of the Navy (DON) contracted with Tetra Tech EC, Inc. (TtEC) to provide basewide radiological support under TtEC's United States Nuclear Regulatory Commission Service Provider Radioactive Materials License. In support of the ongoing chemical and radiological remediation work at Hunters Point Shipyard (HPS), TtEC will operate three Radiological Screening Yards (RSYs), provide on-site and off-site radiological laboratory services, and provide radiological support to contractors performing work in radiologically impacted areas. This work will be conducted under Contract No. N62473-10-D-0809, Contract Task Order No. 0004. This Sampling and Analysis Plan (SAP) has been prepared by TtEC to provide guidance on sampling, analysis, and quality control (QC) in support of these activities at HPS.

BACKGROUND

HPS is located in the southeastern part of San Francisco on a long promontory that extends east into San Francisco Bay. Presently, HPS encompasses approximately 866 acres, including approximately 420 acres on land. 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 when the DON deactivated HPS. From 1976 to 1986, the DON leased HPS 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, HPS 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 HPS. Essentially, this may entail removal of buildings and structures, including subsurface systems, as well as removal of contaminated materials. HPS was divided into 11 parcels, A, B, C, D-1, D-2, E, E-2, F, G, UC1, and UC2. Parcel A, consisting of the most inland 75 acres, was transferred to the San Francisco Redevelopment Agency (SFRA) in 2004. The remainder of HPS will be conveyed to the SFRA once the environmental cleanup is complete.

This basewide radiological support SAP will be used as a reference document by all field and laboratory personnel engaged in sampling and analysis activities associated with radiological contamination and will be used by TtEC and as well as other contractors. Included in this SAP are data quality objectives, field sampling procedures, quality assurance (QA)/quality control (QC) requirements, and data gathering methods for radiological activities at HPS performed by TtEC or other contractors. The QA/QC elements of this SAP were prepared in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (EPA 2005) and U.S. Environmental Protection Agency (EPA) Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS (EPA 2006b) to ensure that all data collected are precise, accurate, representative, complete, and comparable to meet their intended use.

RADIOLOGICAL SCREENING YARD OPERATIONS

TtEC will operate three RSYs to conduct the scanning and surveying of excavated material generated by TtEC and other contractors. Excavated soil will be transported by the remediation contractor to an RSY to be scanned, surveyed, remediated, and radiologically cleared for either reuse or disposal. Sampling of the RSY material will include collection of Multi-Agency Radiation Survey and Site Investigation Manual Final Status Survey (FSS) soil samples based on sample spacing using Equation 4-2 from the Base-wide Radiological Work Plan, Revision 1 (TtEC 2007) and using the most current version of Visual Sample Plan. These samples will be screened at the TtEC on-site laboratory by gamma spectroscopy. Excavated soil determined to have residual radioactive contamination below the radiological remediation objectives (RROs) may be used as backfill, pending additional off-site radiological and chemical analysis and Radiological Affairs Support Office (RASO) concurrence as discussed below.

Excavated soil generated from an Installation Restoration (IR) site will also require chemical sampling. Material that does not exceed the IR site chemical cleanup goals and does not exceed the RROs may be used as backfill pending RASO concurrence. Analysis will be based on the chemicals of concern for each site as addressed in site-specific SAPs.

Material exceeding the RROs will be removed and placed in appropriate containers for subsequent transport and disposal under the direction of the DON low-level radioactive waste (LLRW) Disposal Program as directed by the RASO. Chemically and non-radiologically impacted material that does not meet the HPS Backfill Acceptance Criteria will be staged for pickup by the Navy's non-LLRW disposal contractor. The appropriate analytical data will accompany the transfer of both the LLRW and non-LLRW materials.

Radiological surveys of excavated soil in the RSYs are an iterative process that may involve soil characterization, remediation, and postremediation sampling, as appropriate, prior to the actual FSS activities. This iterative process will be considered complete only after the postremediation sample results indicate radioactivity is below the RROs. The FSS will be considered complete when the systematic "screening" samples submitted to the on-site laboratory are below RROs.

TtEC will submit the screening sample results to the RASO for concurrence to stage the soil in an area designated by the DON Caretaker Site Office pending receipt of additional off-site data.

Subsequently, TestAmerica-St. Louis (a Department of Defense [DoD] and California Department of Public Health [DPH]-accredited laboratory) will be used to perform gamma spectroscopy analysis to generate definitive sample results for FSS samples and provide data packages for submission to the regulatory agencies for review. TestAmerica-St. Louis will also be used to perform additional radiochemical analysis (such as strontium-90 and alpha spectroscopy) that the on-site laboratory does not perform.

Once the off-site data are received and TtEC has determined the soil meets the HPS Soil Acceptance Criteria, a second e-mail will be sent to the RASO for concurrence to use the soil as backfill material. A copy of RASO's concurrence and all the analytical data will be provided to the remediation contractor.

ON-SITE LABORATORY OPERATIONS

The on-site laboratory will be used solely as a screening laboratory for gamma spectroscopy analysis to provide expedient sample analysis turnaround times to guide site remediation, investigation, and characterization. Once the on-site laboratory identifies sample results that are considered to be the final confirmation sample results (i.e., no further remediation is necessary as all results are below RROs), then all of those samples will be sent to the off-site laboratory (TestAmerica-St. Louis) to produce the final definitive data that will be used to deem the area below RROs and/or requiring no further action.

On-site laboratory equipment will be used to analyze most radiological samples collected in the field. The following table lists the types of measurements and laboratory equipment to be used on-site to support the survey activities.

TABLE ES-1
ON-SITE LABORATORY INSTRUMENTATION

Measurement/ Technique	Type of Instrumentation*	Typical Background	Typical Efficiency (%)	Detection Sensitivity
Gamma spectroscopy	High-purity germanium detector	N/A	40 to 60	0.05 pCi/g (for ^{137}Cs) 0.5 pCi/g (for ^{226}Ra)
Gross alpha and beta/gamma on swipes	Protean IPC9025 low-background gas-flow proportional counter	1–5 cpm β 0–0.5 cpm α	~62 β ~27 α	4–10 dpm/100 cm^2 β 2–5 dpm/100 cm^2 α

Notes:
* or equivalent
Types of radiation: α – alpha, β – beta

Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys

Swipe samples will be processed using a Protean IPC 9025 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.

Gamma Spectroscopy

Gamma spectroscopy analysis is performed on soil samples using hardware features that include a high-purity germanium gamma photon detector supported by Ortec software. Instrument hardware is calibrated using a multi-energy National Institute of Standards and Technology-traceable source ranging from 10 kiloelectron volts to 2 megaelectron volts. Data results will undergo a QC review and be reported in units of picocuries per gram. 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 radionuclides of concern.

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 Laboratory Coordinator who will be responsible for ensuring that the laboratory results (both as ASCII and PDF files) are submitted electronically in a timely manner to the appropriate remediation contractor. If gamma results are below the established RROs, 100 percent of the FSS sample set will be sent off-site for definitive analysis to TestAmerica-St. Louis, a DoD and California DPH-accredited laboratory.

Additional Analyses

As required, additional radiological and chemical analyses will be performed by the off-site laboratory (TestAmerica-St. Louis) in accordance with the procedures described in this SAP. Off-site analytical results will be provided electronically to the appropriate remediation contractor as a PDF of an EPA Level III- or IV-equivalent data package along with an electronic data deliverable compatible file.

BASEWIDE RADIOLOGICAL SUPPORT

Under this contract, TtEC will provide radiological screening support to non-radiological remediation contractors performing work within areas defined in the Memorandum of Understanding (TtEC 2010b) for HPS. In support of the basewide radiological scope of work, TtEC will:

- Perform incoming and outgoing construction equipment surveys.
- Provide personnel dosimeters for staff and non-radiological remediation contractors performing work in radiologically impacted areas.
- Institute radiological controls and postings in impacted areas not covered by an on-site radiological remediation contractor.
- Conduct routine radiological surveys and perform on-site/off-site analysis as needed.
- Prepare and/or update HPS standard operating procedures and develop work instructions.
- Operate an on-site portal monitor for incoming and outgoing trucks.
- Conduct radiological awareness briefings for non-radiological remediation contractors executing work in radiologically impacted areas.

TtEC will also provide rapid response (within 1 business day from notification) to support the DON's need to quickly assess and address off-site remedial needs. This will include:

- Assessment of the situation and development of the remedial approach
- Expedited chemical/radiological characterization
- Performance of the remediation and management of the waste as directed by the DON

REMOVAL ACTION OBJECTIVES

Consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) requirements in Title 40 *Code of Federal Regulations*, Part 300.415(b)(2), the removal action objectives for radiological activities at HPS are to implement the Action Memorandum (DON 2006) and protect public health and welfare and the environment by physically removing and disposing of radioactive contamination that exceeds the RROs presented in Table 1 of the Action Memorandum (DON 2006). The following table summarizes the RROs:

TABLE ES-2
RADIOLOGICAL REMEDIAL OBJECTIVES

Radionuclide	Surfaces (dpm/100 cm^2)		Soil [a] (pCi/g)		Water [e] (pCi/L)
	Equipment Waste [b]	Structures [c]	Outdoor Worker [d]	Residential [d]	
Americium-241	100	100	5.67	1.36	15
Cesium-137	5,000	5,000	0.113	0.113	119
Cobalt-60	5,000	5,000	0.0602	0.0361	100
Europium-152	5,000	5,000	0.13[h]	0.13[h]	60
Europium-154	5,000	5,000	0.23[h]	0.23[h]	200
Plutonium-239	100	100	14.0	2.59	15
Radium-226	100	100	1.0 [f]	1.0 [f]	5.0 [g]
Strontium-90	1,000	1,000	10.8	0.331	8
Thorium-232	1,000	36.5	2.7	1.69	15
Tritium (^{3}H)	5,000	5,000	4.23	2.28	20,000
Uranium-235+D	5,000	488	0.398	0.195	30

Notes:

[a] EPA PRGs for two future-use scenarios.

[b] These limits are based on AEC Regulatory Guide 1.86 (AEC 1974). Limits for removable surface activity are 20 percent of these values.

[c] These limits are based on 25 millirems per year, using RESRAD-Build Version 3.3 or Regulatory Guide 1.86, whichever is lower.

[d] The on-site and off-site laboratory will ensure that the MDA meets the listed release criteria by increasing sample size or counting time as necessary. The MDA is defined as the lowest net response level, in counts, that can be seen with a fixed level of certainty, customarily 95 percent. The MDA is calculated per sample by considering background counts, amount of sample used, and counting time.

[e] Release criteria for water have been derived from Radionuclides Notice of Data Availability Technical Support Document, (EPA 2000) by comparing the limits from two criteria and using the most conservative limit.

[f] Limit is 1 pCi/g above background per agreement with EPA.

[g] Limit is for total radium concentration.

[h] Value is based on EPA-decay corrected PRGs for commercial reuse and a previous action memorandum (TtEMI 2000, 2001).

REGULATORY OVERSIGHT

Environmental investigation and remediation activities are being conducted at HPS under the DoD IR Program in accordance with Comprehensive Environmental Response, Compensation, and Liability Act and the NCP. Under Executive Order 12580, the DON is the lead agency responsible for implementation of the IR Program and any removal actions. The 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.

SAP Worksheets

Page

#1 – Title and Approval Page 1
#2 – SAP Identifying Information 17
#3 – Distribution List 21
#4 – Project Personnel Sign-Off Sheet 25
#5 – Project Organizational Chart 27
#6 – Communication Pathways 29
#7 – Personnel Responsibilities and Qualifications Table 33
#8 – Special Personnel Training Requirements Table 41
#9 – Project Scoping Session Participants Sheet 43
#10 – Problem Definition 45
#11 – Project Quality Objectives/Systematic Planning Process Statements 63
#12 – Measurement Performance Criteria Table for Soil Samples 67
#13 – Secondary Data Criteria and Limitations Table 69
#14 – Summary of Project Tasks 71
#15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples 83
#15.2 – Reference Limits and Evaluation Table for Water Samples 101
#16 – Project Schedule / Timeline Table 123
#17 – Sampling Design and Rationale 125
#18 – Sampling Locations and Methods/SOP Requirements Table 133
#19 – Analytical SOP Requirements Table 135
#20 – Field Quality Control Sample Summary Table 139
#21 – Project Sampling SOP References Table 143
#22 – Field Equipment Calibration, Maintenance, Testing, and Inspection Table 145
#23 – Analytical SOP References Table 147
#24 – Analytical Instrument Calibration Table 151
#25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 161
#26 – Sample Handling System 167
#27 – Sample Custody Requirements Table 169
#28.1 – Laboratory QC Samples Table – Soil 175
#28.2 – Laboratory QC Samples Table – Water 193
#29 – Project Documents and Records Table 219
#30 – Analytical Services Table 227
#31 – Planned Project Assessments Table 241
#32 – Assessment Findings and Corrective Action Responses 243
#33 – QA Management Reports Table 245
#34 – Verification (Step I) Process Table 247
#35 – Validation (Steps IIa and IIb) Process Table 249
#36 – Analytical Data Validation (Steps IIa and IIb) Summary Table 251
#37 – Usability Assessment 253
References 257

Page

TABLES

Table ES-1 On-site Laboratory Instrumentation 5
Table ES-2 Radiological Remedial Objectives 7
Table 1 Building/Area Assessment and Classification and Associated Isotopes of Concern 47
Table 2 HPS IRP Site Chemicals of Concern 57
Table 3 On-site Laboratory Instrumentation 73

APPENDICES

Appendix A Standard Operating Procedures (on CD only)
Appendix B Example of Chain-of-Custody, Sample Label, and Custody Seal

Abbreviations and Acronyms

°C	degrees Celsius
%D	percent difference
%R	percent recovery
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AA	atomic absorption
AEC	Atomic Energy Commission
AES	atomic emission spectrometer
AM	Action Memorandum
^{241}Am	americium-241
ASCII	American Standard Code for Information Interchange
BHC	benzene hexachloride
BRAC	Base Realignment and Closure
CA	corrective action
Cal/EPA	California Environmental Protection Agency
CAS	Chemical Abstracts Service
CCB	continuing calibration blank
CCV	continuing calibration verification
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm^2	square centimeter
CN	cyanide
^{60}Co	cobalt-60
COC	chain of custody
COD	chemical oxygen demand
CPM	counts per minute
^{137}Cs	cesium-137
CSO	Caretaker Site Office
CTO	Contract Task Order
CV	calibration verification
CVAA	cold vapor atomic absorption
DCC	daily calibration check

Abbreviations and Acronyms
(Continued)

DCN	Document Control Number
DHS	(California) Department of Health Services
DoD	Department of Defense
DOE	Department of Energy
DON	Department of the Navy
DPH	Department of Public Health
dpm	disintegrations per minute
DQA	data quality assessment
DQO	Data Quality Objective
DTSC	Department of Toxic Substances Control
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
EPA	U.S. Environmental Protection Agency
ES	excavated soil
EWI	Environmental Work Instruction
FCR	Field Change Request
FID	flame ionization detector
FSS	Final Status Survey
FUDS	formerly used defense site
FWHM	full width at half maximum
g	gram
GC	gas chromatograph
GC/MS	gas chromatograph/mass spectrometer
^{3}H	tritium
HCl	hydrochloric acid
HNO_3	nitric acid
HPGe	high-purity germanium
HPS	Hunters Point Shipyard
HRA	Historical Radiological Assessment
ICAL	initial calibration
ICB	initial calibration blank

Abbreviations and Acronyms
(Continued)

ICP	inductively coupled plasma
ICS	interference check sample
ICV	initial calibration verification
IR	Installation Restoration (Program)
IRCDQM	Installation Restoration Chemical Data Quality Manual
IRP	Installation Restoration Program
KeV	kiloelectron volt
L	liter
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LDC	Laboratory Data Consultants
LLRW	low-level radioactive waste
m^2	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MCPA	2-methyl-4-chlorophenoxyacetic acid
MCPP	2-(2-methyl-4-chlorophenoxy)-propionic acid
MDA	minimum detectable activity
MDL	method detection limit
MeV	megaelecton volt
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mL	milliliter
MS	matrix spike
MSA	Method of Standard Addition
MSD	matrix spike duplicate
N/A	not applicable
NaI	sodium iodide
NaOH	sodium hydroxide
NAVFAC SW	Naval Facilities Engineering Command Southwest
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NEDD	Navy Electronic Data Deliverable
NIST	National Institute of Standards and Technology

Abbreviations and Acronyms
(Continued)

NORM	naturally occurring radioactive material
NRDL	Naval Radiological Defense Laboratory
OOS	out of service
OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PDF	portable document format
PID	photoionization detector
PjM	Project Manager
PQCM	Project Quality Control Manager
PRG	preliminary remediation goal
^{239}Pu	plutonium-239
^{240}Pu	plutonium-240
^{242}Pu	plutonium-242
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	quality control
QCPM	Quality Control Program Manager
QL	quantitation limit
QSM	Quality Systems Manual
^{226}Ra	radium-226
RASO	Radiological Affairs Support Office
RER	relative error ratio
RL	reporting limit
ROICC	Resident Officer in Charge of Construction
RPD	relative percent difference
RPM	Remedial Project Manager
RRO	radiological remedial objective

Abbreviations and Acronyms
(Continued)

RSD	relative standard deviation
RSL	Regional Screening Level
RSO	Radiation Safety Officer
RSY	Radiological Screening Yard
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SIM	selective ion monitoring
SOP	Standard Operating Procedure
^{90}Sr	strontium-90
SVOC	semivolatile organic compound
TBD	to be determined
^{229}Th	thorium-229
^{230}Th	thorium-230
^{232}Th	thorium-232
TO	Task Order
TOG	total oil and grease
TPH	total petroleum hydrocarbons
TPH-d	total petroleum hydrocarbons quantified as diesel
TPH-extractable	total extractable petroleum hydrocarbons
TPH-g	total petroleum hydrocarbons quantified as gasoline
TPH-mo	total petroleum hydrocarbons quantified as motor oil
TPH-p	TPH purgeable
TPH-purgeable	total purgeable petroleum hydrocarbons
TRPH	total recoverable petroleum hydrocarbons
TSP	Task-specific Plan
TSS	total suspended solids
TtEC	Tetra Tech EC, Inc.
TU	Trench Unit
^{232}U	uranium-232
^{235}U	uranium-235
^{238}U	uranium-238
UFP	Uniform Federal Policy

Abbreviations and Acronyms
(Continued)

USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOA	volatile organic analysis
VOC	volatile organic compound
VSP	Visual Sample Plan
Water Board	Regional Water Quality Control Board
WO	waste oil
Yt	yttrium
ZnAC	zinc acetate

SAP Worksheet #2 – SAP Identifying Information

Site Name/Number:	**Basewide Radiological Support Hunters Point Shipyard (HPS)**
Contractor Name:	**Tetra Tech EC, Inc. (TtEC)**
Contract Number:	**N62473-10-D-0809**
Contract Title:	**Radiological Environmental Multiple Award Contract**

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

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

3. This SAP is a basewide SAP.

4. List dates of scoping sessions that were held.

Scoping Session	Date
Not applicable	

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

Title	Date
Final Base-Wide Storm Drain and Sanitary Sewer Removal, Hunters Point Shipyard, San Francisco, CA, Revision 4	July 2010

6. List organizational partners (stakeholders) and connection with lead organization: The EPA, California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC), Regional Water Quality Control Board (Water Board), Radiological Affairs Support Office (RASO), and United States Fish and Wildlife Service (USFWS) (for sensitive species) will provide regulatory oversight and guidance.

7. Lead organization: The Department of the Navy (DON), with state regulatory oversight, is the lead agency.

8. If any required SAP elements or required information is not applicable to the project or is provided elsewhere, then note the omitted SAP elements and provide an explanation for its exclusion below:

   - Worksheet #9 (Project Scoping Session Participants Sheet) is not applicable since this SAP represents basewide radiological support that TtEC has performed under previous contracts.

SAP Worksheet #2 – SAP Identifying Information (Continued)

- Worksheet #13 (Secondary Data Sources) is not applicable for this project as secondary data evaluation is not required.
- Worksheet #16 (Project Schedule/Timeline Table) is applicable since this SAP is intended for basewide radiological support and schedules are based on contractor's timelines for their project.
- Worksheet #21 (Project Sampling SOPs Reference Table) is not included in this SAP since the sampling procedures are described in detail in Worksheet #14.

SAP elements and required information that are not applicable to the project are noted below. An explanation is provided above and in the appropriate SAP worksheet(s), as necessary.

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	Not applicable
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	Not applicable
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Table	
16	Project Schedule/Timeline Table	Not applicable
B. Measurement Data Acquisition		
Sampling Tasks		

SAP Worksheet #2 – SAP Identifying Information (Continued)

UFP-QAPP Worksheet #	Required Information	Crosswalk to Related Information
17	Sampling Design and Rationale	
18	Sampling Locations and Methods/ SOP Requirements Table Sampling Location Map(s)	
19	Analytical Methods/SOP Requirements Table	
20	Field Quality Control Sample Summary Table	
21	Project Sampling SOP References Table	Not applicable
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	
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	

This page intentionally left blank.

SAP Worksheet #3 – Distribution List

The following distribution list represents the recipients of the final version of this SAP.

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing and E-mail Address
Mr. Jim Whitcomb	Remedial Project Manager	NAVFAC SW	(619) 532-0936	1455 Frazee Road, Suite 900 San Diego, CA 92108-4310 james.h.whitcomb@navy.mil
Ms. Laurie Lowman	Radiological Environmental Protection Manager	RASO	(757) 887-4692	Building 1971 NWS P.O. Drawer 260 Yorktown, VA 23691-0260 laurie.lowman@navy.mil
Mr. Narciso Ancog	Quality Assurance Officer	NAVFAC SW	(619) 532-3046	1220 Pacific Coast Highway San Diego, CA 92132 narciso.ancog@navy.mil
Ms. Diane Silva	Administrative Record Manager	NAVFAC SW	(619) 532-3676	937 N. Harbor Drive Building 1, 3rd Floor San Diego, CA 92132 diane.silva@navy.mil
Mr. Mike Mentink	Caretakers Site Office	BRAC CSO HPS	(415) 743-4729	1 Avenue of the Palms, Suite 161 San Francisco, CA 94130 mike.mentink@navy.mil
Mr. Ryan Miya	Lead Remedial Project Manager	Cal/EPA DTSC	(510) 540-3775	700 Heinz Ave., Bldg. F, Suite 200 Berkeley, CA 94710-2721 rmiya@dtsc.ca.gov
Mr. Ross Steenson	Remedial Project Manager	California Water Board, San Francisco Bay Region	(510) 622-2445	1515 Clay Street, Suite 1400 Oakland, California 94612 rsteenson@waterboards.ca.gov
Mr. Mark Ripperda	Remedial Project Manager	EPA	(415) 972-3028	75 Hawthorne Street San Francisco, CA 94105 ripperda.mark@epa.gov

SAP Worksheet #3 – Distribution List (Continued)

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing and E-mail Address
Ms. Shirley Ng	ROICC	NAVFAC SW	(510) 749-5939	2450 Saratoga Street, Suite 200 Alameda, CA 94501-7545 shirley.ng@navy.mil
Mr. Bill Dougherty	Project Manager	TtEC	(415) 216-2731	200 Fisher Avenue San Francisco, CA 94124 bill.dougherty@tetratech.com
Mr. Erik Abkemeier	Radiation Safety Officer	TtEC	(757) 466-4906	Twin Oaks, Suite 309 5700 Lake Wright Drive Norfolk, VA 23502 erik.abkemeier@tetratech.com
Mr. Rick Weingarz	On-site Laboratory Coordinator	TtEC	(415) 216-2733	200 Fisher Avenue San Francisco, CA 94124 richard.weingarz@tetratech.com
Ms. Shanti Montgomery	RSY Manager	TtEC	(415) 216-2772	200 Fisher Avenue San Francisco, CA 94124 shanti.montgomery@tetratech.com
Mr. Gregory Joyce	QC Program Manager	TtEC	(360) 598-8117	1230 Columbia St., Suite 750 San Diego, CA 92101 greg.joyce@tetratech.com
Ms. Lisa Bienkowski	Program Chemist	TtEC	(949) 809-5028	17885 Von Karman Ave., Suite 500 Irvine, CA 92614 lisa.bienkowski@tetratech.com
Mr. Paul Wall	On-site Laboratory Manager	RSRS	(415) 216-2739	200 Fisher Avenue San Francisco, CA 94124 paul.wall@tetratech.com

SAP Worksheet #3 – Distribution List (Continued)

Name of SAP Recipients	Title/Role	Organization	Telephone Number	Mailing and E-mail Address
Ms. Erika Starman	Off-site Laboratory Project Manager	TestAmerica-St. Louis	(314) 298-8566	13715 Rider Trail North Earth City, MO 63045 erika.starman@testamericainc.com
Ms. Linda Rauto	Data Validator Project Manager	LDC	(760) 634-0437	7750 EL Camino Real, Suite 2L Carlsbad, CA 92009 lrauto@lab-data.com

This page intentionally left blank.

SAP Worksheet #4 – Project Personnel Sign-Off Sheet

The key personnel listed below will read the final version of this SAP. Their signature and date will be filled in below and included in the project file.

Name	Organization/Title/Role	Signature/Email Receipt	SAP Section Reviewed	Date SAP Read
Mr. Bill Dougherty	TtEC/Project Manager		Entire document	
Ms. Sabina Sudoko	TtEC/Project Chemist		Entire document	
Mr. Greg Joyce	TtEC/Quality Control Program Manager		Entire document	
Mr. Richard Kanaya	TtEC/Project Quality Control Manager		Entire document	
Mr. Rick Weingarz	TtEC/On-site Laboratory Coordinator		Entire document	
Mr. Paul Wall	RSRS/On-site Laboratory Manager		Entire document	
Ms. Erika Starman	TestAmerica-St. Louis /Off-site Laboratory Project Manager		Entire document	
Ms. Linda Rauto	LDC /Data Validator Project Manager		Entire document	
TBD [a]	TtEC/Field Crews		Entire Document	

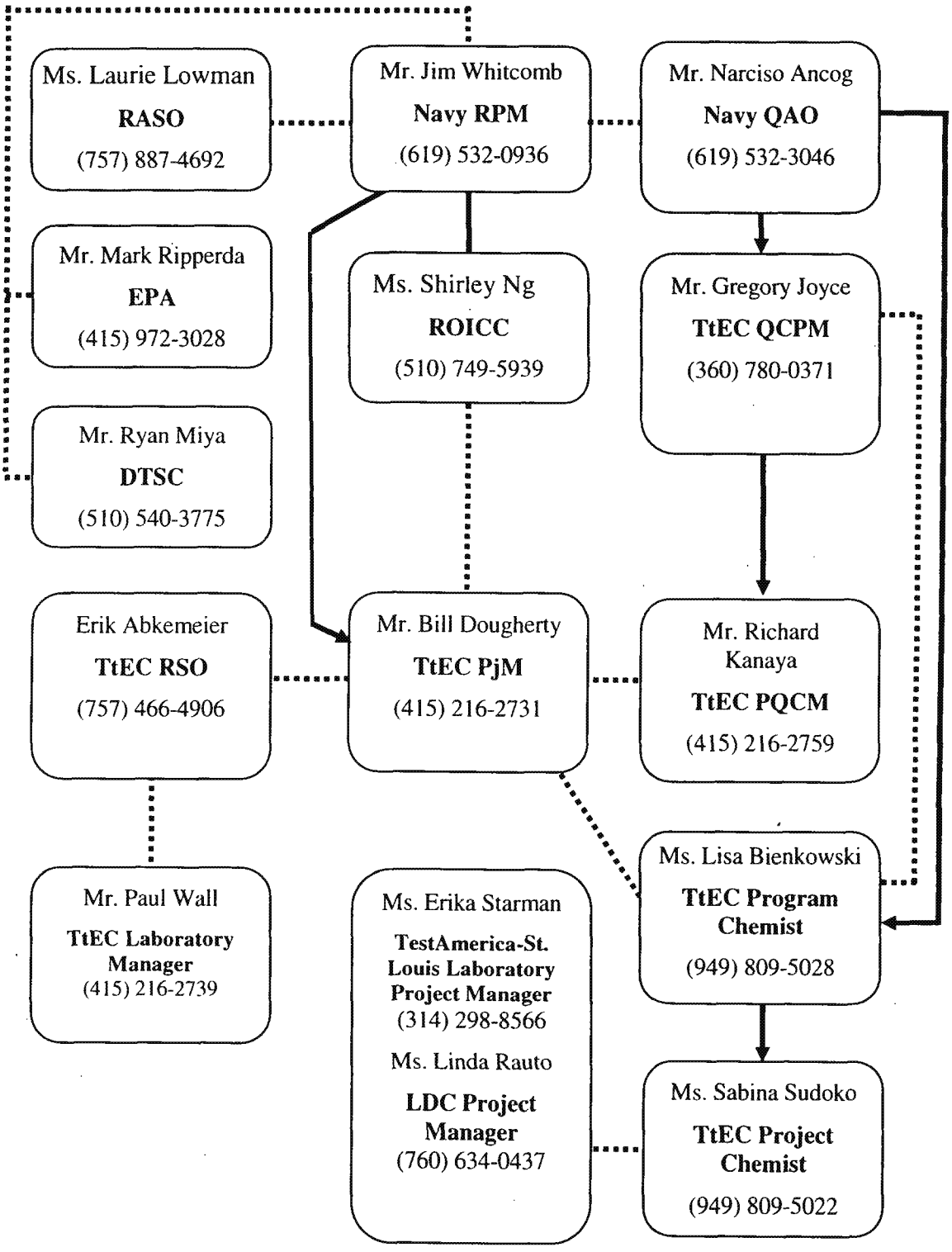
Notes:

[a] Field crews include multiple persons and vary from project to project. Therefore, persons identified by the on-site Project Quality Control Manager will read the SAP and sign this worksheet as required.

This page intentionally left blank.

SAP Worksheet #5 – Project Organizational Chart

Lines of Authority ——— ····· Lines of Communication



This page intentionally left blank.

SAP Worksheet #6 – Communication Pathways

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
Point of contact for Navy quality issues	NAVFAC SW QAO	Mr. Narciso Ancog	(619) 532-3046	SAP and its addendum (if applicable) will be approved by the QAO prior to start of sampling. If during sampling, a change in sampling procedures or strategy is required, QAO will be notified via email and give concurrence to issue a field change request. In addition, the QAO has the authority to suspend project execution if quality assurance requirements are not adequately followed.
Point of contact for contractor quality issues	TtEC Quality Control Program Manager	Mr. Greg Joyce	(360) 780-0371	The TtEC Quality Control Program Manager is responsible for overseeing program QC, including construction and chemical data acquisition. The Quality Control Program Manager has the authority to suspend project activities if quality standards are not maintained.
Project management	Project Manager	Mr. Bill Dougherty	(415) 216-2731	If changes are necessary, the PjM is responsible for communicating the changes via phone and/or e-mail to the project staffs and is authorized to stop work if necessary.
SAP review and radiological concurrence	RASO	Ms. Laurie Lowman	(757) 887-4692	The RASO will review and concur on the SAP as related to the radiological aspects of the site.
SAP review	Program Chemist or QCPM	Ms. Lisa Bienkowski or Mr. Gregory Joyce	(949) 809-5028 (360) 598-8117	SAP will be reviewed by the Program Chemist (or QCPM) prior to submittal to the NAVFAC SW QAO.
Notification of non-usable analytical data	TtEC Program Chemist	Ms. Lisa Bienkowski	(949) 809-5028	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 data quality objectives are not met), the TtEC Program Chemist will notify the NAVFAC SW RPM and QAO within 24 hours.

SAP Worksheet #6 – Communication Pathways (Continued)

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
Coordination of off-site laboratory supplies for field activities	Project Chemist	Ms. Sabina Sudoko	(949) 809-5022	The Project Chemist or designee will contact the off-site laboratory to provide all 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.
Submittal of samples to the on-site laboratory	Sampling Personnel	TtEC	(415) 216-2739	Sampler will transfer samples to the on-site laboratory at the end of each day.
Reporting laboratory data quality issues	Laboratory Manager (on-site laboratory) Laboratory Project Manager (off-site laboratory)	Mr. Paul Wall Ms. Erika Starman	(415) 216-2739 (314) 298-8566	All QA/QC issues will be reported by the Laboratory Project Manager to the Project Chemist or Radiological Technical Manager in writing within 2 business days.
Field and analytical corrective actions	Project Chemist (off-site laboratory)	Ms. Sabina Sudoko	(949) 809-5022	The Project Chemist or Radiological Technical Manager will immediately notify the PQCM, QCPM, Program Chemist, RASO, and RSO in writing of any field or analytical procedures not performed in accordance with this SAP. The Project Chemist or Radiological Technical Manager in coordination with the PQCM will complete documentation of the nonconformance and corrective actions to be taken. The Project Chemist or Radiological Technical Manager will verify that the corrective actions have been implemented.
Release of analytical data	Project Chemist (off-site laboratory)	Ms. Sabina Sudoko	(949) 809-5022	The Project Chemist or Radiological Technical Manager will review data to verify that data quality objectives are met as described in this SAP prior to releasing the data. Analytical data will be released to the Project Manager (or their designee) after the

SAP Worksheet #6 – Communication Pathways (Continued)

Communication Drivers	Responsible Affiliation	Name	Phone Number	Procedure
				Project Chemist or Radiological Technical Manager has verified that the data are in accordance the SAP requirements.
Review of radiological data and concurrence on radiological actions	RASO	Ms. Laurie Lowman	(757) 887-4692	The RASO will review all appropriate radiological data provided by the Radiological Technical Manager or designee and will concur on actions proposed by the Radiological Technical Manager.
SAP procedure revision during field activities	Program Chemist	Ms. Lisa Bienkowski	(949) 809-5028	The Program Chemist or designee will prepare an FCR for any changes in sampling procedures that occur due to conditions in the field.
SAP amendments	Program Chemist	Ms. Lisa Bienkowski	(949) 809-5028	Any changes to the SAP will require that the Program Chemist or designee prepare an addendum, which will be approved by NAVFAC SW QAO prior to any field activities.

This page intentionally left blank.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

Name	Title/Role	Organizational Affiliation	Responsibilities
Mr. Narciso Ancog	QAO	NAVFAC SW	Reviewing and approving this SAP Providing Navy oversight of TtEC's Quality Assurance Program Providing technical and administrative oversight of TtEC's surveillance audit activities Acting as point of contact for matters concerning quality assurance and the Navy's Laboratory Quality Assurance Program Coordinating training on matters pertaining to generation and maintenance of quality of data Authorizing the suspension of project execution if quality assurance requirements are not adequately followed
Mr. Jim Whitcomb	RPM	NAVFAC SW	Performing project management for the DON Ensuring that the project scope of work requirements are fulfilled Overseeing the project cost and schedule Providing formal technical direction to the TtEC project team, as needed Acting as lead interface with agencies
Mr. Bill Dougherty	PjM	TtEC	Coordinating work activities of subcontractors and TtEC personnel, and ensuring that all personnel adhere to the administrative and technical requirements of the project Monitoring and reporting the progress of work, and ensuring that the project deliverables are completed on time and within project budget Monitoring the budget and schedule, and notifying the client and the RPM of any changes that may require administrative actions Ensuring adherence to the quality requirements of the contract, project scope of work, and the QC Plans Ensuring that all work meets the requirements of the technical specifications and complies with applicable codes and regulations

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Mr. Bill Dougherty (Continued)	PjM	TtEC	Ensuring that all work activities are conducted in a safe manner in accordance with the Site-Specific Health and Safety Plan, United States Army Corps of Engineers' Safety and Health Requirements (EM-385-1-1), and all applicable OSHA regulations Serving as the primary contact between the DON and TtEC for actions and information related to the work and including appropriate TtEC technical personnel in the decision-making Coordinating satisfactory resolution and completion of evaluation and acceptance report for nonconformance reports Suspending project activities if standards are not maintained
Ms. Laurie Lowman	Radiological Site Manager	RASO	Reviewing radiological laboratory data on a routine basis Reviewing and approving on-site laboratory SOPs for each type of analysis performed Performing on-site reviews of all radiological site operations including the on-site laboratory Reviewing and approving all radiological work plans and final reports Performing quality reviews on COCs to ensure samples are handled in accordance with the Work Plan and SAP Providing review and concurrence on data for proposed radiological actions Ensuring that all necessary sample results are provided and are consistent with proposed radiological actions Comparing radiological data with the requirements of the Work Plan, Design Plans, Task-specific Plans, and SAP to ensure that all proper conditions have been met to implement the action requested Ensuring that the radiological data reported are consistent with the intent for which the data were provided

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Ms. Laurie Lowman (Continued)	Radiological Site Manager	RASO	Comparing the sample number matrix with the intent of the data package to ensure that the sample number is consistent with the intent of the data package Reviewing sample acquisition information to ensure that the duration the sample was analyzed for meets the minimum required time necessary to meet the MDA Comparing each of the radionuclide's specific activity with the release criteria to ensure that the decision made is consistent with the specific activity reported Comparing the MDA with the release criteria to ensure that it is sufficiently below the release levels Evaluating the qualifiers provided in the sample results to ensure that the information provided is consistent with the results provided Reviewing uncertainty counting and the 2 sigma total uncertainty data along with the laboratory qualifiers to determine if the data are of sufficient quality
Mr. Erik Abkemeier	Radiation Safety Officer	TtEC	Overseeing overall radiological operations and documentation for the project Supporting projects as the technical lead for radiological data collection and analysis Ensuring that Radiation Safety Officer Representative and on-site laboratory manager have adequate training in sample collection and analytical methods Monitoring performance of on-site radiological contractors Monitoring performance of on-site laboratory Receiving and reviewing the QA sample data from the off-site laboratory to ensure the data quality objectives have been met
Mr. Daryl DeLong	Radiological Technical Manager	RSRS	Providing overall day-to-day, on-site radiological operations and document-preparation activities Reviewing on-site laboratory data against requirements in this SAP prior to use Assessing on-site data to ensure that the quality of the data meets the intended use of the data

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Mr. Daryl DeLong (Continued)	Radiological Technical Manager	RSRS	Reviewing and evaluating scan survey data and requiring additional scan data, as necessary Overseeing performance of radiological static surveys Identifying and assessing radiological contamination Concurring on the identification of elevated areas for collection of biased samples and the locations of systematic samples Overseeing the preparation of a remediation plan and the performance of remedial activities when sampling activities indicate the presence of radioactive materials at levels above the release criteria Directing any additional biased sampling activities to ensure the isolation and removal of radioactive material Reviewing and evaluating biased sampling data and identifying any additional radiological activities Recommending radiological activities to the RASO for concurrence including additional sampling, backfilling of trenches, identification of material that can be used as backfill, etc. Overseeing the plotting of systematic sample locations and collection of the appropriate number of samples Reviewing and evaluating static survey readings used to verify scan surveys or to get a reading of a sampling point Performing periodic on-site review of laboratory operations Reviewing sample data to ensure the appropriate information is included in the gamma spectroscopy reports Consulting with the on-site Laboratory Manager regarding his assessment of the spectrum provided with the analyses and other issues

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Mr. Daryl DeLong (Continued)	Radiological Technical Manager	RSRS	Directing the on-site laboratory to analyze samples for longer periods to ensure the sample data results are correct, the MDA is below the release criteria, and/or the uncertainty is within tolerance, as appropriate Directing the on-site laboratory to perform additional types of analyses (i.e., ^{90}Sr or alpha spectroscopy) Comparing the laboratory results to the appropriate release criteria for the site Identifying samples to be forwarded to the off-site laboratory for QA purposes Reviewing the QA sample data from the off-site laboratory to ensure the data quality objectives have been met and requesting additional information, as necessary
Mr. Paul Wall	On-site Laboratory Manager	RSRS	Providing day-to-day technical and administrative oversight of the on-site radiological laboratory Reviewing on-site laboratory sample results Developing and implementing on-site laboratory SOPs Reviewing sample counting results prior to sending the samples off-site Overseeing performance of gamma spectroscopy analyses for the on-site laboratory Ensuring that samples are properly prepared for the appropriate analysis in the on-site laboratory Ensuring that all detectors and equipment are properly maintained and calibrated, as necessary Overseeing the MDA calibration geometry, system and source-induced backgrounds, and detector resolution and ensuring that they are appropriate for each radionuclide Reviewing gamma spectroscopy analytical result reports to ensure that the MDAs are below the release criteria, that the counting uncertainties are within tolerance of the reported activity, and that the flags associated with each report represent a clear understanding of the associated reported activity for the isotope in question Verifying each analytical result by reviewing the spectrum file associated with each report

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Mr. Paul Wall (Continued)	On-site Laboratory Manager	TtEC	Ensuring that the electronic and hard copies of the analytical summary reports are delivered to the appropriate contractor for review Reviewing the QA sample data from the off-site laboratory to ensure that the data quality objectives have been met
Mr. Gregory Joyce	QCPM	TtEC	Establishing and maintaining the Quality Program Overseeing program QC, including construction and chemical data acquisition Working directly with the PjM and the DON to ensure implementation of the Program QC Plans Acting as a focal point for coordination for quality matters across all projects and resolving quality issues Suspending project activities if quality standards are not maintained Interfacing with the DON, including NAVFAC SW QAO, on quality-related items Conducting field QC audits to ensure project plans are being followed Performing reviews of audit and surveillance reports conducted by others Implementing the DON technical direction letters related to quality topics Approving any Field Change Requests or Addendums to the SAP
Ms. Lisa Bienkowski	Program Chemist	TtEC	Developing the SAP and any amendments to the SAP Implementing contract requirements for chemical data collection Supporting projects as the technical lead for chemical data collection and analysis Ensuring the Project Chemist has adequate training in analytical methodology Ensuring that sampling personnel have documented training on sampling procedures for specific project requirements Monitoring performance of subcontract laboratory and data validator

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table (Continued)

Name	Title/Role	Organizational Affiliation	Responsibilities
Ms. Sabina Suduko	Project Chemist	TtEC	Evaluating and selecting a qualified subcontract laboratory Reviewing laboratory data prior to use against requirements in this SAP Evaluating and selecting a qualified data validation subcontractor Reviewing data validation reports Preparing data quality assessment report to ensure the quality of the data meets the intended use of the data
Mr. Jon Karnath	Data Manager	TtEC	Uploading field information and laboratory data into the database Checking all data for completeness such that all required fields are entered and providing output to the project team in the format requested Submitting NEDD-formatted data to the DON in accordance with the requirements set forth in Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards (NAVFAC SW 2005)

This page intentionally left blank.

SAP Worksheet #8 – Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel / Groups Receiving Training	Personnel Titles / Organizational Affiliation	Location of Training Records / Certificates
Soil/sediment sampling	General employee radiological training	RSO or designee	Prior to field work	Sampling personnel	Sampler/TtEC	TtEC project file
Swipe sampling	On-site demonstration	RSO or designee	Prior to sampling activities	Sampling personnel	Sampler/TtEC	TtEC Project file
VOC sampling (En Core and vials)	On-site demonstration	RSO or designee	Prior to sampling activities	Sampling personnel	Sampler/TtEC	TtEC Project file
Sampling handling, documentation, and packaging procedures	On-site demonstration	RSO or designee	Prior to sampling activities	Sampling personnel	Sampler/TtEC	TtEC Project file

This page intentionally left blank.

SAP Worksheet #9 – Project Scoping Session Participants Sheet

Worksheet #9 (Project Scoping Session Participants Sheet) is not applicable since this SAP represents basewide radiological support that TtEC has performed under previous contracts.

This page intentionally left blank.

SAP Worksheet #10 – Problem Definition

The main problem defined for this project is as follows: The DON has determined (based on the site-specific investigative data) that radioactive contamination in soils requires a response action; therefore, the DON has initiated removal actions for the extraction of radiologically impacted material. These removal actions will serve to substantially eliminate the potential threat posed by future migration and/or off-site release of radioactive material present at HPS into the surrounding environment.

Prior radiological investigations have confirmed the presence of radium-226 (^{226}Ra) and cesium-137 (^{137}Cs) at HPS. The presence of other radionuclides, such as strontium-90 (^{90}Sr), will be assessed during the screening-process activities. Table ES-2 provides the radiological remedial objectives (RROs) for these and other radionuclides of concern at HPS that have been established by the DON in consonance with the EPA, Region IX. Table 1 identifies sites and their associated isotopes of concern.

Chemical contamination at HPS will be addressed through the Installation Restoration Program (IRP) process, consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Table 2 identifies the IRP sites located at HPS and their associated chemicals of concern.

Since this SAP is intended for a basewide operation and not for a specific site, a conceptual site model has not been included.

BACKGROUND

HPS is located on a long promontory in the southeastern part of the City of San Francisco that extends east into San Francisco Bay. Presently, HPS encompasses approximately 866 acres, including approximately 420 acres on land. The land portion of HPS was purchased by the DON in 1939 and leased to Bethlehem Steel Corporation. At the start of World Was II in 1941, the DON took possession of the property and operated it as a shipbuilding, repair, and maintenance facility until 1974. 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 that ceased operations in 1986. The DON resumed occupancy in 1989. In 1991, HPS was placed on the DON's Base Realignment and Closure list, and its mission as a DON shipyard ended in April 1994.

HPS was divided into six parcels, Parcels A through F. In November 2004, Parcel A was transferred to the City and County of San Francisco and, in that same year, the DON subdivided Parcel E, creating Parcel E-2. For over 20 years, the DON has leased many HPS buildings to private tenants and DON-related entities for industrial and artistic uses, including storage space, art studios, machine workshops, woodworking shops, automobile restoration garages, recreational vehicle parking, and the filming of movies. Most of these tenants are no longer leasing facilities at HPS.

SAP Worksheet #10 – Problem Definition (Continued)

SYSTEM DESCRIPTION

The present-day configuration of the sanitary and stormwater sewer system is the result of an evolutionary process. This system was originally designed and built in the 1940s as a combined system, using the same conveyance piping and 40 separate discharge outfalls into the bay. This combined system grew in sections from the 1940s to its maximum size in 1958, when it underwent the first in a series of separation projects. The Building 819 pump station was constructed for conveyance of much of the sanitary sewage from HPS to the City of San Francisco treatment works, and separation of the systems took place in the industrial areas and the southwest area of HPS.

Separation of the systems involved installation of dedicated sanitary sewer collection piping or diversion structures within the combined system. Twenty-eight bay outfalls were converted for exclusive use for stormwater outlets, while 12 continued to serve as combined sanitary and stormwater sewer outlets. In 1973, the second segregation project was undertaken. This project removed some of the stormwater outfalls from the South Basin Area, just offshore from the Parcel E shoreline. The last of the separation projects performed in 1976 involved the installation of additional dedicated sanitary sewer piping. Complete separation of the combined systems was never achieved. All components of the storm and sanitary sewer systems in Parcels B, C, D, E, and E-2 are considered impacted as documented in the final Historical Radiological Assessment (HRA) (NAVSEA 2004).

SCOPE

DON has contracted with TtEC to provide basewide radiological support under TtEC's United States Nuclear Regulatory Commission Service Provider Radioactive Materials License. In support of the ongoing chemical and radiological remediation work at HPS, TtEC will operate three radiological screening yards (RSYs), provide on-site and off-site radiological laboratory services, and provide radiological support to contractors performing work in radiologically impacted areas.

SAP Worksheet #10 – Problem Definition (Continued)

TABLE 1
BUILDING/AREA ASSESSMENT AND CLASSIFICATION AND ASSOCIATED ISOTOPES OF CONCERN

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known-Restricted Access	Known-Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
PARCEL B																					
103				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, and ^{90}Sr
113				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, and ^{90}Sr
113A				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs and ^{226}Ra
114				✓		L	N	N	N	N	N	N	L	N	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
130				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs and ^{226}Ra
140 and Discharge Channel				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
142				✓		L	N	N	N	N	L	N	L	N	N	N	N	L	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
146			✓			N	N	N	N	N	L	N	N	N	N	N	N	L	N	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

Building No. or Area	Contamination Potential					Contaminated Media							Potential Migration Pathways							Recommended Actions	Isotopes of Concern
	Known Restricted Access	Known Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System		
157				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Scoping Survey	^{60}Co, ^{137}Cs, and ^{226}Ra
IR-07				✓		L	L	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
IR-18				✓		L	L	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
Drydock 5				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
Drydock 6				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
Drydock 7				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
PARCEL C																					
203				✓		L	N	N	N	N	L	N	L	N	N	N	N	L	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
205 and Discharge Channel				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
211		✓				N	N	N	N	N	M	L	N	N	N	N	N	L	L	Remediation and Final Status Survey	^{137}Cs, ^{226}Ra, and ^{232}Th
214				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

Building No. or Area	Contamination Potential					Contaminated Media							Potential Migration Pathways							Recommended Actions	Isotopes of Concern
	Known Restricted Access	Known Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System		
224			✓			N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, and ^{90}Sr
241				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	NORM
253		✓				N	N	N	N	N	H	H	N	N	N	N	N	M	M	Remediation and Final Status Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{232}Th
271				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{226}Ra
272				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{60}Co, ^{137}Cs, and ^{226}Ra
Drydock 2			✓			N	N	N	N	N	M	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
Drydock 3			✓			N	N	N	N	N	M	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
Drydock 4			✓			N	N	N	N	N	M	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known Restricted Access	Known Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
PARCEL D																					
274				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs, ^{226}Ra, and ^{90}Sr
313 Site			✓			L	L	N	N	N	N	N	L	L	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{232}Th
313A Site			✓			M	L	N	N	N	N	M	L	L	N	N	N	N	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{232}Th
317 Site			✓			L	L	N	N	N	N	N	L	L	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs, ^{226}Ra, and ^{90}Sr
322 Site			✓			L	N	N	N	N	N	N	L	N	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{232}Th
351			✓			N	N	N	N	N	M	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{226}Ra, ^{90}Sr, and ^{232}Th
351A		✓				M	N	N	N	N	M	M	M	N	N	N	N	L	L	Characterization Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{232}Th
364		✓				H	M	N	N	N	H	H	M	L	N	N	N	M	M	Remediation and Final Status Survey	^{60}Co, ^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{235}U

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known-Restricted Access	Known-Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
365				✓		N	N	N	N	N	L	L	N	N	N	N	N	L	L	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{235}U
366/351B		✓				N	N	N	N	N	M	M	N	N	N	N	N	L	L	Remediation and Final Status Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
383				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{3}H, ^{226}Ra, and ^{90}Sr
408			✓			N	N	N	N	N	M	N	N	N	N	N	N	L	N	Scoping Survey	^{226}Ra
411				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{60}Co, ^{137}Cs, and ^{226}Ra
Gun Mole (Regunning) Pier			✓			L	L	N	N	N	L	N	L	L	N	N	N	L	N	Review Characterization Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
500				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Scoping Survey	^{137}Cs and ^{226}Ra
503 Site			✓			N	L	N	N	N	N	L	N	L	N	N	N	N	L	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Mahan Street-NRDL			✓			M	M	N	N	N	N	N	L	L	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
813				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Scoping Survey	^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

Building No. or Area	Contamination Potential					Contaminated Media							Potential Migration Pathways							Recommended Actions	Isotopes of Concern
	Known Restricted Access	Known Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System		
819			✓			N	N	N	N	N	L	M	N	N	N	N	N	L	M	Scoping Survey	^{137}Cs and ^{226}Ra
PARCEL E																					
406			✓			N	N	N	N	N	M	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{137}Cs and ^{226}Ra
414				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Review Final Status Survey Report	^{226}Ra
500 Building Series			✓			M	H	N	N	N	N	H	L	M	N	N	N	N	H	Scoping Survey	^{241}Am, ^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
506 Site			✓			M	M	N	N	N	N	M	L	L	N	N	N	N	M	Scoping Survey	^{241}Am, ^{137}Cs, ^{3}H, ^{239}Pu, ^{226}Ra, and ^{90}Sr
507 Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Characterization Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
508 Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
509 Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Characterization Survey	^{137}Cs and ^{90}Sr
510 Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Characterization Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
510A Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Scoping Survey	^{137}Cs and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known-Restricted Access	Known-Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
517 Site			✓			L	L	N	N	N	N	M	L	L	N	N	N	N	L	Characterization Survey	^{60}Co, ^{137}Cs, and ^{90}Sr
520 Site		✓				M	M	N	N	N	N	M	M	M	N	N	N	N	L	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
521				✓		L	N	N	N	N	L	N	N	N	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
529 Site		✓				M	M	N	N	N	M	H	L	L	N	N	N	L	M	Scoping Survey	^{137}Cs, ^{3}H, ^{226}Ra, and ^{90}Sr
701 Site				✓		L	N	N	N	N	N	N	L	N	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
704 Area			✓			L	L	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
704/Pens				✓		L	L	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
707/Kennels		✓				L	L	N	N	N	L	M	L	L	N	N	N	L	M	Characterization Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
707 B Site				✓		L	L	N	N	N	N	N	N	L	N	N	N	N	L	Characterization Survey (as part of 707 Triangle Area Survey)	^{137}Cs, ^{226}Ra, and ^{90}Sr
707 C Site				✓		L	L	N	N	N	N	N	L	L	N	N	N	N	N	Characterization Survey as (part of 707 Triangle Area Survey)	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known Restricted Access	Known Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
707 Triangle Area		✓				L	H	N	N	N	N	H	L	M	N	N	N	N	M	Characterization Survey	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{235}U
708				✓		L	N	N	N	N	L	N	L	N	N	N	N	N	N	Review Final Status Survey Report	^{137}Cs and ^{90}Sr
719 Site				✓		L	L	N	N	N	N	N	L	N	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
807 Site				✓		L	L	N	N	N	N	N	L	L	N	N	N	L	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
810		✓				M	N	N	N	N	M	N	L	N	N	N	N	L	N	Remediation and Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Shack 79 Site			✓			M	L	N	N	N	N	N	L	L	N	N	N	N	N	Final Status Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Shack 80 Site		✓				H	M	N	N	N	N	N	M	L	N	N	N	N	N	Remediation and Final Status Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Experimental Shielding Range			✓			M	L	N	N	N	N	N	L	L	N	N	N	N	N	Review Final Status Survey Report	^{60}Co, ^{137}Cs, and ^{226}Ra
IR-01/21, Industrial Landfill		✓				H	H	N	N	N	N	N	M	M	N	N	N	N	N	Review Characterization Survey Report, Remediation, and Final Status Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
IR-02, Bay Fill		✓				H	H	N	L	N	N	N	M	M	N	L	N	N	N	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known-Restricted Access	Known-Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
IR-03			✓			M	M	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
IR-04		✓				H	M	N	N	N	N	N	M	L	N	N	N	N	N	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Former Salvage Yard			✓			M	M	N	N	N	N	N	L	L	N	N	N	N	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
Shoreline		✓				H	M	L	N	N	N	N	M	M	L	N	N	N	N	Characterization Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr
BASEWIDE																					
Storm Drain lines		✓				N	L	N	N	N	L	H	N	L	N	N	N	L	M	Scoping/Characterization Surveys of systems associated with NRDL sites or sites associated with radium use	^{137}Cs, ^{226}Ra, and ^{90}Sr
Sanitary Sewers		✓				N	L	N	N	N	L	H	N	L	N	N	N	L	M	Scoping/Characterization Survey of systems associated with NRDL sites or sites associated with radium use	^{137}Cs, ^{226}Ra, and ^{90}Sr
Septic Systems			✓			N	M	N	N	N	N	H	N	L	N	N	N	N	M	Scoping/Characterization Surveys of systems associated with NRDL buildings	^{137}Cs, ^{226}Ra, and ^{90}Sr

SAP Worksheet #10 – Problem Definition (Continued)

	Contamination Potential					Contaminated Media							Potential Migration Pathways								
Building No. or Area	Known-Restricted Access	Known-Continued Access	Likely	Unlikely	Unknown	Surface Soil	Subsurface Soils	Surface Water	Groundwater	Air	Structures	Drainage System	Surface Soil	Subsurface Soil	Surface Water	Groundwater	Air	Structures	Drainage System	Recommended Actions	Isotopes of Concern
PARCEL F																					
Underwater Areas			✓			N	L	N	N	N	N	N	L	N	N	N	N	N	N	Scoping Surveys in areas of Operation CROSSROADS decontamination activities and site outfall discharge	^{137}Cs, ^{239}Pu, ^{226}Ra, ^{90}Sr, and ^{235}U
All Ships' Berths				✓		L	L	N	N	N	L	N	N	L	N	N	N	L	N	Review Final Status Survey Report for completed berths; Scoping Survey on remainder	^{137}Cs, ^{239}Pu, ^{226}Ra, and ^{90}Sr
OFF-SITE FACILITY																					
ICW 418				✓		N	N	N	N	N	L	N	N	N	N	N	N	L	N	Scoping Survey	^{137}Cs, ^{226}Ra, and ^{90}Sr

Notes:

H High = Evidence of contamination in the media or migration pathway has been identified.

L Low = The potential for contamination in the type of media or migration pathway is remote.

M Moderate = The potential for contamination in the media or migration pathway exists, although the extent has not been fully assessed.

N None = Evidence of contamination in the specific media or migration pathway has not been found, or known contamination has been removed, and surveys indicate that the media or migration pathway meets today's release criteria.

SAP Worksheet #10 – Problem Definition (Continued)

TABLE 2
HPS IRP SITE CHEMICALS OF CONCERN

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
	PARCEL B																
IR-07	Sub-Base Area				S		S		S								S/GW
IR-10	Battery & Electroplating Shop	S	S/GW	S	S/GW	S	S/GW		S/GW	S					S		S/GW
IR-18	Waste Oil Disposal Area	S/GW	S	S	GW	S	S/GW		S	S							S/GW
IR-20	Building 156	S/GW	S		GW	S/GW	S		S	S							S/GW
IR-23	Bldgs. 145, 146, 161, 162, UST	S	S/GW	S	S	S		GW	S		S		S	S			S
IR-24	Bldgs. 124, 125, 128, 130	S/GW	S		GW	S	S/GW		S/GW	S	S/GW	S/GW					S/GW
IR-26	Bldg. 157, area north of Dry Dock 3	S			S	S	S			S	S	S					S/GW
SI-31	Building 114				S												S
IR-42	Bldgs. 109, 113, 113A			S	S	S	S				S		S				S
IR-60	Drydocks 5, 6, 7	S	S					S									S/GW
IR-61	Substation V/ Building 122		S/GW			S/GW		S/GW									
IR-62	Bldgs. 115 and 116, UST		S/GW			S/GW		S/GW									
	PARCEL C																
IR-06	Tank Farm	S/GW	S/GW		S	S	S		S/GW	S							S/GW
IR-25	Building 134	S/GW	GW	GW	S	S	S	GW	S		S	S	S				S/GW
IR-27	Bldg. 205, USTs		S				S		S	S							S

SAP Worksheet #10 – Problem Definition (Continued)

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
IR-28	Bldgs. 211/253, 219, 229, 230, 231, 258, 270, 271, 273, 281, USTs	S/GW	S/GW	S/GW	S/GW	S	S/GW		S/GW	S/GW		S/GW	S				S/GW
IR-29	Bldgs. 203, 217, 275, 279, 280, 282, USTs	S/GW	S/GW	S/GW	S	S	S	GW	S		S	S					S/GW
IR-30	Building 241	S/GW	S/GW	S/GW	S/GW	GW	S/GW	GW	S/GW		S/GW	S				S/GW	S/GW
IR-57	Drydock 4 Area	S	S			S	S		S					S			S
IR-58	Scrap Yard north of Bldg. 258	S/GW	S/GW	S	S	S	S	GW	S		S	S					S/GW
IR-63	Former Building 278		S			S		S									S
IR-64	Building 206	S/GW	S					S/GW									S/GW
	PARCEL D																
IR-08	PCB Spill Area (Bldg. 503)	S/GW	S/GW	S	S/GW	S/GW	S		S								S/GW
IR-09	Pickling and Plate Yard	S/GW	GW	S	S/GW				S								S/GW
IR-16	Container Storage Area					GW		GW									S/GW
IR-17	Drum Storage and Disposal Area	S/GW			S		S/GW										S
IR-22	Buildings 368, 369, UST	S/GW	S	S	S/GW	S	S/GW		S		S						S/GW
SI-32	Building 383, Regunning Pier	GW	S		S		S		S							S	S/GW

SAP Worksheet #10 – Problem Definition (Continued)

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
IR-33	Bldgs. 302, 302A, 304, 364, 365, 411, 417, 418, 424, UST	S	S	S	S	S	S	GW	S	S	S		S			S	S/GW
IR-34	Bldgs. 351, 366	S/GW	S	S	S	S	S	GW	S				S				S/GW
IR-35	Bldgs. 274, 306, 313, 313A, 322, 372, area bounded by Manseau, Morell, and E Streets	S/GW		S	S	S	S	GW			S	S	S				S/GW
IR-37	Bldgs. 401, 423, 435, 436, 437, UST		S/GW					GW									S/GW
SI-38	Building 500, UST		S				S	GW	S	S							S/GW
IR-39	Building 505	S/GW	S		S	S	S	GW	S	S	S						S/GW
IR-44	Area near Bldgs. 408, 409, 410, 438	S/GW	S/GW					S/GW									S/GW
IR-53	Bldgs. 525, 530	S/GW	S/GW	S	S	S/GW	S	GW	S	S	S						S/GW
IR-55	Building 307 and surrounding area	S	S	S	S	S	S	S/GW	S		S	S					S/GW
IR-65	Building 324					S/GW											
IR-66	Building 407		S/GW					S/GW									S/GW
IR-67	Building 439	S	S					S/GW									S
IR-68	Building 378					GW		S/GW									
IR-69	Building 523, metal shed near Building 523					S		S									S/GW

SAP Worksheet #10 – Problem Definition (Continued)

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
IR-70	Area northeast of S-308	S/GW	S/GW					S/GW									S/GW
IR-71	Crane Area							S/GW									
	PARCEL E																
IR-1/21	Industrial Landfill	S/GW	S/GW			S/GW			S/GW	S/GW							S/GW
IR-02	Bay Fill	S/GW	S/GW	S		S/GW	S		S/GW	S/GW					S/GW		S/GW
IR-03	Oil Reclamation Ponds	S/GW	S/GW	GW	S	S/GW	S		S/GW		S				S		S/GW
IR-04	Scrap Yard	S/GW	S		S	S	S/GW		S/GW	S/GW							S/GW
IR-05	Old Transformer Storage Yard	S/GW	S	S	S/GW	S/GW	S		S/GW	S		GW					S/GW
IR-11	Building 521, Power Plant Area	S/GW	S	S		S	S		S/GW	S							S
IR-12	Disposal Trench Area	S/GW	S/GW	S	S	S/GW	S/GW		S/GW	S/GW	S		S			S	S/GW
IR-13	Old Commissary Area	S	S/GW			S	S/GW		S	S	GW						S
IR-14	Oily Liquid Waste Disposal Area	S	S	S			S/GW		S/GW	S/GW					S		S/GW
IR-15	Oily Waste Ponds and Incineration Tank	S/GW	S/GW	S	GW	GW	S/GW		S/GW	S/GW							S/GW

SAP Worksheet #10 – Problem Definition (Continued)

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
IR-36	Bldgs. 371, 400, 404A, 405, 406, 413, 414, 704, 710, parts of Area IV, UST	S/GW	S/GW	S/GW	S	S	S/GW		S/GW	S/GW		S	S/GW				S/GW
SI-38	Bldgs. 506, 507, 509, 510, UST	S					S		S	S							S/GW
IR-39	Building 707						S		S							GW	S/GW
IR-40	Building 527, Pier 2	S	S			S	S		S	S							S
IR-52	Railroad Right-of-Way	S		S		S	S		S	S							S
SI-54	Building 511A			S	S	S	S		S	S					S		S
IR-56	Railroad Tracks and yard south of Crisp Ave.	S/GW	S		S		S	GW									S/GW
IR-72	Building 810 Area, UST	S/GW	S/GW					S/GW									S
IR-73	Asphalt Batch Plant	S/GW	S/GW					S/GW									
IR-74	Building 815 (FUDS)		S					S									
IR-75	Building 820 (FUDS)	GW						S/GW									S/GW
IR-76	Area surrounding Bldgs. 830 and 831	GW	S/GW	S/GW		S		S/GW									S/GW

SAP Worksheet #10 – Problem Definition (Continued)

Site	Area	VOCs	SVOCs	Pesticides	PAHs	PCBs	TOG	TPH	TPH-d	TPH-g	TPH-E	TPH-P	TPH-MO	WO	TRPH	CN	Metals
PARCEL F																	
IR-78	Subtidal Area				S	S		S									S
UTILITY SITES**																	
IR-45	Steam Lines	S	S	S	S	S	S		S	S							S
IR-46	Fuel Distribution Lines (Tank Farm)	S	S	S	S	S	S		S/GW		S	S			S		S
IR-47	Fuel Distribution Lines (Tank S-505)	S		S		S	S		GW		S	S					S
IR-48	Suspected Steam Lines (Building 503) No Found																
IR-49	Fuel Distribution Lines (Bldgs. 203, 205)	S	S	S	S	S	S		GW		S	S			S		S
IR-50	Storm Drains and Sanitary Sewers	S/GW	S		S/GW	S			S	S/GW	S				S	S	S/GW
IR-51	Former Transformer Locations					S											

Notes:
** Facility-wide sites (Parcels A through E only)
GW Groundwater
S Soil

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

The data quality objectives (DQOs) specify the project objectives, the data collection boundaries and limitations, the most appropriate type of data to collect, and the level of acceptable decision error. The quality and quantity of data required to implement an environmental remedial action are also defined.

The project-specific DQOs, as defined through the seven-step process (EPA 2006a), are as follows:

1. State the problem

The main problem defined for this project is as follows: The DON has determined (based on the site-specific investigative data) that sites containing radioactive contamination require a response action; therefore, the DON has initiated removal actions for the extraction of radiologically impacted material. These removal actions will serve to substantially eliminate the potential threat posed by future migration and/or off-site release of radioactive material present at the site into the surrounding environment. (Any chemical analysis discussed in this SAP is for the purposes of waste characterization only.)

2. Identify the goal of the study

a. Is radioactivity detected above background plus 3 sigma in the soil during gamma scans?
b. Is ^{226}Ra detected at 1.0 picocurie per gram (pCi/g) above background in postexcavation samples?
c. Is ^{137}Cs detected at or above 0.113 pCi/g in postexcavation samples?
d. Is strontium-90 (^{90}Sr) detected at or above 0.331 pCi/g in postexcavation samples?
e. Are any other radioisotopes detected above the RROs established in the Action Memorandum (AM)?
f. Does the import material meet screening levels listed in Worksheet #15?

3. Identify information inputs

The background concentration of ^{226}Ra, ^{137}Cs, and ^{90}Sr will be determined during this project or will be based on historical background concentrations. A geophysical survey or historical drawings may be used to locate pipelines as required.

Radiological surveys required to support the unrestricted release of trenches and excavated soil are to include 1) 100 percent gamma scan surveys, 2) systematic and biased soil sampling of the Class 1 survey units, and 3) laboratory data review and statistical analysis of collected data.

As applicable, postexcavation samples will be collected at systematic soil sampling locations throughout the trench and from each excavated soil screening pad in the RSY. As applicable, at least one sediment sample will be collected from piping that contains a sufficient quantity of

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

material, and swipe samples will be collected from piping. Postexcavation samples will be analyzed by gamma spectroscopy, and swipes will be analyzed for gross alpha/beta.

The review and acceptance of backfill material will be performed in accordance with SOP HPO-Tt-0270 (as provided in Appendix A of this SAP). Import material samples will be collected from each source and analyzed prior to use for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), total purgeable petroleum hydrocarbons (TPH-purgeable), total extractable petroleum hydrocarbons (TPH-extractable), metals, and gamma-emitting isotopes.

4. Define the boundaries of the study

The 866-acre site includes about 420 acres on land that contains the majority of the suspect radiologically contaminated storm and sanitary sewer system pipelines, land, and structures at HPS, which was divided into six parcels, Parcels A through F. In 2004, Parcel E was subdivided, creating Parcel E-2. Parcel A was transferred in December 2004.

The spatial boundaries for the Final Status Survey (FSS) effort are confined to the radiologically impacted sanitary sewer and storm drain systems. The release limits for this survey are listed in Table ES-2.

Readings greater than background plus 3 sigma (or an otherwise RASO approved investigation level) or sample results that exceed the release limits will be further investigated to identify the extent of the contamination.

This is an ongoing project expected to extend over many years with multiple contracting vehicles.

5. Develop the analytic approach

The on-site laboratory will solely be used as a screening laboratory for gamma spectroscopy analysis to provide expedient sample analysis turnaround times to guide site remediation, investigation, and characterization. Once the on-site laboratory identifies sample results that are considered to be the final confirmation sample results (i.e., no further remediation is necessary as all results are below RROs), then all of those samples will be sent to the off-site laboratory (TestAmerica-St. Louis) to produce the final definitive data that will be used to deem the area below RROs and/or requiring no further action.

a. If activity of radiation is reported at background plus 3 sigma (or an otherwise RASO approved investigation level) for soil during gamma scans, then additional surveys and sampling will continue as necessary to support the removal action goals until otherwise directed by the DON and RASO. Otherwise, no further action will be required.

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

b. If ^{226}Ra is reported 1.0 pCi/g above the background concentration for postexcavation samples, then excavation of the area and additional surveys and sampling will continue as necessary to support the removal action goals until otherwise directed by the DON and RASO. Otherwise, no further action will be required.

c. If ^{137}Cs is reported at 0.113 pCi/g or above for postexcavation samples, then excavation of the area and additional surveys and sampling will continue as necessary to support the removal action goals until otherwise directed by the DON and RASO. Otherwise, no further action will be required.

d. If ^{90}Sr is reported at 0.331 pCi/g or above for postexcavation samples, then excavation of the area and additional surveys and sampling will be conducted as necessary to support the removal action goals until otherwise directed by the DON and RASO. Otherwise, no further action will be required.

e. If any other radioisotope is detected above the RROs stated in the AM, then the Radiological Technical Manager will notify the RASO and additional surveys and sampling will continue as necessary to support the removal action goals until otherwise directed by the DON and RASO.

f. If the results of the import material are above the screening criteria listed in the AM, then the material will not be used on-site. Another import fill source will be identified, and Standard Operating Procedure (SOP) HPO-Tt-0270 (as provided in Appendix A of this SAP) will be followed. Otherwise, the import material will be used as backfill on-site.

6. Specify performance or acceptance criteria

Actions to minimize decision errors will be instituted during the data collection phase of the radiological survey. Qualified radiation survey personnel will perform the surveys and record the data. Automated recording of survey data will be used where possible to minimize errors. Data transcribing is the second phase where errors may arise. To avoid data errors for manual surveys, experienced personnel will record and transcribe data.

The ongoing on-site analyses and evaluation of survey results provide a final check for errors which, if detected, can be corrected.

A knowledgeable individual who is not involved in the direct data collection process (Radiation Safety Officer [RSO], Radiological Technical Manager, or designee) will review the survey data on a daily basis. This will ensure an ongoing independent review for consistency of all survey data collected.

Field crews will review this SAP prior to collection of samples and sign off on Worksheet #4. An equivalent form to Worksheet #4 may be used.

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

Sampling and analytical performance or acceptance criteria are specified in Worksheets #12, 15, and 28. Third-party data validation will be performed on samples as described in Worksheets #29 and 36.

7. Develop the plan for obtaining data

Radioactive source readings will be used to check instruments for consistency prior to use in each daily shift. The instrument will only be used after readings are compared and agree within +/- 20 percent of predetermined responses. The on-site RSO will review the information each day to verify that equipment is operating satisfactorily.

A knowledgeable individual who is not involved in the direct data collection process will review the survey data on a daily basis. This will ensure an ongoing independent review for consistency of all survey data collected.

The Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) guidelines will be used (DoD et al. 2000). A 95 percent confidence level for detecting radioactivity above the release levels will be assumed with Type I and II errors limited to 5 percent, except when double sampling is used. Then the Type I error rate will be set to a maximum of 2.5 percent, as specified in Section 5.5.6.1 of the Work Plan.

The data collecting design alternatives may change slightly if assumptions are reviewed based on conditions in the field being different than the furnished information derived from historical research and current knowledge.

The survey design will be specified in the Task-specific Plans (TSPs) in order to perform radiological FSSs. Combined with the use of qualified and experienced personnel, this design is considered both efficient and resource effective. The theoretical assumptions of the survey design are based on guidelines contained in MARSSIM. Specific assumptions regarding types of radiation measurements, instrument-detection capabilities, quantities and locations of data to be collected, and investigation levels will be contained in the TSP.

SAP Worksheet #12 – Measurement Performance Criteria Table for Soil Samples

Measurement Performance Criteria Table – Field QC Samples

QC Sample [a]	Analytical Group	Frequency	Data Quality Indicators	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Equipment blank	VOCs, SVOCs, pesticides, PCBs, TPH-purgeable, TPH-extractable, metals, and gamma-emitting isotopes	1 per non-disposable sampling equipment used for import material samples per day	Accuracy	Analyte < QL	S&A
Laboratory duplicate	Radiological analyses	[b]	Precision	RPD < 30%	A

Notes:

[a] Soil sample results have high variability due to percent moisture and inherent heterogeneity of the matrix. Since sample variability is not a concern for this project in achieving the project objectives, field duplicates are not required. The only QC samples required for this project are equipment blanks and laboratory duplicates.

[b] For sampling events that are used to recommend unrestricted release of survey units or sites (namely FSS samples), the on-site laboratory will perform at least one laboratory duplicate per survey unit. Selection of duplicate samples will be as random as possible but ensure that samples with activity less than the quantification or reporting limit are included. It will also ensure that at least one sample per isotope per survey unit will be run for samples above the quantitation limit, if present. The laboratory duplicates for gamma spectroscopy will consist of reanalyzing the original sample in the original container on the same gamma spectroscopy system. In addition, the laboratory may compare radionuclide activities for any other radionuclide that is reported above the quantification or reporting limit during both analyses.

This page intentionally left blank.

SAP Worksheet #13 – Secondary Data Criteria and Limitations Table

For this project, secondary data are not applicable.

This page intentionally left blank.

SAP Worksheet #14 – Summary of Project Tasks

PROJECT TASKS

Project tasks applicable to radiological activities at HPS performed by TtEC or other contractors may include the following:

- Permitting and notifications
- Preparatory activities and meetings
- Environmental resources surveying
- Clearing vegetation
- Initial geophysical surveying
- Topographic surveying
- Excavation and management of radiologically impacted soils and associated material
- Stormwater, sediment, and erosion control
- Radiological surveys and sampling
- FSSs
- Backfill placement and compaction
- Site restoration
- Free-release survey and decontamination of equipment
- Waste classification, storage, and disposal

Details on tasks that TtEC is specifically responsible for under this basewide radiological support CTO are described as follows.

RADIOLOGICAL SCREENING YARD OPERATIONS

TtEC will operate three RSYs to conduct the scanning and surveying of other contractor's excavated material. Excavated soil will be transported by the remediation contractor to an RSY to be scanned, surveyed, remediated, and radiologically cleared for either reuse or disposal. Prior to the excavation of any soil, the contractor will contact the RSY Manager (or designee) to determine which RSY will be used so that the screening pad and unique stockpile number can be provided to the contactor.

To facilitate the MARSSIM FSS to radiologically clear the material for reuse as backfill, the excavated soil will be spread out in lifts approximately 6 inches in height and up to 1,000 square meters in surface area. As necessary, the material will be allowed to dewater before radiological surveys are performed.

The radiological surface survey (towed array survey) will consist of a high-density gamma scan supported by Global Positioning System equipment. The high-density survey process will result in a 100 percent surface scan survey, as detailed in Section 4.0 of the Base-wide Storm Drain and

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

Sanitary Sewer Removal Work Plan, Revision 4 (TtEC 2010a). Areas having radiation levels greater than the established 3 sigma of the mean background area level will be evaluated further for the presence of radioactive material and may include additional biased sampling.

FSS soil samples will be collected based on sample spacing using Equation 4-2 from the Basewide Radiological Work Plan, Revision 1 (TtEC 2007), using the most current version of Visual Sample Plan. FSS soil sampling procedures are described further in this worksheet. The samples will be screened at the on-site radiological laboratory by gamma spectroscopy. Excavated soil determined to have residual radioactive contamination below the RROs may be used as backfill, pending additional chemical analysis and RASO concurrence as discussed below.

Excavated soil generated from an Installation Restoration (IR) site will also require chemical sampling. Material that does not exceed the IR site chemical cleanup goals and does not exceed the RROs may be used as backfill pending RASO concurrence. Analysis will be based on the chemicals of concern for each site.

Material exceeding the RROs will be removed and placed in appropriate containers for subsequent transport and disposal under the direction of the DON low-level radioactive waste (LLRW) Disposal Program as directed by the RASO. Chemically and non-radiologically impacted material that does not meet the HPS Backfill Acceptance Criteria will be staged for pickup by the DON's non-LLRW disposal contractor. The appropriate analytical data will accompany the transfer of both the LLRW and non-LLRW materials.

Radiological surveys of excavated soil in the RSYs are an iterative process that may involve soil characterization, remediation, and postremediation sampling, as appropriate, prior to the actual FSS activities. This iterative process will be considered complete only after the postremediation sample results indicate radioactivity is below the RROs. The FSS will be considered complete when the results from the systematic "screening" samples submitted to the on-site laboratory are below RROs.

TtEC will submit the screening sample results to the RASO for concurrence to stage the soil in an area designated by the DON Caretaker Site Office (CSO) pending receipt of additional off-site data.

Subsequently, TestAmerica-St. Louis will be used to perform gamma spectroscopy analysis to generate "definitive sample results" for FSS samples and provide data packages from a DoD Environmental Laboratory Accreditation Program (ELAP) and California Department of Public Health (DPH)-accredited laboratory for submission to the regulatory agencies and provide quality assurance check of the on-site laboratory's results for nondefinitive sample results. TestAmerica-St. Louis will also be used to perform additional radiochemical analysis (such as strontium-90 and alpha spectroscopy) that the on-site laboratory does not perform.

Once the off-site data are received and TtEC has determined the soil meets the HPS Soil Acceptance Criteria, a second e-mail will be sent to the RASO for concurrence to use the soil as

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

backfill material. A copy of RASO's concurrence and all the analytical data will be provided to the remediation contractor.

ON-SITE LABORATORY OPERATIONS

The on-site laboratory will solely be used as a screening laboratory for gamma spectroscopy analysis to provide expedient sample analysis turnaround times to guide site remediation, investigation, and characterization. Once the on-site laboratory identifies sample results that are considered to be the final confirmation sample results (i.e., no further remediation is necessary as all results are below RROs), then all of those samples will be sent to the off-site laboratory (TestAmerica-St. Louis) to produce the final definitive data that will be used to deem the area below RROs and/or requiring no further action.

On-site laboratory equipment will be used to analyze most radiological samples collected in the field. Table 3 lists the types of measurements and laboratory equipment to be used on-site to support the survey activities.

TABLE 3
ON-SITE LABORATORY INSTRUMENTATION

Measurement/ Technique	Type of Instrumentation*	Typical Background	Typical Efficiency (%)	Detection Sensitivity
Gamma spectroscopy	High-purity germanium detector	N/A	40 to 60	0.05 pCi/g (for ^{137}Cs) 0.5 pCi/g (for ^{226}Ra)
Gross alpha and beta/gamma on swipes	Protean IPC9025 low-background gas-flow proportional counter	1–5 cpm β 0–0.5 cpm α	~62 β ~27 α	4–10 dpm/100 cm^2 β 2–5 dpm/100 cm^2 α

Notes:
* or equivalent
Types of radiation: α – alpha, β – beta

Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys

Swipe samples will be processed using a Protean IPC 9025 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.

Gamma Spectroscopy

Gamma spectroscopy analysis is performed on soil samples using hardware features that include a high-purity germanium gamma photon detector supported by Ortec software. Instrument

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

hardware is calibrated using a multi-energy National Institute of Standards and Technology-traceable source ranging from 10 kiloelectron volts to 2 megaelectron volts. Data results will undergo a quality control (QC) review and be reported in units of picocuries per gram. 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 radionuclides of concern. 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 Laboratory Coordinator who will be responsible for ensuring that the laboratory results (both as ASCII and PDF files) are submitted electronically in a timely manner to the appropriate remediation contractor. If gamma results are below the established RRO, 100 percent of the FSS sample set will be sent off-site for definitive analysis to TestAmerica-St. Louis, a Department of Defense (DoD) and California DPH-accredited laboratory.

Additional Analyses

As required, additional radiological and chemical analyses will be performed by the off-site laboratory (TestAmerica-St. Louis) in accordance with the procedures described in this SAP. Off-site analytical results will be provided electronically to the appropriate remediation contractor as a PDF of an EPA Level III- or IV-equivalent data package along with a electronic data deliverable compatible file.

BASEWIDE RADIOLOGICAL SUPPORT

Under this contract, TtEC will provide radiological screening support to non-radiological remediation contractors performing work within areas defined in the Memorandum of Understanding (TtEC 2010b) for HPS. In support of the basewide radiological scope of work, TtEC will:

- Perform incoming and outgoing construction equipment surveys.
- Provide personnel dosimeters for staff and non-radiological remediation contractors performing work in radiologically impacted areas.
- Institute radiological controls and postings in impacted areas not covered by an on-site radiological remediation contractor.
- Conduct routine radiological surveys and perform on-site/off-site analysis as needed.
- Prepare and/or update HPS standard operating procedures and develop work instructions.
- Operate an on-site portal monitor for incoming and outgoing trucks.
- Conduct radiological awareness briefings for non-radiological remediation contractors executing work in radiologically impacted areas.

TtEC will also provide rapid response to support the DON's need to quickly assess and address off-site remedial needs. This will include:

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

- Assessment of the situation and development of the remedial approach
- Expedited chemical/radiological characterization
- Performance of the remediation and management of the waste as directed by the DON

DETAILS ON SAMPLING TASKS

The following sections provide the sampling procedures that may be used by TtEC or other contractors for collection of samples associated with basewide radiological support activities.

Reference Background Area Sample Procedures

Reference background area samples will be collected as follows:

1. Locations will be chosen based on reference background area radiological survey scans.
2. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
3. Grab samples will be collected with a disposable plastic scoop into a 250-milliliter (mL) or 500-mL plastic container that will be filled completely.
4. Each container will be labeled.
5. Samples will be sealed and packaged in accordance with the section below.
6. Samples will be stored in a cooler or other container without ice.
7. Field documentation including field logbooks and chains of custody (COCs) will be filled out during sample collection.

The samples will then be transferred to the on-site laboratory for analysis. These samples will also be sent to the off-site laboratory for definitive analysis.

Soil/Sediment/Swipe Sampling Procedures

Soil/sediment/swipe samples for radiological analyses will be collected as follows:

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
2. Radiological samples will be collected as specified in the SOP HPO-Tt-009 (as provided in Appendix A of this SAP) governing sampling procedures for radiological surveys.
3. Grab samples for chemical analyses (as appropriate) will be collected with a disposable plastic scoop into sample containers that will be filled completely. An additional sample container may be collected to ensure sufficient sample quantity for analyses.

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

For VOC or TPH-purgeable analysis, three 5-gram En Core® samples will be collected from the sample container or from the soil directly as follows:

a. Holding the coring body, the plunger rod will be pushed down until the small o-ring rests against the tabs. This will ensure that the plunger will move easily.

b. The locking lever on the En Core T-handle will be depressed. The coring body, with the plunger end first, will be placed into the open end of the T-handle, aligning the slots of the coring body with the locking pins in the T-handle. The coring body will be twisted clockwise to lock the pins in the slots. The sampler will be checked to ensure that it is locked in place. The sampler will now be ready for use.

c. By holding the T-handle, the coring body will be pushed into the soil until the coring body is full. When full, the small o-ring will be centered in the T-handle viewing hole. The sampler will then be removed from the soil, and any excess soil will be wiped from the coring body exterior.

d. The coring body will be capped while it is still on the T-handle. The cap should be pushed over the flat area of the ridge. To lock the cap in place, the cap will be pushed and twisted so that it seals the sampler.

e. The capped sample will be removed by depressing the locking lever on the T-handle while twisting and pulling the sampler from the T-handle.

f. The En Core sample will be placed in its aluminum sealed bag.

g. This procedure will be performed until three En Core samples are collected for each sample. All three En Core samples for VOCs may be placed in one aluminum bag for consolidation purposes.

h. Following completion of the sample label on the outside of the aluminum bag, the aluminum bag will be placed in a resealable bag, a custody seal will be placed over the resealable bag, that bag will be placed in another resealable bag, and then that bag will immediately be placed on ice.

4. Sample numbering, labeling, documentation, and packaging procedures will be followed as described below and in Worksheets #27 and 29.

5. Sampling equipment will be screened and decontaminated between each sample acquisition.

Stockpile Soil Sampling Procedures

Samples for radiological analysis will be collected as specified in the SOP HPO-Tt-009 (as provided in Appendix A of this SAP) governing sampling procedures for radiological surveys. Soil from the stockpile will be sampled for chemical analyses at a rate of one sample for every 500 cubic yards with a minimum of five samples collected for any excavated soil unit less than 2,500 cubic yards using the following procedure:

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

1. The volume (in cubic yards) of the stockpiles will be calculated using the following formula:

$$V = A \times H/27$$

Where: V = volume in cubic yards
A = area of the base of the stockpile in square feet calculated using one of the following formulas:
Rectangular = length × width
Square = length × width
Triangular = ½ base × height
Circular = 3.14 × radius × radius
Oval = 3.14 × long radius × short radius
H = average height of the stockpile in feet
27 = conversion factor for cubic feet to cubic yards

2. The stockpile will be divided into the number of sections equivalent to the number of samples to be collected.
3. The sample locations within each section will be determined by generating random numbers.
4. A hand auger or similar device will be used to access each x, y, and z coordinate. Due to limitations in accessing deep depths in a large stockpile, z coordinates will be limited to 10 feet.
5. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
6. Grab samples will be collected with a disposable plastic scoop into sample containers that will be filled completely. For VOC or TPH-purgeable analysis, En Core samples will be collected as described above. An additional sample container may be collected to ensure sufficient sample quantity for analyses.
7. A temperature blank will be shipped in each cooler containing field samples for chemical analysis.
8. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Worksheets #27 and 29.
9. Sampling equipment will be screened and decontaminated between each sample acquisition.

Import Fill Material Sampling Procedures

For verification sampling of any necessary import materials, unless already certified, backfill samples will be collected as follows for chemical analysis. Samples for radiological analysis will be collected as specified in the SOP HPO-Tt-009 (as provided in Appendix A of this SAP) governing sampling procedures for radiological surveys.

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

If the site from which the backfill is being imported is accessible, then samples will be collected at the site. If the site is not accessible, then material will be sent to the TtEC project site, and samples will be collected as follows:

1. Only soil and fine materials will be sampled. Four samples per borrow area or quarry will be collected.
2. The sample locations will be determined by generating random numbers.
3. A hand auger or similar device will be used to access each x, y, and z coordinate. Due to limitations in accessing deep depths in a large stockpile, z coordinates will be limited to 10 feet.
4. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
5. Grab samples will be collected with a disposable plastic scoop into sample containers that will be filled completely. For VOC or TPH-purgeable analysis, En Core samples will be collected as described above. An additional sample container may be collected to ensure sufficient sample quantity for analyses.
6. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Worksheets #27 and 29.
7. Sampling equipment will be screened and decontaminated between each sample acquisition.

Waste Characterization Sampling Procedures

Stockpiled soil not suitable for reuse and wastewater will be generated during field activities and will require sampling for proper disposal. Where required, samples for radiological analysis will be collected as specified in the SOP HPO-Tt-009 (as provided in Appendix A of this SAP) governing sampling procedures for radiological surveys. Stockpiled soil sampling procedures are described above. Wastewater sampling are described in the sections below.

Wastewater Sampling Procedures

This procedure will be used to collect wastewater samples from approved containers or in situ water samples from an excavation.

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 similar device. Samples will be transferred from the bailers to pre-preserved, pre-cleaned sample containers.
3. Vials for VOC analysis will be filled as follows:
   a. The water samples will be carefully collected into 40-mL volatile organic analysis (VOA) vials using techniques to minimize aeration.

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

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 resampled using a new vial.

f. The previous steps will be repeated until an air bubble-free sample is collected.

4. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Worksheets #27 and 29.

5. Sampling equipment will be screened and decontaminated between each sample acquisition.

Container Content Sampling Procedures

Prior to sampling the contents of the material from each container, a qualitative visual description of the contents of each container will be recorded in the logbook to include the following:

- Any and all exterior markings
- Any unique or unusual container conditions (e.g., reinforced, lined, exotic construction materials)
- Type of opening(s)
- Approximate amount of material contained in the container
- Physical state, color, clarity, viscosity, number, and relative estimated volume of each identified discrete layer or phase
- Readings from real-time health and safety monitors

Swipe samples of material from the containers will be collected in accordance with SOP HPO-Tt-009 (as provided in Appendix A of this SAP) for sampling of radiological materials.

Liquid samples from containers will be extracted through the bunghole if one is on the container. If the container contains mostly solid material rather than liquids, the entire top of the container will be removed to sample the contents. Using an appropriate sampling device or a combination of devices, several representative grab samples with a combined volume of up to approximately 250 mL will be withdrawn from each container and carefully placed into a sampling container. If a container contains more than one phase (e.g., solids and liquids or multi-phase liquids), separate samples are to be taken from each phase. If the volume of any individual phase is so small as to preclude recovery of a sufficient sample (any volume less than 5 mL), a remark to this effect will be recorded in the logbook.

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

Samples will be numbered, labeled, documented, and packaged according to procedures in Worksheets #27 and 29.

At the same time the sample is collected for the off-site laboratory analysis, an aliquot will be collected in a labeled test tube and transferred to the HazCat area where the HazCat technician(s) will carry out waste-compatibility screening. The parameters described in Worksheet #17 will be tested according to the manufacturer's instructions for the HazCat kit. The results of the HazCat tests will be recorded on a field form and subsequently evaluated to categorize similar types of wastes together for disposal purposes.

Decontamination Procedures

Prior to decontamination, sampling equipment will be screened using a hand-held alpha/beta survey meter. If radioactive contamination exceeding the release limit is present, the equipment and local area will be secured and the Radiological Technical Manager will be notified.

After radiological screening, nondisposable sampling equipment will be decontaminated to prevent the introduction of extraneous material into samples and to prevent cross-contamination between samples. All sampling equipment will be decontaminated. Decontamination water will be collected in approved Department of Transportation containers.

The following steps will be taken for the general decontamination of nondisposable sampling equipment, as appropriate:

1. **Wash with nonphosphate detergent and water solution** — This step will reduce the amount of gross contamination from the equipment. Use of a container, approximately 75 percent full of solution, is suggested for this step. This detergent solution will be prepared as directed by the manufacturer.
2. **Rinse with potable water** — This step will rinse all the detergent solution away from equipment. Use of a container, approximately 75 percent full of potable water, is suggested for this step. Periodic changing of this water is required.
3. **Rinse with potable water** — Repeat Step 2. Subsequent to this final rinse, place decontaminated equipment on a clean surface area (plastic sheeting) to air dry.
4. **Radiological screening of equipment** — When dry, survey the post-decontaminated equipment using a hand-held alpha/beta survey meter. If radioactive contamination exceeding the release limits is detected, immediately secure the equipment and local area and notify the RSO.
5. **Sample investigation-derived waste** — Drummed decontamination fluids will be sampled to characterize the waste for disposal. Drums will be stored in a designated storage area pending receipt of the analytical data. Samples will be collected from each wastewater container.

DATA MANAGEMENT TASKS FOR OTHER CONTRACTOR'S SAMPLES

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

On-site gamma spectroscopy data will be reviewed and, if acceptable, a PDF file of the Ortec-generated ASCII file will be created. Both files will be submitted to the TtEC Laboratory Coordinator who will be responsible for ensuring that the laboratory results (both as ASCII and PDF files) are submitted electronically in a timely manner to the appropriate remediation contractor. As required, additional radiological and chemical analyses will be performed by the off-site laboratory (TestAmerica-St. Louis) in accordance with the procedures described in this SAP. Off-site analytical results will be provided electronically to the appropriate remediation contractor as a PDF of an EPA Level III- or IV-equivalent data package along with an electronic data deliverable compatible file.

The remediation contractor will be responsible for third party data validation of their off-site laboratory results and the submittal of their data to the Naval Installation Restoration Information Solution (NIRIS) website as required by their contract.

DATA MANAGEMENT TASKS FOR TTEC SAMPLES

The following section discusses the data management tasks for samples associated with TtEC projects.

Field sampling data, including field logbooks and field forms, will be maintained. The logbooks will be numbered sequentially on the cover by the Project Quality Control Manager (PQCM) and that number will be entered into a logsheet maintained by the PQCM. A copy of all field forms will be maintained in the project file.

A copy of the off-site laboratory COCs will be faxed/emailed to the Project Chemist on a daily basis for review and communication with the laboratory. The manila copy of the COC form will be mailed to the Project Chemist. The Project Chemist will maintain the manila copy of the COC form until submitted to the Navy Administrative Record along with the hard-copy packages as described in Worksheet #29.

The off-site laboratory will submit data at the turnaround time to TtEC via email. This submittal will include results and basic QC results (method blanks, laboratory control sample [LCS], surrogates, and matrix spike/matrix spike duplicates [MS/MSDs]). Following this submittal, the laboratory will be required to submit a Level III- or Level IV-equivalent data package within 20 business days of the sample collection date. For this project, 80 percent of the data 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 as listed on the COC and described in Worksheet #29.

Field data from the off-site laboratory COCs (date and time collected, sample identification, etc.) will be entered into the TtEC database by the Project Chemist. Survey data will be recorded and also entered into the database. All definitive/confirmation sampling locations, except for waste characterization samples, will be surveyed in accordance with Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards (SWDIV 2005). Horizontal control information will be captured in the State Plane Coordinate System (North American Datum 83) in feet, and vertical control standards will be in mean sea

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

level (North American Vertical Datum 88) in feet. All manual entries into the database will be 100 percent verified by the Project Chemist by checking the manual entry against the hard copy information.

The off-site laboratory will provide an electronic data deliverable (EDD) that will be compatible with TtEC requirements, and the EDD will be uploaded into the TtEC database. The data will be checked for required values and project-specific requirements by the database. Any discrepancies in the EDD will be corrected by TtEC or the laboratory will be notified to make corrections.

All analytical data generated by the off-site laboratory, except waste characterization data, will be validated by an independent data validation company. The validation report will include the data validation findings worksheets as described in Worksheet #29, and the validation qualifiers will be entered electronically in the laboratory EDD.

Within 30 calendar days of receipt of the validated data, the validation qualifiers will be uploaded into the TtEC database, and the off-site and on-site electronic data for definitive/confirmation samples will be submitted to the Naval Installation Restoration Information Solution website in Navy Electronic Data Deliverable format in accordance with EWI EVR.6, Environmental Data Management and Required Electronic Delivery Standards (SWDIV 2005).

Hard-copy data will be stored until subsequent submittal to the Navy Administrative Record as described in Worksheet #29. The TtEC database will be electronically backed up on data storage tapes, and the backup will be stored as an archive file.

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples

Matrix: Soil

Analytical Group: Gamma Spectroscopy (on-site laboratory)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Actinium-228	14331-83-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Americium-241	86954-36-1	1.36	RROs	0.9 [a]	0.9 [a]	Not applicable[b]
Bismuth-212	14913-49-6	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Bismuth-214	14733-03-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Cesium-137	10045-97-3	0.113	RROs	0.07	0.07	Not applicable[b]
Cobalt-60	10198-40-0	0.0361	RROs	0.02 [a]	0.02 [a]	Not applicable[b]
Europium-152	14683-23-9	0.13	RROs	0.1 [a]	0.1 [a]	Not applicable[b]
Europium-154	15585-10-1	0.23	RROs	0.2 [a]	0.2 [a]	Not applicable[b]
Lead-210	14255-04-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-212	15092-94-1	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-214	15067-28-4	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Potassium-40	13966-00-2	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Protactinium-234M	378783-76-7	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Radium-226	13982-63-3	1.0 above background	RROs	1.3 [c]	1.3 [c]	Not applicable[b]
Thallium-208	14913-50-9	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Thorium-232	7440-29-1	1.69	RROs	0.9 [a]	0.9 [a]	Not applicable[b]
Thorium-234	15065-10-8	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Uranium-235	15117-96-1	0.195	RROs	0.1 [a]	0.1 [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Swipe
Analytical Group: Gross Alpha/Gross Beta (on-site laboratory)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Gross Alpha	12587-46-1	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Gross Beta	12587-47-2	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil

Analytical Group: Gamma Spectroscopy (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Actinium-228	14331-83-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Americium-241	86954-36-1	1.36	RROs	0.9 [a]	0.9 [a]	Not applicable[b]
Bismuth-212	14913-49-6	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Bismuth-214	14733-03-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Cesium-137	10045-97-3	0.113	RROs	0.07	0.07	Not applicable[b]
Cobalt-60	10198-40-0	0.0361	RROs	0.02 [a]	0.02 [a]	Not applicable[b]
Europium-152	14683-23-9	0.13	RROs	0.1 [a]	0.1 [a]	Not applicable[b]
Europium-154	15585-10-1	0.23	RROs	0.2 [a]	0.2 [a]	Not applicable[b]
Lead-210	14255-04-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-212	15092-94-1	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-214	15067-28-4	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Potassium-40	13966-00-2	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Protactinium-234M	378783-76-7	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Radium-226	13982-63-3	1.0 above background	RROs	0.7	0.7	Not applicable[b]
Thallium-208	14913-50-9	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Thorium-232	7440-29-1	1.69	RROs	0.9 [a]	0.9 [a]	Not applicable[b]
Thorium-234	15065-10-8	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Uranium-235	15117-96-1	0.195	RROs	0.1 [a]	0.1 [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: Strontium-90 (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Total Strontium	7440-24-6	0.331	RROs	0.17 [a]	0.17 [a]	Not applicable[b]
Strontium-90	10098-97-2	0.331	RROs	0.17 [a]	0.17 [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil

Analytical Group: Alpha Spectroscopy (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Uranium-233/234	-163 [d]	Not applicable	Not applicable	0.1 [a]	0.1 [a]	Not applicable[b]
Uranium-235-236	-164 [d]	0.195	RROs	0.1 [a]	0.1 [a]	Not applicable[b]
Uranium-238	7440-61-1	Not applicable	Not applicable	0.1 [a]	0.1 [a]	Not applicable[b]
Thorium-228	14274-82-9	Not applicable	Not applicable	0.1 [a]	0.1 [a]	Not applicable[b]
Thorium-230	14269-63-7	Not applicable	Not applicable	0.1 [a]	0.1 [a]	Not applicable[b]
Plutonium-238	13981-16-3	Not applicable	Not applicable	0.1 [a]	0.1 [a]	Not applicable[b]
Plutonium-239/240	10-12-8	2.59	RROs	0.1 [a]	0.1 [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil

Analytical Group: Tritium (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/g)	Project Action Limit Reference	Project MDA (pCi/g)	Laboratory-specific	
					MDAs (pCi/g)	MDLs (pCi/g)
Tritium	10028-17-8	2.28	RROs	2.00 [a]	2.00 [a]	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Swipe
Analytical Group: Gross Alpha/Gross Beta (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/sample)	Project Action Limit Reference	Project MDA (pCi/sample)	Laboratory-specific	
					MDAs (pCi/sample)	MDLs (pCi/sample)
Gross Alpha	12587-46-1	Not applicable	Not applicable	10	10	Not applicable[b]
Gross Beta	12587-47-2	Not applicable	Not applicable	10	10	Not applicable[b]

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: VOCs

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
1,1,1-Trichloroethane	71-55-6	39,000,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.291
1,1,2,2-Tetrachloroethane	79-34-5	2,900	EPA Region 9 Industrial RSL (April 2009)	5	5	0.272
1,1,2-Trichloroethane	79-00-5	5,500	EPA Region 9 Industrial RSL (April 2009)	5	5	0.573
1,1-Dichloroethane	75-34-3	17,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.392
1,1-Dichloroethene	75-35-4	1,100,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.365
1,2-Dichloroethane	107-06-2	2,200	EPA Region 9 Industrial RSL (April 2009)	5	5	0.372
1,2-Dichloropropane	78-87-5	4,700	EPA Region 9 Industrial RSL (April 2009)	5	5	0.317
2-Butanone	78-93-3	190,000,000	EPA Region 9 Industrial RSL (April 2009)	20	20	0.389
2-Hexanone	591-78-6	Not applicable	Not applicable	20	20	0.261
4-methyl-2-pentanone	108-10-1	52,000,000	EPA Region 9 Industrial RSL (April 2009)	20	20	0.326
Acetone	67-64-1	610,000,000	EPA Region 9 Industrial RSL (April 2009)	20	20	6.47
Benzene	71-43-2	5,600	EPA Region 9 Industrial RSL (April 2009)	5	5	0.253
Bromodichloromethane	75-27-4	1,400	EPA Region 9 Industrial RSL (April 2009)	5	5	0.254
Bromoform	75-25-2	220,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.366
Bromomethane	74-83-9	35,000	EPA Region 9 Industrial RSL (April 2009)	10	10	0.396
Carbon tetrachloride	56-23-5	1,300	EPA Region 9 Industrial RSL (April 2009)	5	5	0.360
Chlorobenzene	108-90-7	1,500,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.382
Chloroethane	75-00-3	62,000,000	EPA Region 9 Industrial RSL (April 2009)	10	10	0.382
Chloroform	67-66-3	1,500	EPA Region 9 Industrial RSL (April 2009)	5	5	0.092

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Chloromethane	74-87-3	510,000	EPA Region 9 Industrial RSL (April 2009)	10	10	0.553
cis-1,2-Dichloroethene	156-59-2	10,000,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.159
cis-1,3-Dichloropropene	10061-01-5	8,400	EPA Region 9 Industrial RSL (April 2009)	5	5	0.339
Dibromochloromethane	124-48-1	3,400	EPA Region 9 Industrial RSL (April 2009)	5	5	0.329
Ethylbenzene	100-41-4	29,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.299
Methyl tert-butyl ether	1634-04-4	190,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.401
Methylene chloride	75-09-2	54,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.801
Styrene	100-42-5	38,000,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.347
Tetrachloroethene	127-18-4	2,700	EPA Region 9 Industrial RSL (April 2009)	5	5	0.280
Toluene	108-88-3	46,000,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.303
trans-1,2-Dichloroethene	156-60-5	500,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.178
trans-1,3-Dichloropropene	10061-02-6	84,000,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.349
Trichloroethene	79-01-6	14,000	EPA Region 9 Industrial RSL (April 2009)	5	5	0.290
Vinyl chloride	75-01-4	1,700	EPA Region 9 Industrial RSL (April 2009)	5	5	0.428
Xylenes (Total)	1330-20-7	2,600,000	EPA Region 9 Industrial RSL (April 2009)	10	10	0.854

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: SVOCs

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
1,2,4-Trichlorobenzene	120-82-1	400,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
1,2-Dichlorobenzene	95-50-1	10,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
1,3-Dichlorobenzene	541-73-1	Not applicable	Not applicable	330	330	33.3
1,4-Dichlorobenzene	106-46-7	13,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,4,5-Trichlorophenol	95-95-4	62,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,4,6-Trichlorophenol	88-06-2	160,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,4-Dichlorophenol	120-83-2	1,800,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,4-Dimethylphenol	105-67-9	12,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,4-Dinitrophenol	51-28-5	1,200,000	EPA Region 9 Industrial RSL (April 2009)	1,600	1,600	330
2,4-Dinitrotoluene	121-14-2	5,500	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2,6-Dinitrotoluene	606-20-2	620,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2-Chloronaphthalene	91-58-7	82,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2-Chlorophenol	95-57-8	5,100,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2-Methylphenol (o-cresol)	95-48-7	31,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2-Nitroaniline	88-74-4	1,800,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
2-Nitrophenol	88-75-5	Not applicable	Not applicable	330	330	33.3
3,3'-Dichlorobenzidine	91-94-1	3,800	EPA Region 9 Industrial RSL (April 2009)	1,600	1,600	33.3
3-Nitroaniline	99-09-2	Not applicable	Not applicable	330	330	33.3
¾-Methylphenol (m/p-cresol)	-3495 [d]	3,100,000	EPA Region 9 Industrial RSL (April 2009)	660	660	66.6

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
4,6-Dinitro-2-methylphenol	534-52-1	62,000	EPA Region 9 Industrial RSL (April 2009)	1,600	1,600	330
4-Bromophenyl-phenylether	101-55-3	Not applicable	Not applicable	330	330	33.3
4-Chloro-3-methylphenol	59-50-7	Not applicable	Not applicable	330	330	33.3
4-Chloroaniline	106-47-8	8,600	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
4-Chlorophenyl-phenylether	7005-72-3	Not applicable	Not applicable	330	330	33.3
4-Nitroaniline	100-01-6	86,000	EPA Region 9 Industrial RSL (April 2009)	1,600	1,600	330
4-Nitrophenol	100-02-7	Not applicable	Not applicable	1,600	1,600	330
bis(2-Chloroethoxy)methane	111-91-1	1,800,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
bis(2-Chloroethyl)ether	111-44-4	900	EPA Region 9 Industrial RSL (April 2009)	330	330	33.4
bis(2-Chloroisopropyl)ether	108-60-1	17,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
bis(2-Ethylhexyl)phthalate	117-81-7	120,000	EPA Region 9 Industrial RSL (April 2009)	330	330	43.3
Butylbenzyl phthalate	85-68-7	910,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Dibenzofuran	132-64-9	Not applicable	Not applicable	330	330	33.3
Diethyl phthalate	84-66-2	490,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Dimethyl phthalate	131-11-3	Not established	Not applicable	330	330	33.3
Di-n-butyl phthalate	84-74-2	62,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Di-n-octyl phthalate	117-84-0	Not applicable	Not applicable	330	330	33.3
Hexachlorobenzene	118-74-1	1,100	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Hexachlorobutadiene	87-68-3	22,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Hexachlorocyclopentadiene	77-47-4	3,700,000	EPA Region 9 Industrial RSL (April 2009)	1,600	1,600	330
Hexachloroethane	67-72-1	120,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Nitrobenzene	98-95-3	22,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
n-Nitrosodiphenylamine	86-30-6	350,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
n-Nitroso-di-n-propylamine	621-64-7	250	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Pentachlorophenol	87-86-5	9,000	EPA Region 9 Industrial RSL (April 2009)	660	660	330
Phenol	108-95-2	180,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Pyridine	110-86-1	1,000,000	EPA Region 9 Industrial RSL (April 2009)	660	660	66.6
Acenaphthene	83-32-9	33,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Acenaphthylene	208-96-8	Not applicable	Not applicable	330	330	33.3
Anthracene	120-12-7	170,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Benzo(a)anthracene	56-55-3	2,100	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Benzo(a)pyrene	50-32-8	210	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Benzo(b)fluoranthene	205-99-2	2,100	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Benzo(g,h,i)perylene	191-24-2	Not applicable	Not applicable	330	330	33.3
Benzo(k)fluoranthene	207-08-9	21,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Chrysene	218-01-9	210,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Dibenzo(a,h)anthracene	53-70-3	210	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Fluoranthene	206-44-0	22,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Fluorene	86-73-7	22,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Indeno(1,2,3-cd)pyrene	193-39-5	2,100	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Naphthalene	91-20-3	20,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3
Phenanthrene	85-01-8	Not applicable	Not applicable	330	330	33.3
Pyrene	129-00-0	17,000,000	EPA Region 9 Industrial RSL (April 2009)	330	330	33.3

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: Pesticides

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
4,4′-DDD	72-54-8	7,200	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.082
4,4′-DDE	72-55-9	5,100	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.390
4,4′-DDT	50-29-3	7,000	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.628
alpha-BHC	319-84-6	270	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.133
Aldrin	309-00-2	100	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.306
beta-BHC	319-85-7	960	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.300
delta-BHC	319-86-8	Not applicable	Not applicable	1.7	1.7	0.242
Chlordane (technical)	12789-03-6	6,500	EPA Region 9 Industrial RSL (April 2009)	17	17	3.729
Dieldrin	60-57-1	110	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.215
Endosulfan sulfate	1031-07-8	3,700,000	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.249
Endosulfan I	959-98-8	3,700,000	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.570
Endosulfan II	33213-65-9	3,700,000	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.235
Endrin	72-20-8	180,000	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.136
Endrin aldehyde	7421-93-4	Not applicable	Not applicable	1.7	1.7	0.389
Endrin ketone	53494-70-5	Not applicable	Not applicable	1.7	1.7	0.297
gamma-BHC (Lindane)	58-89-9	2,100	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.168
Heptachlor	76-44-8	380	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.095
Heptachlor epoxide	1024-57-3	190	EPA Region 9 Industrial RSL (April 2009)	1.7	1.7	0.429

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Methoxychlor	72-43-5	3,100,000	EPA Region 9 Industrial RSL (April 2009)	3.3	3.3	0.719
Toxaphene	8001-35-2	1,600	EPA Region 9 Industrial RSL (April 2009)	67	67	15.16

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: PCBs

Analyte	CAS Number	Project Action Limit (µg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/kg)	Laboratory-specific	
					QLs (µg/kg)	MDLs (µg/kg)
Aroclor 1016	12674-11-2	21,000	EPA Region 9 Industrial RSL (April 2009)	33	33	5.39
Aroclor 1221	11104-28-2	620	EPA Region 9 Industrial RSL (April 2009)	33	33	5.39
Aroclor 1232	11141-16-5	620	EPA Region 9 Industrial RSL (April 2009)	33	33	5.39
Aroclor 1242	53469-21-9	740	EPA Region 9 Industrial RSL (April 2009)	33	33	5.39
Aroclor 1248	12672-29-6	740	EPA Region 9 Industrial RSL (April 2009)	33	33	5.39
Aroclor 1254	11097-69-1	740	EPA Region 9 Industrial RSL (April 2009)	33	33	6.13
Aroclor 1260	11096-82-5	740	EPA Region 9 Industrial RSL (April 2009)	33	33	6.13

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: TPH-purgeable (gasoline) and TPH-extractable (diesel and motor oil)

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
TPH-gasoline (C_6-C_{10})	8006-61-9	Not applicable	Not applicable	0.1	0.1	0.01
TPH-diesel (C_{10}-C_{24})	-3527 [d]	Not applicable	Not applicable	10	10	0.333
TPH-motor oil (C_{24}-C_{36})	-3528 [d]	Not applicable	Not applicable	10	10	0.637

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil [a]
Analytical Group: Metals

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs (mg/kg)	MDLs (mg/kg)
Antimony	7440-36-0	410	EPA Region 9 Industrial RSL (April 2009)	0.5	0.5	0.164
Arsenic	7440-38-2	1.6	EPA Region 9 Industrial RSL (April 2009)	1	1	0.203
Barium	7440-39-3	190,000	EPA Region 9 Industrial RSL (April 2009)	2	2	0.057
Beryllium	7440-41-7	2,000	EPA Region 9 Industrial RSL (April 2009)	0.1	0.1	0.011
Cadmium	7440-43-9	800	EPA Region 9 Industrial RSL (April 2009)	0.05	0.05	0.011
Chromium	7440-47-3	1,500,000	EPA Region 9 Industrial RSL (April 2009)	1	1	0.302
Cobalt	7440-48-4	300	EPA Region 9 Industrial RSL (April 2009)	0.2	0.2	0.043
Copper	7440-50-8	41,000	EPA Region 9 Industrial RSL (April 2009)	1	1	0.054
Lead	7439-92-1	800	EPA Region 9 Industrial RSL (April 2009)	0.30	0.30	0.026
Mercury	7439-97-6	24	EPA Region 9 Industrial RSL (April 2009)	0.033	0.033	0.006
Molybdenum	7439-98-7	5,100	EPA Region 9 Industrial RSL (April 2009)	0.5	0.5	0.077
Nickel	7440-02-0	20,000	EPA Region 9 Industrial RSL (April 2009)	0.5	0.5	0.082
Selenium	7782-49-2	5,100	EPA Region 9 Industrial RSL (April 2009)	0.5	0.5	0.045
Silver	7440-22-4	5,100	EPA Region 9 Industrial RSL (April 2009)	0.2	0.2	0.008
Thallium	7440-28-0	66	EPA Region 9 Industrial RSL (April 2009)	0.2	0.2	0.058
Vanadium	7440-62-2	5,200	EPA Region 9 Industrial RSL (April 2009)	1	1	0.735
Zinc	7440-66-6	310,000	EPA Region 9 Industrial RSL (April 2009)	5	5	1.33

SAP Worksheet #15.1 – Reference Limits and Evaluation Table for Soil/Swipe Samples (Continued)

Matrix: Soil
Analytical Group: Asbestos

Analyte	CAS Number	Project Action Limit (percent)	Project Action Limit Reference	Project Quantitation Limit Goal (percent)	Laboratory-specific	
					QLs (percent)	MDLs (percent)
Asbestos	132207-33-1	0.25	Bay Area Air Quality Management District	0.25	0.25	Not applicable[b]

Notes:

This worksheet represents the types of analyses that may be performed during basewide radiological activities.

[a] Project quantitation limits and minimum detectable activities for radiological analyses are calculated per samples per analysis. Therefore, these values are listed as to be determined until a project action limit is applicable since these are determined based on background, sample size, and count time. Values listed indicate a minimum MDA that will be achieved for isotopes that have RROs. For the off-site laboratory, the MDAs listed are based on a 30-45 minute count time. To achieve lower MDAs, the sample count time would have to increase.
[b] MDLs are not applicable to radiological and asbestos analyses.
[c] The value listed as the MDA for radium-226 is calculated as a MDL for gamma spectroscopy analysis of the 186 keV energy peak.
[d] CAS number listed is from the NEDD valid value list since a CAS number is not available for this analyte.

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples

Matrix: Water
Analytical Group: Gamma Spectroscopy (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference	Project MDA (pCi/L)	Laboratory-specific	
					MDAs (pCi/L)	MDLs (pCi/L)
Actinium-228	14331-83-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Americium-241	86954-36-1	15	Wastewater Discharge Permit	7.5[a]	7.5 [a]	Not applicable[b]
Bismuth-212	14913-49-6	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Bismuth-214	14733-03-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Cesium-137	10045-97-3	119	Wastewater Discharge Permit	60	60	Not applicable[b]
Cobalt-60	10198-40-0	100	Wastewater Discharge Permit	50 [a]	50 [a]	Not applicable[b]
Europium-152	14683-23-9	60	Wastewater Discharge Permit	30 [a]	30 [a]	Not applicable[b]
Europium-154	15585-10-1	200	Wastewater Discharge Permit	100 [a]	100 [a]	Not applicable[b]
Lead-210	14255-04-0	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-212	15092-94-1	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Lead-214	15067-28-4	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Potassium-40	13966-00-2	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Protactinium-234M	378783-76-7	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Radium-226	13982-63-3	5	Wastewater Discharge Permit	2.5	2.5	Not applicable[b]
Thallium-208	14913-50-9	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Thorium-232	7440-29-1	15	Wastewater Discharge Permit	8 [a]	8 [a]	Not applicable[b]
Thorium-234	15065-10-8	Not applicable	Not applicable	TBD [a]	TBD [a]	Not applicable[b]
Uranium-235	15117-96-1	30	Wastewater Discharge Permit	15 [a]	15 [a]	Not applicable[b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Radium-226 (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference	Project MDA (pCi/L)	Laboratory-specific	
					MDAs (pCi/L)	MDLs (pCi/L)
Radium-226	13982-63-3	5	Wastewater Discharge Permit	2.5 [a]	2.5 [a]	Not applicable[b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Strontium-90 (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference	Project MDA (pCi/L)	Laboratory-specific	
					MDAs (pCi/L)	MDLs (pCi/L)
Total Strontium	7440-24-6	8	Wastewater Discharge Permit	4 [a]	4 [a]	Not applicable[b]
Strontium-90	10098-97-2	8	Wastewater Discharge Permit	4 [a]	4 [a]	Not applicable[b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water

Analytical Group: Alpha Spectroscopy (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference	Project MDA (pCi/L)	Laboratory-specific	
					MDAs (pCi/L)	MDLs (pCi/L)
Uranium-233/234	-163 [c]	Not applicable	Not applicable	0.10 [a]	0.10 [a]	Not applicable[b]
Uranium-235/236	-164 [c]	30	Wastewater Discharge Permit	0.10 [a]	0.10 [a]	Not applicable[b]
Uranium-238	7440-61-1	Not applicable	Not applicable	0.10 [a]	0.10 [a]	Not applicable[b]
Thorium-228	14274-82-9	Not applicable	Not applicable	0.10 [a]	0.10 [a]	Not applicable[b]
Thorium-230	14269-63-7	Not applicable	Not applicable	0.10 [a]	0.10 [a]	Not applicable[b]
Plutonium-238	13981-16-3	Not applicable	Not applicable	0.10 [a]	0.10 [a]	Not applicable[b]
Plutonium-239/240	10-12-8	15	Wastewater Discharge Permit	0.10 [a]	0.10 [a]	Not applicable[b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water

Analytical Group: Tritium (TestAmerica-St. Louis)

Analyte	CAS Number	Project Action Limit (pCi/L)	Project Action Limit Reference	Project MDA (pCi/L)	Laboratory-specific	
					MDAs (pCi/L)	MDLs (pCi/L)
Tritium	10028-17-8	20,000	Wastewater Discharge Permit	500 [a]	500 [a]	Not applicable[b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: VOCs

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
1,1,1-Trichloroethane	71-55-6	Not applicable	Not applicable	5	5	0.291
1,1,2,2-Tetrachloroethane	79-34-5	Not applicable	Not applicable	5	5	0.272
1,1,2-Trichloroethane	79-00-5	Not applicable	Not applicable	5	5	0.573
1,1-Dichloroethane	75-34-3	Not applicable	Not applicable	5	5	0.392
1,1-Dichloroethene	75-35-4	700	Wastewater Discharge Permit	5	5	0.365
1,2-Dichloroethane	107-06-2	500	Wastewater Discharge Permit	5	5	0.372
1,2-Dichloropropane	78-87-5	Not applicable	Not applicable	5	5	0.317
2-Butanone (MEK)	78-93-3	200,000	Wastewater Discharge Permit	20	20	0.389
2-Hexanone	591-78-6	Not applicable	Not applicable	20	20	0.261
4-Methyl-2-pentanone	108-10-1	Not applicable	Not applicable	20	20	0.326
Acetone	67-64-1	Not applicable	Not applicable	20	20	6.47
Benzene	71-43-2	500	Wastewater Discharge Permit	5	5	0.253
Bromodichloromethane	75-27-4	Not applicable	Not applicable	5	5	0.254
Bromoform	75-25-2	Not applicable	Not applicable	5	5	0.366
Bromomethane	74-83-9	Not applicable	Not applicable	10	10	0.396
Carbon tetrachloride	56-23-5	500	Wastewater Discharge Permit	5	5	0.360
Chlorobenzene	108-90-7	100,000	Wastewater Discharge Permit	5	5	0.382
Chloroethane	75-00-3	Not applicable	Not applicable	10	10	0.382
Chloroform	67-66-3	6,000	Wastewater Discharge Permit	5	5	0.092

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Chloromethane	74-87-3	Not applicable	Not applicable	10	10	0.553
cis-1,2-Dichloroethene	156-59-2	Not applicable	Not applicable	5	5	0.159
cis-1,3-Dichloropropene	10061-01-5	Not applicable	Not applicable	5	5	0.339
Dibromochloromethane	124-48-1	Not applicable	Not applicable	5	5	0.329
Ethylbenzene	100-41-4	Not applicable	Not applicable	5	5	0.299
Methyl tert-butyl ether	1634-04-4	Not applicable	Not applicable	5	5	0.401
Methylene chloride	75-09-2	Not applicable	Not applicable	5	5	0.801
Styrene	100-42-5	Not applicable	Not applicable	5	5	0.347
Tetrachloroethene	127-18-4	700	Wastewater Discharge Permit	5	5	0.280
Toluene	108-88-3	Not applicable	Not applicable	5	5	0.303
trans-1,2-Dichloroethene	156-60-5	Not applicable	Not applicable	5	5	0.178
trans-1,3-Dichloropropene	10061-02-6	Not applicable	Not applicable	5	5	0.349
Trichloroethene	79-01-6	500	Wastewater Discharge Permit	5	5	0.290
Vinyl chloride	75-01-4	200	Wastewater Discharge Permit	5	5	0.428
Xylenes (Total)	1330-20-7	Not applicable	Not applicable	10	10	0.854

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: SVOCs

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
1,2,4-Trichlorobenzene	120-82-1	Not applicable	Not applicable	10	10	1.00
1,2-Dichlorobenzene	95-50-1	Not applicable	Not applicable	10	10	1.00
1,3-Dichlorobenzene	541-73-1	Not applicable	Not applicable	10	10	1.00
1,4-Dichlorobenzene	106-46-7	7,500	Wastewater Discharge Permit	10	10	1.00
2,4,5-Trichlorophenol	95-95-4	400,000	Wastewater Discharge Permit	10	10	1.00
2,4,6-Trichlorophenol	88-06-2	2,000	Wastewater Discharge Permit	10	10	1.00
2,4-Dichlorophenol	120-83-2	Not applicable	Not applicable	10	10	1.00
2,4-Dimethylphenol	105-67-9	Not applicable	Not applicable	10	10	1.00
2,4-Dinitrophenol	51-28-5	Not applicable	Not applicable	50	50	2.00
2,4-Dinitrotoluene	121-14-2	130	Wastewater Discharge Permit	10	10	1.00
2,6-Dinitrotoluene	606-20-2	Not applicable	Not applicable	10	10	2.16
2-Chloronaphthalene	91-58-7	Not applicable	Not applicable	10	10	1.00
2-Chlorophenol	95-57-8	Not applicable	Not applicable	10	10	1.00
2-Methylphenol (o-cresol)	95-48-7	200,000	Wastewater Discharge Permit	10	10	2.00
2-Nitroaniline	88-74-4	Not applicable	Not applicable	10	10	1.00
2-Nitrophenol	88-75-5	Not applicable	Not applicable	10	10	1.00
3,3'-Dichlorobenzidine	91-94-1	Not applicable	Not applicable	50	50	1.00
3-Nitroaniline	99-09-2	Not applicable	Not applicable	10	10	1.00
3/4-Methylphenol (m/p-cresol)	-3495 [c]	200,000	Wastewater Discharge Permit	10	10	2.00

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
4,6-Dinitro-2-methylphenol	534-52-1	Not applicable	Not applicable	10	10	1.00
4-Bromophenyl-phenylether	101-55-3	Not applicable	Not applicable	10	10	1.00
4-Chloro-3-methylphenol	59-50-7	Not applicable	Not applicable	10	10	1.00
4-Chloroaniline	106-47-8	Not applicable	Not applicable	10	10	1.00
4-Chlorophenyl-phenylether	7005-72-3	Not applicable	Not applicable	10	10	1.00
4-Nitroaniline	100-01-6	Not applicable	Not applicable	10	10	1.00
4-Nitrophenol	100-02-7	Not applicable	Not applicable	10	10	2.00
bis(2-Chloroethoxy)methane	111-91-1	Not applicable	Not applicable	10	10	1.00
bis(2-Chloroethyl)ether	111-44-4	Not applicable	Not applicable	10	10	1.00
bis(2-Chloroisopropyl)ether	108-60-1	Not applicable	Not applicable	10	10	1.00
bis(2-Ethylhexyl)phthalate	117-81-7	Not applicable	Not applicable	10	10	1.00
Butylbenzyl phthalate	85-68-7	Not applicable	Not applicable	10	10	1.00
Dibenzofuran	132-64-9	Not applicable	Not applicable	10	10	1.00
Diethyl phthalate	84-66-2	Not applicable	Not applicable	10	10	1.00
Dimethyl phthalate	131-11-3	Not applicable	Not applicable	10	10	1.00
Di-n-butyl phthalate	84-74-2	Not applicable	Not applicable	10	10	1.00
Di-n-octyl phthalate	117-84-0	Not applicable	Not applicable	10	10	1.00
Hexachlorobenzene	118-74-1	130	Wastewater Discharge Permit	10	10	1.00
Hexachlorobutadiene	87-68-3	500	Wastewater Discharge Permit	10	10	1.00
Hexachlorocyclopentadiene	77-47-4	Not established	Not applicable	10	10	1.00
Hexachloroethane	67-72-1	3,000	Wastewater Discharge Permit	10	10	1.00

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Nitrobenzene	98-95-3	2,000	Wastewater Discharge Permit	10	10	1.00
n-Nitrosodiphenylamine	86-30-6	Not applicable	Not applicable	10	10	1.00
n-Nitroso-di-n-propylamine	621-64-7	Not applicable	Not applicable	10	10	1.00
Pentachlorophenol	87-86-5	100,000	Wastewater Discharge Permit	10	10	1.27
Phenol	108-95-2	Not applicable	Not applicable	10	10	2.00
Pyridine	110-86-2	5,000	Wastewater Discharge Permit	20	20	2.00

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: SVOCs by SIM

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Acenaphthene	83-32-9	Not applicable	Not applicable	0.2	0.2	0.02
Acenaphthylene	208-96-8	Not applicable	Not applicable	0.2	0.2	0.02
Anthracene	120-12-7	Not applicable	Not applicable	0.2	0.2	0.021
Benzo(a)anthracene	56-55-3	Not applicable	Not applicable	0.2	0.2	0.025
Benzo(a)pyrene	50-32-8	Not applicable	Not applicable	0.2	0.2	0.025
Benzo(b)fluoranthene	205-99-2	Not applicable	Not applicable	0.2	0.2	0.031
Benzo(g,h,i)perylene	191-24-2	Not applicable	Not applicable	0.2	0.2	0.021
Benzo(k)fluoranthene	207-08-9	Not applicable	Not applicable	0.2	0.2	0.034
Chrysene	218-01-9	Not applicable	Not applicable	0.2	0.2	0.026
Dibenzo(a,h)anthracene	53-70-3	Not applicable	Not applicable	0.2	0.2	0.028
Fluoranthene	206-44-0	Not applicable	Not applicable	0.2	0.2	0.031
Fluorene	86-73-7	Not applicable	Not applicable	0.2	0.2	0.020
Indeno(1,2,3-cd)pyrene	193-39-5	Not applicable	Not applicable	0.2	0.2	0.029
Naphthalene	91-20-3	Not applicable	Not applicable	0.2	0.2	0.020
Phenanthrene	85-01-8	Not applicable	Not applicable	0.2	0.2	0.037
Pyrene	129-00-0	Not applicable	Not applicable	0.2	0.2	0.023

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Pesticides

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
4,4′-DDD	72-54-8	Not applicable	Not applicable	0.05	0.05	0.01
4,4′-DDE	72-55-9	Not applicable	Not applicable	0.05	0.05	0.02
4,4′-DDT	50-29-3	Not applicable	Not applicable	0.05	0.05	0.01
alpha-BHC	319-84-6	Not applicable	Not applicable	0.05	0.05	0.01
Aldrin	309-00-2	Not applicable	Not applicable	0.05	0.05	0.01
beta-BHC	319-85-7	Not applicable	Not applicable	0.05	0.05	0.01
delta-BHC	319-86-8	Not applicable	Not applicable	0.05	0.05	0.01
Chlordane (technical)	57-74-9	30	Wastewater Discharge Permit	0.5	0.5	0.04
Dieldrin	60-57-1	Not applicable	Not applicable	0.05	0.05	0.01
Endosulfan sulfate	1031-07-8	Not applicable	Not applicable	0.05	0.05	0.01
Endosulfan I	959-98-8	Not applicable	Not applicable	0.05	0.05	0.02
Endosulfan II	33213-65-9	Not applicable	Not applicable	0.05	0.05	0.01
Endrin	72-20-8	20	Wastewater Discharge Permit	0.05	0.05	0.01
Endrin aldehyde	7421-93-4	Not applicable	Not applicable	0.05	0.05	0.01
Endrin ketone	53494-70-5	Not applicable	Not applicable	0.05	0.05	0.02
gamma-BHC (Lindane)	58-89-9	400	Wastewater Discharge Permit	0.05	0.05	0.003
Heptachlor	76-44-8	8	Wastewater Discharge Permit	0.05	0.05	0.003
Heptachlor epoxide	1024-57-3	8	Wastewater Discharge Permit	0.05	0.05	0.01

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Methoxychlor	72-43-5	10,000	Wastewater Discharge Permit	0.1	0.1	0.01
Toxaphene	8001-35-2	500	Wastewater Discharge Permit	2.0	2.0	0.66

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: PCBs

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Aroclor 1016	12674-11-2	Not applicable	Not applicable	1	1	0.0841
Aroclor 1221	11104-28-2	Not applicable	Not applicable	1	1	0.0841
Aroclor 1232	11141-16-5	Not applicable	Not applicable	1	1	0.0841
Aroclor 1242	53469-21-9	Not applicable	Not applicable	1	1	0.0841
Aroclor 1248	12672-29-6	Not applicable	Not applicable	1	1	0.0841
Aroclor 1254	11097-69-1	Not applicable	Not applicable	1	1	0.0845
Aroclor 1260	11096-82-5	Not applicable	Not applicable	1	1	0.0845

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: TPH-purgeable (gasoline) and TPH-extractable (diesel and motor oil)

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
TPH-gasoline (C_6-C_{10})	8006-61-9	Not applicable	Not applicable	0.1	0.1	0.01
TPH-diesel (C_{10}-C_{24})	-3527 [c]	Not applicable	Not applicable	0.5	0.5	0.017
TPH-motor oil (C_{24}-C_{36})	-3528 [c]	Not applicable	Not applicable	0.5	0.5	0.023

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Metals

Analyte	CAS Number	Project Action Limit [a] (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Antimony	7440-36-0	Not applicable	Not applicable	5	5	1.12
Arsenic	7440-38-2	4,000	Wastewater Discharge Permit	10	10	0.946
Barium	7440-39-3	Not applicable	Not applicable	2	2	0.196
Beryllium	7440-41-7	Not applicable	Not applicable	0.5	0.5	0.114
Cadmium	7440-43-9	500	Wastewater Discharge Permit	0.5	0.5	0.055
Chromium	7440-47-3	5,000	Wastewater Discharge Permit	10	10	3.26
Cobalt	7440-48-4	Not applicable	Not applicable	2	2	0.217
Copper	7440-50-8	4,000	Wastewater Discharge Permit	1	1	0.097
Lead	7439-92-1	1,500	Wastewater Discharge Permit	3	3	0.173
Mercury	7439-97-6	50	Wastewater Discharge Permit	0.2	0.2	0.05
Molybdenum	7439-98-7	Not applicable	Not applicable	5	5	0.216
Nickel	7440-02-0	2,000	Wastewater Discharge Permit	5	5	0.231
Selenium	7782-49-2	Not applicable	Not applicable	5	5	0.308
Silver	7440-22-4	600	Wastewater Discharge Permit	2	2	0.040
Thallium	7440-28-0	Not applicable	Not applicable	2	2	0.55
Vanadium	7440-62-2	Not applicable	Not applicable	10	10	2.37
Zinc	7440-66-6	7,000	Wastewater Discharge Permit	5	5	3.74

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Herbicides

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
2,4-D	94-75-7	10,000	Wastewater Discharge Permit	4	4	1.98
2,4-DB	94-82-6	Not applicable	Not applicable	4	4	2.11
2,4,5-T	93-76-5	Not applicable	Not applicable	1	1	0.179
2,4,5-TP (Silvex)	93-72-1	1,000	Wastewater Discharge Permit	1	1	0.298
Dalapon	75-99-0	Not applicable	Not applicable	4	4	2.91
Dicamba	1918-00-9	Not applicable	Not applicable	2	2	0.399
Dichloroprop	120-36-5	Not applicable	Not applicable	4	4	2.01
Dinoseb	88-85-7	Not applicable	Not applicable	1	1	0.269
MCPA	94-74-6	Not applicable	Not applicable	400	400	191
MCPP	93-65-2	Not applicable	Not applicable	400	400	138

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Oil and Grease

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
Oil and Grease	-46 [c]	100	Wastewater Discharge Permit	5	5	2.12

Matrix: Water
Analytical Group: TRPH

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
TRPH	-3530 [c]	300	Wastewater Discharge Permit	5	5	2.03

Matrix: Water
Analytical Group: TSS

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
TSS	-20 [c]	Not applicable	Not applicable	4	4	Not applicable [b]

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: pH

Analyte	CAS Number	Project Action Limit (pH units)	Project Action Limit Reference	Project Quantitation Limit Goal (pH units)	Laboratory-specific	
					QLs (pH units)	MDLs (pH units)
pH	-9 [c]	6.0-9.5	Wastewater Discharge Permit	0.1	0.1	Not applicable[b]

Matrix: Water
Analytical Group: Ignitability

Analyte	CAS Number	Project Action Limit (°C)	Project Action Limit Reference	Project Quantitation Limit Goal (°C)	Laboratory-specific	
					QLs (°C)	MDLs (°C)
Ignitability	-3120 [c]	≥ 60	Wastewater Discharge Permit	Not applicable	Not applicable	Not applicable[b]

Matrix: Water
Analytical Group: COD

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
COD	-13 [c]	Not applicable	Not applicable	20	20	6.47

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Matrix: Water
Analytical Group: Total/Dissolved Sulfide

Analyte	CAS Number	Project Action Limit (mg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/L)	Laboratory-specific	
					QLs (mg/L)	MDLs (mg/L)
Total sulfide	18496-25-8	0.5	Wastewater Discharge Permit	1	1	0.453
Dissolved sulfide	18496-25-8	0.5	Wastewater Discharge Permit	1	1	0.453

Matrix: Water
Analytical Group: Cyanide

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Cyanide	57-12-5	1,000	Wastewater Discharge Permit	10	10	3.52

Matrix: Water
Analytical Group: Phenols

Analyte	CAS Number	Project Action Limit (µg/L)	Project Action Limit Reference	Project Quantitation Limit Goal (µg/L)	Laboratory-specific	
					QLs (µg/L)	MDLs (µg/L)
Phenols	108-95-2	23,000	Wastewater Discharge Permit	50	50	14.05

SAP Worksheet #15.2 – Reference Limits and Evaluation Table for Water Samples (Continued)

Notes:

This worksheet represents the types of analyses that may be performed during basewide radiological activities.

[a] Project quantitation limits and minimum detectable activities for radiological analyses are calculated per samples per analysis. Therefore, these values are listed as to be determined until a project action limit is applicable since these are determined based on background, sample size, and count time. Values listed indicate a minimum MDA that will be achieved for isotopes that have RROs. For the off-site laboratory, the MDAs listed are based on a 30-45 minute count time. To achieve lower MDAs, the sample count time would have to increase.

[b] MDLs are not applicable to radiological and asbestos analyses.

[c] CAS number listed is from the NEDD valid value list since a CAS number is not available for this analyte.

This page intentionally left blank.

SAP Worksheet #16 – Project Schedule / Timeline Table

A project schedule is not applicable since this SAP is intended for basewide radiological support.

This page intentionally left blank.

SAP Worksheet #17 – Sampling Design and Rationale

The following sections provide a rationale for types of sampling that may be performed under basewide radiological support activities described in Worksheet #14.

BACKGROUND (REFERENCE) SAMPLING

Prior to the start of pipeline excavation activities, an average background level will be determined by performing measurements at systematic or random locations within a designated background area. Additional background samples may be collected as directed by the RSO. The soil samples will be collected in the background area at systematic locations and analyzed by the on-site laboratory by gamma spectroscopy to establish average background values for ^{226}Ra and ^{137}Cs or other radionuclides as applicable, which will be used in conjunction with the RROs listed in Table ES-2.

The background values for ^{226}Ra and ^{137}Cs will be determined at the off-site laboratory, by counting for a period typically necessary to meet the applicable maximum minimum detectable activity (MDA) listed in Worksheet #15.1.

Measurement uncertainty values will be considered acceptable if, in the opinion of the off-site laboratory manager, a longer duration count would not improve the counting statistics markedly, and:

1. The two-sigma total uncertainty for ^{226}Ra is less than 10 pCi/g for activity indicated below the MDA.

2. The two-sigma uncertainty for ^{137}Cs is less than 10 pCi/g for activity indicated below the MDA.

PIPE REMOVAL SAMPLING

The general approach to removing the storm drain and sanitary sewer lines will be to first remove the overlying pavement, then excavate the soils, and subsequently remove the pipelines. Radiological screening and sampling will be performed ex situ on excavated soil, pipe, and debris.

To remove the storm and sanitary sewer lines, surface pavement (where present) will be removed from the limits of the excavation. The surface pavement material will be stockpiled and evaluated for potential reuse as granular surface material, subject to the approval of the DON, or disposed of as waste.

The soil overlying each storm and sanitary sewer line will be excavated and transported to a designated RSY for subsequent survey and sampling activities. The depth of the excavation will extend to a minimum of 1 foot below the pipeline. Excavated soil removed from within an identified IRP site will be managed separately from other IRP sites. Excavated soil removed from non-IRP site areas will be managed so that, once free released, it can be returned to the general area from which it was excavated.

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

Following removal of the excavated soil, the sewer pipelines will be removed. To the extent practicable, the pipes and manholes will be removed and stockpiled separately. If the piping cannot be extracted separately (as may be the case for terracotta pipe), the piping will be stockpiled, sampled, and surveyed as excavated soil [ES]).

Where practicable, pipe segments shall be removed intact. The pipe will be placed in designated stockpile/laydown areas within the radiologically controlled area from which it was removed to allow for radiological characterization and sampling as required. Excavated piping will be considered potentially radiologically contaminated until survey and sampling data prove otherwise, and it shall be controlled as potentially radioactively contaminated material and handled accordingly. Every effort will be made to contain silts and debris that may be inside the pipe. If sediment is present within removed piping, a minimum of one sample will be collected from each section of pipe for radiological analysis unless otherwise described in a RASO approved work document. These sediment samples will be collected from the interior surfaces of extracted piping and components and analyzed by gamma spectroscopy by the on-site laboratory. Open sewer or storm drain lines left in place during the removal process will be plugged to prevent water from entering or exiting pipes and to prevent the release of any contamination that may be present in the lines. In no case will sediments from removal or installation work be allowed to enter the bay.

In-place and excavated piping, piping components, and large debris will be screened for alpha and beta/gamma emitters. Swipe samples will be collected from the interior and exterior surfaces to identify the presence of removable surface contamination for the purposes of health and safety monitoring and equipment and debris release. Swipe samples will be analyzed at the on-site laboratory using a gas-flow proportional alpha and beta/gamma radiation counter. A minimum of one exterior and one interior swipe sample will be collected for each 10 linear feet of excavated piping. Additional swipe samples may be collected based on the result of the field surveys, and are typically collected in the event that a specific criteria or release limit has been exceeded and additional information is necessary to determine the impact in order to properly release the debris.

In instances where surveys cannot be performed, such as broken piping, the pipe will be managed as ES. Radiologically contaminated material identified during pipe surveys will be stored at the originating site pending disposal. Additional samples will be analyzed for ^{90}Sr and alpha spectroscopy if ^{137}Cs activity above the release criteria is identified during on-site laboratory gamma spectroscopy analysis.

A grab soil sample will be collected from the bottom of the excavated trench section where there is evidence of a breach in the storm drain/sanitary sewer structure. A breach will be defined as 1) gap/crack/break in the pipe segments; 2) abrupt end to a pipe (open ended); 3) missing section of pipe/conduit; and 4) other visible signs of pipe/conduit failure/leakage. The sample will be analyzed for the radioactivity and chemicals of concern from upgradient sources.

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

If it is practical and required to remove piping from a radiologically impacted site, an initial surface radiological survey will be performed to identify surface and near-surface (less than 30 centimeters [12 inches] below ground surface) radioactive material for subsequent removal and proper on-site storage pending disposal through the DON's low-level radioactive waste (LLRW) Disposal Program prior to excavation.

Excavated debris and piping components not radiologically contaminated will be stockpiled in a temporary laydown area. Subsequently, these wastes will be transported off-site for disposal at a CERCLA Off-site Rule-approved landfill. Trucks transporting these nonradiological wastes will pass through the on-site portal monitor prior to exiting HPS.

Excavated soil, piping, and debris will be placed on stockpile/laydown pads for storage, sampling, and/or radiological screening. Water collected from the screening pads will be characterized for chemical and radiological constituents.

Throughout the excavation process, soil and piping shall be visually inspected for chemical staining or odors. Material from an IRP site that emits odors or is stained shall be segregated for further characterization sampling and analysis by another DON contractor in accordance with the disposal facilities requirements. (Characterization and disposal are not included in the scope of work for TtEC for this type of material.) If the material is identified outside the bounds of an IRP site, then the DON will be notified to determine any further action.

Drums, bottles, jars, and small containers with unknown contents may be located during excavation activities. When these items are located, the procedure included in Attachment 1 of the Work Plan will be used to determine safety measures and procedures needed to inspect, handle, remove, and dispose of them.

All soil and sediment samples will be analyzed by gamma spectroscopy by the on-site radiological laboratory. Samples will be sent to the off-site laboratory for definitive analysis as needed. Additional samples may also be analyzed for ^{90}Sr, isotopic plutonium, and isotopic uranium, if the on-site laboratory results indicate concentrations of ^{137}Cs at or above its RRO. When on-site laboratory results indicate concentrations of ^{90}Sr at the RRO or greater, additional analysis for isotopic plutonium and isotopic uranium will be performed by the off-site laboratory.

Trench segment piping identified as having radioactive materials present above the RRO will require further trench sampling to characterize the extent of contamination, as directed by the RSO. No scoping survey will need to be performed on these Trench Units (TUs).

EXCAVATED SOIL SAMPLING

Excavated soil will be transported to a screening pad for subsequent dewatering (if necessary) and radiological survey activities. Excavated soil placed on the screening pads will be spread out in lifts not to exceed 6 inches in height and up to 1,000 square meters (m^2) in surface area. As necessary, the material will be allowed to dewater prior to performing radiological surveys. The

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

radiological surface survey will consist of a high-density survey process with the use of sodium iodide (NaI) or equivalent detectors. The high-density survey process will result in a 100 percent scan survey. Radioactive material identified during screening activities will be collected, segregated, and stored in appropriate containers for subsequent packaging and disposal under the direction of the DON LLRW Disposal Program as directed by the Radiological Technical Manager.

Collected field data will be logged and survey points plotted on survey unit grid maps to document survey results. These data will be used to directly tie the locations of any elevated radiation measurements to the corresponding grid coordinates, which will be established during the development of the systematic sampling plan. Data analysis will be performed as the data are received, and questionable areas will be flagged in the field for resurvey/verification. Locations where surface radiation levels appear to be greater than 3 sigma of the mean background level (or otherwise RASO-approved investigation level) will be noted on a subcontractor-provided grid map. Areas confirmed as having radiation levels greater than the established 3 sigma of the mean background area level (or otherwise RASO-approved investigation level) will be evaluated further for the presence of radioactive material and may include additional biased sampling points. If radioactive material is confirmed, the area will be physically marked and the associated radioactive material removed.

Systematic solid samples will be collected for each survey unit of excavated soil (up to 1,000 m^2) and placed on the screening pad for a Scoping Survey and FSS. Any contamination found in ES will be characterized and remediated as directed by the RSO. Remedial action support surveys will be performed until postremediation sample results are less than the RROs. Scoping survey sample data may be used as the FSS if all sample results are less than the RROs.

Scoping survey and FSS samples will be systematically collected based on a random start point and sample spacing utilizing Equation 4-2 from the Base-wide Storm Drain and Sanitary Sewer Removal Project Work Plan, Revision 1 (Base-wide Work Plan, Rev. 1) (TtEC 2007) or using the most current version of Visual Sample Plan (VSP) software with a triangular grid pattern. Additional samples will be collected at locations where the investigation level is exceeded, or as directed by the Radiological Technical Manager or RSO. The samples will be analyzed at the on-site radiological laboratory by gamma spectroscopy. Excavated soil determined to have residual radioactive contamination below the RROs may be used as backfill, pending additional chemical analytical results. Radiologically contaminated material identified during surveys or sample analysis will be placed in storage containers pending disposal.

The DON has applied a conservative remediation decision criteria (any one sample result exceeding the action level or RRO will require remediation), and this conservative approach effectively overrides the large uncertainty in single sample results. Measurement uncertainty values will be considered acceptable if, in the opinion of the on-site laboratory manager, a longer duration count would not improve the counting statistics markedly, and:

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

1. The two-sigma total uncertainty for ^{226}Ra is less than 10 pCi/g for activity indicated below the MDA.
2. The two-sigma uncertainty for ^{137}Cs is less than 10 pCi/g for activity indicated below the MDA.

Since any indicated activity above the release criteria will be remediated prior to an FSS, using these limits for uncertainty measurement effectively overrides a larger uncertainty in a single sample result.

FSS samples analyzed by the on-site radiological laboratory that have results below the RROs will be sent to the off-site laboratory for definitive analysis.

TRENCH SAMPLING

Following completion of excavation activities, scoping surveys of the trenches will be completed. If the scoping survey sample results are less than the RROs, then the scoping survey data will be used as an FSS, and backfilling or limited storm drain replacement will be acceptable with the concurrence of the RASO. Scoping surveys and FSSs for the excavated sections will include scans and systematic sampling. Samples will be collected after establishing a grid consisting of cells not to exceed 1,000 m^2 over the excavated trench surfaces (sidewalls and bottom). Systematic sample collection locations will be generated using the most current version of VSP.

Any area from a trench with results indicating that radioactive materials are present above the RROs will be characterized and remediated. Remedial action support surveys will be considered completed when post-remediation sample results do not indicate activity above the RROs. An FSS will be performed on each TU after the remedial action support survey has concluded. TUs will be considered acceptable for backfill or limited storm drain replacement when no contamination is found above the RROs during a systematic sampling, either from a scoping survey or FSS.

The DON has applied a conservative remediation decision criteria (any one sample result exceeding the action level or RRO will require remediation) and the conservative approach effectively overrides the large uncertainty in single sample results. Measurement uncertainty values will be considered acceptable if, in the opinion of the laboratory manager, a longer duration count would not improve the counting statistics markedly, and:

1. The two-sigma total uncertainty for ^{226}Ra is less than 10 pCi/g for activity indicated below the MDA.
2. The two-sigma uncertainty for ^{137}Cs is less than 10 pCi/g for activity indicated below the MDA.

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

Since any indicated activity above the release criteria will be remediated prior to an FSS, using these limits for uncertainty measurement effectively overrides a larger uncertainty in a single sample result.

The postexcavation trench soil samples will be analyzed by the on-site laboratory by gamma spectroscopy. If on-site laboratory results indicate concentrations of ^{137}Cs at or above its RRO, the sample will be analyzed by the off-site laboratory for ^{90}Sr. If laboratory results indicate concentrations of ^{90}Sr at or above the RRO, additional analysis for isotopic plutonium and uranium will be performed.

FSS soil samples analyzed by the on-site laboratory and below the RROs will be sent to the off-site laboratory for definitive analysis.

IMPORT FILL MATERIAL SAMPLING

Excavated soil cleared of radioactivity (and, where excavated from IRP sites, for location-specific chemicals of concern) will be used as backfill at HPS. However, additional soil may be imported for use as fill. Imported material to be used as backfill material at HPS will be evaluated in accordance with the HPS Backfill Review and Acceptance Procedure, SOP HPO-Tt-0270 (as provided in Appendix A of this SAP).

Four randomly located material samples will be collected from each imported material source prior to use and analyzed by the off-site laboratory for VOCs, SVOCs with polynuclear aromatic hydrocarbons (PAHs) by selective ion monitoring (SIM) mode, pesticides, PCBs, TPH-purgeable, TPH-extractable, metals, and gamma-emitting isotopes. Frequency and analysis of import material were selected following the guidelines established by DTSC in the Information Advisory on Clean Imported Fill Material (DTSC 2001). If the facility cannot provide a certificate stating that material does not contain asbestos, the four samples collected will also be analyzed for asbestos. Only soil or fine materials will be sampled. Gravel and rock will not be sampled but will be required to be cleaned, washed, free of fines, and from an approved/acceptable source (certified not to contain asbestos). If gravel or rock sources cannot provide a certificate, then four samples of the gravel or rock will be tested for asbestos.

WASTE CHARACTERIZATION SAMPLING

Wastes that will be generated during excavation activities include LLRW and/or low-level mixed waste of soil, sediment, debris (including piping and system components), and wastewater. Non-radiological generated waste may include soil and sediment, debris (including piping and system components), and wastewater.

During removal actions, monitoring wells may be located within the excavation footprint. If possible, wells will be preserved, but if preservation is not possible or deemed unnecessary by the DON, wells may be abandoned. Waste materials results from overdrilling each well or piezometer, such as soil cuttings and well-casing remnants, will be screened and sampled for radioactive material.

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

If the results of analyses for the chemicals of concern associated with excavated soil from IRP sites (see Table 2 for a list of chemicals of concern associated with each IRP site) indicate that the soil is not suitable for reuse on-site, then additional chemical analyses may be performed to adequately characterize the material for off-site disposal. Additional analyses may include VOCs, SVOCs, pesticides, PCBs, TPH-purgeable, TPH-extractable, and Title 22 metals, asbestos, Soluble Threshold Limit Concentration, and Toxicity Characteristic Leaching Procedure. The actual characterization analyses requested will depend on the types of analyses previously performed on the material and the analyses required to profile the material for disposal. Samples will be collected at a frequency of one sample per 500 cubic yards of soil with a minimum of five samples collected from any excavated soil unit with a total volume less than 2,500 cubic yards.

If groundwater is present in the excavation, it may be pumped directly to an approved storage container. To the extent practicable, waters from known groundwater plume locations will be collected and stored separately from waters in non-IR site locations. If light non-aqueous phase liquid, dense non-aqueous phase liquid, or high concentrations of VOCs in the breathing zone are encountered, in situ water may be sampled.

Water from the dewatering pads and decontamination activities will be collected and stored in approved storage containers. One water sample per approved container may be collected and analyzed by the off-site laboratory for VOCs, SVOCs, pesticides, PCBs, herbicides, Title 22 metals, TPH-purgeable, TPH-extractable, total oil and grease, total recoverable petroleum hydrocarbons, pH, total suspended solids, ignitability, total cyanide, phenols, chemical oxygen demand, dissolved sulfide, and radionuclides as required per the disposal facility. (If smaller containers such as drums are used to contain the wastewater, then the frequency of samples collected for waste characterization will be determined by the TtEC Regulatory Compliance Specialist.)

Drums, bottles, jars, and small containers with unknown contents unearthed during the excavation activities will be first screened by field instruments for radioactivity, and then a swipe sample will be collected from the inside of each container and analyzed on-site using a gas-flow proportional alpha and beta/gamma radiation counter. A sample of the container content may be collected and sent to an off-site laboratory for gamma spectroscopy, ^{90}Sr, or alpha spectroscopy, based upon review of the swipe sample results. Once the containers are sampled for radioactivity, the containers will undergo "HazCating" or "waste compatibility screening," which is defined as a series of rapid, qualitative chemical and physical tests conducted to determine potential hazards, handling precautions, storage criteria, and the disposal classification of the material in question.

This page intentionally left blank.

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

Sampling Location / ID Number	Matrix	Depth (feet)	Analytical Group	Number of Samples	Sampling SOP Reference
Reference background area (WW-PX-RA-UU)	Soil	Surface	Gamma isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	Worksheet #14
Inside piping [a] (WW-PXPI-QQQQ-UU)	Sediment	N/A	Gamma isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	Worksheet #14
Interior and exterior of piping [a] (WW-PXS-AABBCC-SS-UU)	Swipe	N/A	Alpha/beta isotopes	TBD [a]	Worksheet #14
Postexcavation samples from trench walls and floor [a] (WW-PXT-YYY-UUU)	Soil	TBD [a]	Gamma isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	Worksheet #14
Import fill material [b] (WW-BACKFILL-UUU)	Soil	Random	VOCs, SVOCs, pesticides, PCBs, TPH-purgeable, TPH-extractable, Title 22 metals, asbestos, and gamma isotopes	TBD [a]	Worksheet #14
Excavated soil chemical samples (not radioactive) [c] (WW-PX-IRYY-ZZZZ)	Soil	Random	Per each IRP associated list of chemicals of concern	TBD [a]	Worksheet #14
Soil stockpile waste (initial radiological screening) [d]	Soil	Random	Gamma isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	Worksheet #14
Soil stockpile waste (not radioactive) [d]	Soil	Random	VOCs, SVOCs, pesticides, PCBs, TPH-purgeable, TPH-extractable, Title 22 metals	TBD [a]	Worksheet #14
Soil waste (radioactive) [d] (WW-PX-UU)	Soil	Random	Gamma isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	Worksheet #14
Wastewater [d]	Water	N/A	VOCs, SVOCs, pesticides, PCBs, herbicides, Title 22 metals, TPH-purgeable, TPH-extractable, total oil and grease, total recoverable petroleum hydrocarbons, pH, total suspended solids, ignitability, total cyanide, phenols, chemical oxygen demand, dissolved sulfide, gamma isotopes, and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required	TBD [a]	Worksheet #14

Notes:
This worksheet represents the types of samples that may be collected during basewide radiological activities.

SAP Worksheet #18 – Sampling Locations and Methods/SOP Requirements Table (Continued)

[a] The number of locations cannot be determined until excavation of piping and thus the length and size of piping and trench are determined. However, each location will be numbered sequentially and with nomenclature that identifies it as piping or postexcavation trench wall/floor samples.

[b] The number of import fill samples will be determined in the field based on the amount of import material sources samples. However, import material samples will be identified with the source name and a sequential number.

[c] One soil sample from an IRP site will be collected per 500 cubic yards of soil, with a minimum of 5 samples collected from any excavated soil unit with a total volume less than 2,500 cubic yards.

[d] The number of waste samples will be determined in the field based on the amount of soil excavated and wastewater generated. However, each waste will be identified with a sequential number and nomenclature identifying the waste from a stockpile, drum, or other container.

SAP Worksheet #19 – Analytical SOP Requirements Table

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	Gamma Isotopes (on-site laboratory)	C1402-98 Standard Guide for High-Resolution Gamma-ray Spectrometry SOP HPO-Tt-028 [a]	250-mL or 500-mL plastic container or tuna can	250 – 500 mL	None	N/A
Swipe	Alpha/beta Isotopes (on-site laboratory)	Gross alpha/beta by gas-flow proportional counter or ZnS(Ag) detector; Low-energy beta by liquid scintillation counter SOP HPO-Tt-029 [a]	250-mL or 500-mL plastic container	250 mL	None	N/A
Soil	Gamma Isotopes	EPA 901.1 MOD SOP ST-RD-0102	One 250 mL, poly/glass or tuna can	250 to 400 g	None	180 days [c]
Soil	^{90}Sr	EPA 905 MOD or DOE SR-03-RC MOD SOP ST-RC-0050 or ST-RD-0403	One 250 mL, poly/glass	5 g	None	180 days [c]
Soil	Isotopic Uranium, Plutonium, Thorium	DOE A-01-R MOD SOP ST-RC-0210	One 250 mL, poly/glass	5 g	None	180 days [c]
Soil	Tritium	EPA 906.0 MOD SOP ST-RD-0302	One 250 mL poly/glass	100 g	None	180 days [c]
Swipe	Alpha/beta Isotopes	EPA 9310 or equivalent SOP ST-RD-0403	Envelope with paper swipe	Swipe	None	N/A
Soil	VOCs	EPA 5035A/8260C SOP ST-MS-0002	Three 5-gram En Core samplers [b]	15 grams	4±2°C	48 hours/14 days [d]
Soil	TPH-purgeable	EPA 5035A/8015B SOP ST-GC-0014	Three 5-gram En Core samplers [b]	15 grams	4±2°C	48 hours/14 days [d]
Soil	SVOCs	EPA 3550B/8270D SOP ST-MS-0001	One 8-ounce glass jar	8 ounces	4±2°C	14 days/40 days [d]
Soil	Pesticides	EPA 3550B/8081B SOP ST-GC-0016	One 8-ounce glass jar	8 ounces	4±2°C	14 days/40 days [d]

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

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Soil	PCBs	EPA 3550B/8082A SOP ST-GC-0015	One 8-ounce glass jar	8 ounces	4±2°C	14 days/40 days [d]
Soil	TPH-extractable	EPA 3550B/8015B SOP ST-GC-0005	One 8-ounce glass jar	8 ounces	4±2°C	14 days/40 days [d]
Soil	Metals	EPA 3050B/6020A SOP ST-MT- 0001	One 8-ounce glass jar	8 ounces	4±2°C	180 days [c]
Soil	Mercury	EPA 7471B SOP ST-MT-0007	One 8-ounce glass jar	8 ounces	4±2°C	28 days [c]
Soil	Asbestos	CARB 435 SOP III-A	One 8-ounce glass jar	8 ounces	4±2°C	N/A

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

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	^{90}Sr	EPA 905 MOD or DOE SR-03-RC MOD SOP ST-RC-0050 or ST-RD-0403	One 1 L, poly/glass	1 L	HNO_3 pH<2	180 days [c]
Water	Radium-226	EPA 903.0 MOD SOP ST-RD-0403	One 1 L, poly/glass	1 L	HNO_3 pH<2	180 days [c]
Water	Gamma Isotopes	EPA 901.1 MOD SOP ST-RD-0102	One 1 L, poly/glass	1 L	HNO_3 pH<2	180 days [c]
Water	Isotopic Uranium, Plutonium, Thorium	DOE A-01-R MOD SOP ST-RC-0210	One 1 L, poly/glass	1 L	HNO_3 pH<2	180 days [c]
Water	Tritium	EPA 906.0 MOD SOP ST-RD-0302	One 250 mL, Amber glass	120 mL	None	180 days [c]
Water	VOCs	EPA 5030B/8260C SOP ST-MS-0002	Three 40-mL VOA vials	120 mL	pH ≤ 2 w/HCl, 4±2°C	14 days [c]
Water	TPH-purgeable	EPA 5030B/8015B SOP ST-GC-0014	Three 40-mL VOA vials	120 mL	pH ≤ 2 w/HCl, 4±2°C	14 days [c]
Water	SVOCs (including SIM for PAHs)	EPA 3510C/8270D SOP ST-MS-0001	Two 1-L amber bottles	2 L	4±2°C	7 days/40 days [d]
Water	Pesticides	EPA 3510C/8081B SOP ST-GC-0016	Two 1-L amber bottles	2 L	4±2°C	7 days/40 days [d]
Water	PCBs	EPA 3510C/8082A SOP ST-GC-0015	Two 1-L amber bottles	2 L	4±2°C	7 days/40 days [d]
Water	TPH-extractable	EPA 3510C/8015B SOP ST-GC-0005	Two 1-L amber bottles	2 L	4±2°C	7 days/40 days [d]
Water	Title 22 Metals	EPA 3010A/6020A SOP ST-MT-0001	One 500-mL poly bottle	500 mL	pH ≤ 2 w/HNO_3	180 days [c]
Water	Mercury	EPA 7470A SOP ST-MT-0005	One 500-mL poly bottle	500 mL	pH ≤ 2 w/HNO_3	28 days [c]

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

Matrix	Analytical Group	Analytical and Preparation Method / SOP Reference	Containers	Sample Volume	Preservation Requirements (chemical, temperature, light protected)	Maximum Holding Time (preparation/analysis)
Water	Herbicides	EPA 3510C/8151A SOP ST-GC-0017	Two 1-L amber bottles	2 L	4±2°C	7 days/40 days [d]
Water	Oil and Grease	EPA 1664 SOP ST-WC-0039	Two 1-L amber bottles	2 L	pH ≤ 2 w/ HCl, 4±2°C	28 days [c]
Water	TRPH (silica gel)	EPA 1664 SOP ST-WC-0039	Two 1-L amber bottles	2 L	pH ≤ 2 w/ HCl, 4±2°C	28 days [c]
Water	TSS	EPA 160.1 SOP ST-WC-0036	One 500-mL poly bottle	500 mL	4±2°C	7 days [c]
Water	pH	EPA 150.1 SOP ST-WC-0011	One 250-mL poly bottle	250 mL	4±2°C	Upon receipt at laboratory
Water	Ignitability	EPA 1010 SOP ST-WC-0026	One 250-mL poly bottle	250 mL	4±2°C	180 days [c]
Water	COD	EPA 410.4 SOP ST-WC-0004	One 250-mL poly bottle	250 mL	pH ≤ 2 w/ H_2SO_4, 4±2°C	28 days [c]
Water	Total/Dissolved sulfide	EPA 376.1 SOP ST-WC-0012	One 500-mL poly bottle	500 mL	pH ≤ 2 w/NaOH and ZnAC, 4±2°C	7 days [c]
Water	Cyanide	EPA 335.4 SOP ST-WC-0002	One 500-mL poly bottle	500 mL	pH ≤ 2 w/NaOH, 4±2°C	14 days [c]
Water	Phenols	EPA 420.1 SOP ST-WC-0017	Two 1-L amber bottles	2 L	pH ≤ 2 w/H_2SO_4, 4±2°C	28 days [c]

Notes:
This worksheet represents the types of analyses that may be performed during basewide radiological activities.

[a] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number has been listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.
[b] 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.
[c] The time listed is the maximum holding time for the analysis. Preparation time is included in the analytical method holding time.
[d] The time listed is the maximum holding time for the preparation/analysis.

SAP Worksheet #20 – Field Quality Control Sample Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates (FD) or Laboratory Duplicates (LD)	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
Pipe Removal Samples									
Soil/sediment	Gamma Isotopes	TBD [a]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [a]
Swipe	Alpha/Beta isotopes	TBD [a]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [a]
Trench and Excavation Soil Samples									
Soil	Gamma Isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [a]	See Worksheet #12	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [a]
Import Fill Soil Samples									
Soil	Gamma Isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [b]	1 (FSS LD only) 1 per SDG (LD only)	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	VOCs	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	SVOCs	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	Pesticides	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	PCBs	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]

SAP Worksheet #20 – Field Quality Control Sample Summary Table (Continued)

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates (FD) or Laboratory Duplicates (LD)	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	TPH-purgeable	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	TPH-extractable	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	Metals	TBD [b]	1 FD per 10 samples	1 per 20 samples	1 per lot	1 per day per equipment	Not applicable	Not applicable	TBD [b]
Soil	Asbestos	TBD [b]	1 FD per 10 samples	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [b]
Soil Waste Samples									
Soil	Gamma Isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	VOCs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	SVOCs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	Pesticides	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	PCBs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	TPH-purgeable	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	TPH-extractable	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Soil	Metals	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]

SAP Worksheet #20 – Field Quality Control Sample Summary Table (Continued)

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates (FD) or Laboratory Duplicates (LD)	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
Wastewater Samples									
Water	Gamma Isotopes (and ^{90}Sr, isotopic uranium, isotopic plutonium, isotopic thorium, and tritium as required)	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	VOCs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	SVOCs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Pesticides	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	PCBs	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	TPH-purgeable	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	TPH-extractable	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Herbicides	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Metals	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Oil and grease	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	TRPH	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	TSS	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	pH	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Ignitability	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	COD	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Total and Dissolved sulfide	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]

SAP Worksheet #20 – Field Quality Control Sample Summary Table (Continued)

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates (FD) or Laboratory Duplicates (LD)	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
Water	Cyanide	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]
Water	Phenols	TBD [c]	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	TBD [c]

Notes:

This worksheet represents the types of field QC samples that may be collected during basewide radiological activities.

[a] The number of locations cannot be determined until excavation of piping and thus the length and size of piping and trench are determined. However, each location will be numbered sequentially and with nomenclature that identifies it as piping or postexcavation trench wall/floor samples.

[b] The number of import fill samples will be determined in the field based on the number of import material sources samples. Import material samples will be identified with the source name and a sequential number.

[c] The number of waste samples will be determined in the field based on the amount of soil excavated and wastewater generated. Each waste will be identified with a sequential number and nomenclature identifying the waste from a stockpile, drum, or other container.

SAP Worksheet #21 – Project Sampling SOP References Table

Sampling SOPs are not used for this project. Instead, the details of the sampling procedures associated with this SAP are included in Worksheet #14.

This page intentionally left blank.

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

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
Ludlum Mod 3 or 12 Meter w/ 44-9 detector (or equivalent); Ludlum Model 19 (or equivalent); Ludlum 2350-1 w/ 44-10 detector (or equivalent); Ludlum 2360 w/ 43-68 detector (or equivalent); Ludlum 2360 w/ 43-89 detector (or equivalent); Eberline Model RO-20 (or equivalent); GR 135 Exploranium (or equivalent); Ludlum Model 177 w/ HP-210 detector (or equivalent)	1. Calibrate at lab featuring NIST traceable standards 2. Operational checks and verifications	1. Annually 2. Daily	1. Pass/fail 2. +/- 20% of baseline response criteria	1. If recalibration fails, then instrument combo is retained/exchanged by instrument vendor. 2. If checks and verifications fail, then instrument combo is placed OOS/returned to instrument vendor for repair/exchange. Subsequently, data collected with instrument since previous QC check will be reviewed.	Site Instrument Mechanic under oversight of HP Supervisor (under oversight of project/ license RSO)	HPO-Tt-007 (as provided in Appendix A of this SAP)	None

SAP Worksheet #22 – Field Equipment Calibration, Maintenance, Testing, and Inspection Table (Continued)

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
F&J High/Lo Vol Air Sampler (or equivalent	1. Calibrate at lab featuring manufacturer air flow acceptance standards and equipment 2. Operational checks and verifications	1. Annually 2. Daily	Pass/fail	If checks and verifications fail, then instrument combo is placed OOS/returned to instrument vendor for repair/ exchange	Site Instrument Mechanic under oversight of HP Supervisor (under oversight of project/ license RSO)	HPO-Tt-007 (as provided in Appendix A of this SAP)	None

SAP Worksheet #23 – Analytical SOP References Table

Lab SOP Number [a]	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
HPO-Tt-028 [b]	Determination of Gamma Radioactivity in Various Matricies UsingOrtec HpGe Gamma Spectroscopy Detection Systems and Gamma Vision-32 Software and Global Value Productivity Add-on from Gamma Vision-32 [b]	Screening	Soil/Sediment Gamma Isotopes	EG&G Ortec Beryllium Window HPGe Gamma Spectroscopy System	TtEC	N
HPO-Tt-029 [b]	Ortec HpGe Gamma Vision-32 Spectroscopy System Calibration Procedure [b]	Screening	Swipe Alpha/Beta Isotopes	Protean Gas Proportional Counting System WPC 9550	TtEC	N
ST-RD-0403	Determination of Gross Alpha/Beta Activity Low Background Gas Flow Proportional Counting System Analysis Rev. 10, 04/28/10	Definitive	Swipe Alpha/Beta Isotopes	Gas Proportional Counter	TestAmerica – St. Louis	N
ST-RD-0403	Low Background Gas Flow Proportional Counting System Analysis Rev. 10, 4/28/10	Definitive	Soil/Water ^{90}Sr	Gas Flow Proportional Counter	TestAmerica – St. Louis	N
ST-RD-0102	GammaVision Analysis Rev. 6, 07/31/09	Definitive	Soil/Water Gamma Isotopes/^{226}Ra	Gamma Spectrometer	TestAmerica – St. Louis	N
ST-RC-0210	Alpha Spectroscopy Analysis Rev. 6, 06/02/09	Definitive	Soil/Water Isotopic Uranium/Thorium/ Plutonium	Alpha Spectrometer	TestAmerica – St. Louis	N
ST-RD-0302	Liquid Scintillation Counter Analysis Rev. 11, 07/31/09	Definitive	Soil/Water Tritium	Liquid Scintillation Counter	TestAmerica – St. Louis	N

SAP Worksheet #23 – Analytical SOP References Table (Continued)

Lab SOP Number [a]	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
ST-MS-0002	Determination of Volatile Organics by GC/MS Rev. 13, 06/30/09	Definitive	Soil/Water VOCs	GC/MS	TestAmerica – St. Louis	N
ST-GC-0014	Aromatic Volatiles and Volatile Petroleum Hydrocarbons by GC PID/FID Rev. 9, 6/04/10	Definitive	Soil/Water TPH-purgeable	GC/PID	TestAmerica – St. Louis	N
ST-MS-0001	GC/MS Semi-Volatile Analysis Rev.11, 1/31/10	Definitive	Soil/Water SVOCs	GC/MS	TestAmerica – St. Louis	N
ST-GC-0016	Pesticide Gas Chromatographic Analysis Rev. 11, 02/05/10	Definitive	Soil/Water Pesticides	GC	TestAmerica – St. Louis	N
ST-GC-0015	PCB GC Analysis Rev. 8, 10/01/09	Definitive	Soil/Water PCBs	GC	TestAmerica – St. Louis	N
ST-GC-0005	Extractable Total Petroleum Hydrocarbons by GC-FID Rev. 14, 04/17/09	Definitive	Soil/Water TPH-extractable	GC/FID	TestAmerica – St. Louis	N
ST-MT-0001	Analysis of Metals by Inductively Coupled Plasma Mass Spectroscopy Rev. 17, 5/21/10	Definitive	Soil/Water Metals	ICP-MS	TestAmerica – St. Louis	N
ST-MT-0005 ST-MT-0007	Preparation and Analysis of Mercury in Aqueous Samples by CVAA, Rev. 7, 08/21/09 Preparation and Analysis of Mercury in Solid Samples by CVAA, Rev. 8, 08/03/09	Definitive	Soil/Water Mercury	Cold Vapor AA	TestAmerica – St. Louis	N
SOP III-A	Asbestos SOP III-A	Definitive	Soil Asbestos	Microscopy	AmeriSci	N
ST-GC-0017	Herbicide Gas Chromatographic Analysis Rev. 8, 4/28/10	Definitive	Water Herbicides	GC	TestAmerica – St. Louis	N

SAP Worksheet #23 – Analytical SOP References Table (Continued)

Lab SOP Number [a]	Title, Revision Date, and / or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
ST-WC-0039	N-Hexane Extractable Material and Silica Treated N-Hexane Material by Extraction and Gravimetry Rev. 6, 04/30/10	Definitive	Water Oil and Grease/TRPH	Gravimetric	TestAmerica – St. Louis	N
ST-WC-0036	Determination of Solids in Water and Waste Rev. 9, 04/02/10	Definitive	Water TSS	Gravimetric	TestAmerica – St. Louis	N
ST-WC-00112	pH Analysis in Water and Soil Rev. 12, 11/06/09	Definitive	Water pH	Electrode	TestAmerica – St. Louis	N
ST-WC-0026	Flashpoint by Pensky-Martens Closed Cup Tester/Cleveland Open Cup Rev. 10, 3/19/10	Definitive	Water Ignitability	Pensky-Marten Closed Cup	TestAmerica – St. Louis	N
ST-WC-0004	Chemical Oxygen Demand Rev. 9, 10/30/09	Definitive	Water COD	HACH	TestAmerica – St. Louis	N
ST-WC-0012	Analysis of Sulfide Rev. 9, 02/25/10	Definitive	Water Total and Dissolved Sulfide	Titration	TestAmerica – St. Louis	N
ST-WC-0002	Cyanide Analysis by Technicon Traacs 800 Autoanalyzer Rev. 13, 05/28/10	Definitive	Water Cyanide	Traacs	TestAmerica-St. Louis	N
ST-WC-0017	Phenolics, Total Recoverable Rev. 7, 04/30/10	Definitive	Water Phenols	Spectrophotometer	TestAmerica – St. Louis	N

Notes:
This worksheet represents the types of analyses that may be performed during basewide radiological activities.
[a] Analytical SOP revision number and date listed are current as of the date this SAP was published.
[b] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number is listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.

This page intentionally left blank.

SAP Worksheet #24 – Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
EG&G Ortec Beryllium Window HPGe Gamma Spectroscopy System	Ortec Gamma Vision-32 A66-B32 Operations Manual	Annual, after maintenance and at the request of the lab manager	+/- 10% for the radionuclides used for calibration	• Recalibration • Instrument maintenance • Notify lab manager	TtEC Laboratory Manager	HPO-Tt-028 [b]
Protean Gas Proportional Counting System WPC 9550	IPC 9025 Operations Manual, Protean Instrument Manual	Annual, after maintenance and at the request of the lab manager	+/- 10% for the radionuclides used for calibration	• Recalibration • Instrument maintenance • Notify lab manager	TtEC Laboratory Manager	HPO-Tt-029 [b]
Gas Flow Proportional Counter	• Plateau generation and/or verification • Discriminator setting • Initial long background count • Mass attenuated efficiency calibration • Eight source dual/single calibration curves	Annual	• Plot efficiencies vs masses • Calculate equation of curve – degree ≤3 • Remove outliers >15% deviation from theoretical values but not more than 20% of total points • Calculate coefficient of determination (R^2). R^2 must be ≥0.9 • Verify calibration with second source standard count – must be within 30 percent of true value and mean across all detectors <10%	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader	ST-RD-0403

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
Gamma Spectrometer	1. Energy calibration 2. FWHM calibration 3. Background	1. Annual 2. Annual 3. Monthly	For Energy and FWHM calibration: • Within 0.5% or 0.1 KeV for all calibration points • Within 8% for all calibration points • Verify with second source that always contains at least Am-241, Co-60, and Cs-137 • Must be ± 10%D for each nuclide For Background, acceptance criterion is 12 hours	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader	ST-RD-0102
Alpha Spectrometer	1. Energy calibration 2. Efficiency calibration and background check 3. Subtraction spectrum 4. Pulser check and background check	1. Monthly 2. Monthly 3. Monthly 4. Daily	1. Three isotopes in 3–6 MeV range all within ± 40 KeV of expected value 2. >20% 3. Ultra Low Level: < 2 CPM Low Level: < 2–4 CPM Routine Level: < 4–10 CPM High Level: < 10–20 CPM 4. Pulser energy, peak centroid, peak resolution, peak area, calibration and background must pass statistical "boundary" out-of-range test	• Recalibrate • Instrument maintenance • Consult with Technical Director • If background check is > 20 CPM, then detector requires maintenance	TestAmerica – St. Louis Group Leader	ST-RC-0210

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
Liquid Scintillation Counter	1. Statistical baseline for C-14 and H-3 backgrounds and efficiencies 2. Check of C-14 and H-3 backgrounds and efficiencies 3. Quench curve for specific nuclide	1. Startup or long-term use 2. Daily 3. Annual	1. Developed with statistical limits at time of startup 2. Within 3 sigma of baseline established at startup or when re-established 3. Second source verification ± 10% of true value	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader	ST-RD-0302
GC/MS	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	%RSD<20% all compounds, Relative Response Factor meet method criteria	Repeat calibration	TestAmerica – St. Louis Analyst	ST-MS-0002
GC/MS	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 re-calibration	TestAmerica – St. Louis Analyst	ST-MS-0002
GC/MS	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	TestAmerica – St. Louis Analyst	ST-MS-0002
GC/PID	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Linear-mean RSD ≤ 20%	Repeat calibration	TestAmerica – St. Louis Analyst	ST-GC-0014
GC/PID	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ± 15% of expected	Rerun ICV one time, second failure requires re-calibration	TestAmerica – St. Louis Analyst	ST-GC-0014

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
GC/PID	Calibration Verification (Initial [ICV] and continuing [CCV])	ICV: Daily, before sample analysis CCV: 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 CCV – if passes rerun previous 10 samples and continue run; if 2nd CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0014
GC/MS	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	%RSD<20% all compounds, Relative Response Factor meet method criteria	Repeat calibration	TestAmerica – St. Louis Analyst	ST-MS-0001
GC/MS	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 re-calibration	TestAmerica – St. Louis Analyst	ST-MS-0001
GC/MS	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 CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-MS-0001
GC/MS	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	%RSD<20% all compounds, Relative Response Factor meet method criteria	Repeat calibration	TestAmerica – St. Louis Analyst	ST-MS-0001
GC/MS	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 re-calibration	TestAmerica – St. Louis Analyst	ST-MS-0001
GC/MS	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 CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-MS-0001
GC	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	RSD for each analyte ≤ 20%	Repeat calibration	TestAmerica – St. Louis Analyst	ST-GC-0016

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
GC	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	TestAmerica – St. Louis Analyst	ST-GC-0016
GC	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 CCV; if passes rerun previous 10 samples and continue run; if 2nd CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0016
GC	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Mean RSD for each PCB ≤ 20%	Recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0015
GC	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 re-calibration	TestAmerica – St. Louis Analyst	ST-GC-0015
GC	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 CCV; if passes rerun previous 10 samples and continue run; if 2nd CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0015
GC/FID	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Linear mean RSD ≤ 20%	Recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0005
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	TestAmerica – St. Louis Analyst	ST-GC-0005

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
GC/FID	Calibration Verification (Initial [ICV] and continuing [CCV])	ICV: Daily, before sample analysis CCV: 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 CCV; if passes rerun previous 10 samples and continue run; if 2nd CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0005
ICP-MS	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	TestAmerica – St. Louis Analyst	ST-MT-0001
ICP-MS	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	TestAmerica – St. Louis Analyst	ST-MT-0001
ICP-MS	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.	TestAmerica – St. Louis Analyst	ST-MT-0001
Cold Vapor AA	Initial Calibration (ICAL)	Daily initial calibration prior to sample analysis	Correlation coefficient R>=0.995 for linear regression	Recalibrate	TestAmerica – St. Louis Analyst	ST-MT-0005 ST-MT-0007
Cold Vapor AA	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	TestAmerica – St. Louis Analyst	ST-MT-0005 ST-MT-0007
Cold Vapor AA	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.	TestAmerica – St. Louis Analyst	ST-MT-0005 ST-MT-0007

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
GC	Initial Calibration (ICAL) – five-point ICAL	Initial calibration prior to sample analysis	Mean RSD for each herbicide ≤ 20%	Recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0017
GC	Second Source Calibration Verification	Once after each initial calibration	Value of second source for all analytes within ± 30% of expected value (initial source)	Rerun ICV one time, second failure requires re-calibration	TestAmerica – St. Louis Analyst	ST-GC-0017
GC	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 CCV; if passes rerun previous 10 samples and continue run; if 2nd CCV fails, recalibrate	TestAmerica – St. Louis Analyst	ST-GC-0017
Gravimetric	Initial Calibration	Daily	The analytical balance used must be calibrated daily. The balance needs to be calibrated at 2 mg and 1000 mg and calibration must be within 10%.	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0039
Gravimetric	Initial Calibration	Daily	The analytical balance used must be calibrated daily. The weights used for the calibration must bracket the expected range of use. The lower calibration weight must be a maximum of 200 mg.	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0036
Electronic Probe	Initial Calibration	Prior to sample analysis	A three point calibration is performed. Buffer solutions of 4, 7, and 10 are used. Readings must be within ±0.05 for each buffer solution.	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0011

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
Electronic Probe	Continuing Calibration	Check the calibration by analyzing the calibration check standard (pH 7 buffer) after the initial calibration, every ten samples, and at the end of the analytical run	pH reading must be within ±0.05 of the ph 7 buffer.	Recalibrate – rerun samples bracketed by failing CCV	TestAmerica – St. Louis Analyst	ST-WC-0011
Pensky-Marten Closed Cup	Initial Calibration	Annual	Thermometers are verified annually. Rotation apparatus verified annually.	Maintenance required	TestAmerica – St. Louis Analyst	ST-WC-0026
Pensky-Marten Closed Cup	Calibration Check	Prior to running samples	The flash point of a check standard (P-Xylene) must be obtained within a value of 27.2 ± 1.1°C	Re-run check	TestAmerica – St. Louis Analyst	ST-WC-0026
Pensky-Marten Closed Cup	Continuing Calibration Check (second source)	Every 10 samples	Control limit is 27.2 ± 1.1°C.	Recalibrate – rerun samples bracketed by failing CCV	TestAmerica – St. Louis Analyst	ST-WC-0026
HACH	Calibration	Annually the working range of the instrument calibration must be verified with a 5 point calibration.	Each point must read within +/- 5% of its' true value.	Instrument maintenance required	TestAmerica – St. Louis Analyst	ST-WC-0004
HACH	Calibration Check	The low-level LCS and high-level LCS serve as calibration checks.	The calibration check acceptance criteria 90%–110%. Run at beginning and end of the run.	Recalibrate – rerun samples	TestAmerica – St. Louis Analyst	ST-WC-0004

SAP Worksheet #24 – Analytical Instrument Calibration Table (Continued)

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference [a]
Titration	Calibration Check	The low-level LCS and high-level LCS serve as calibration checks.	The calibration check acceptance criteria 90%–110%. Run at beginning and end of the run.	Recalibrate – rerun samples	TestAmerica – St. Louis Analyst	ST-WC-0012
Traacs	Initial Calibration	Daily – minimum of 5 points	Correlation coefficient of 0.995 or greater	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0002
Traacs	ICV	Immediately after the last calibration standard	+/- 15% of true value	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0002
Traacs	CCV	Every 10 samples during the sequence and after the last analytical sample.	± 10% of true value. The high and low distilled check standard must be ± 10%	Recalibrate and reanalyze all analytical samples analyzed since the last compliant CCV	TestAmerica – St. Louis Analyst	ST-WC-0002
Spectrophotometer	Initial Calibration	Daily – minimum of 5 points	Acceptable calibration must have a correlation coefficient ≥ 0.995	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0017
Spectrophotometer	ICV	Immediately after the last calibration standard	Acceptance limit is 85% – 115%.	Recalibrate	TestAmerica – St. Louis Analyst	ST-WC-0017
Spectrophotometer	CCV	Every 10 samples during the sequence and after the last analytical sample.	The CCV must be within the 15%D criteria	Recalibrate and reanalyze all analytical samples analyzed since the last compliant CCV	TestAmerica – St. Louis Analyst	ST-WC-0017

Notes:
This worksheet represents the types of analyses that may be performed during basewide radiological activities.
[a] Analytical SOP revision number listed are current as of the date this SAP was published.
[b] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number is listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.

This page intentionally left blank.

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

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
EG&G Ortec Beryllium Window Gamma Spectroscopy System	Clean cave; fill LNO_2	Physical check	Physical check	Weekly	Acceptable background	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-028 [b]
	Background check/Check deviation	Physical check	Physical check	Prior to use and at minimum daily	Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-028 [b]
	Source check/Check deviation	Physical check	Physical check	Prior to use and at minimum daily	Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-028 [b]
Protean Gas Proportional Counting System WPC 9550	Alpha source check/check deviation	Physical check	Physical check	Prior to use and at minimum daily	Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-029 [b]
	Beta source check/check deviation	Physical check	Physical check	Prior to use and at minimum daily	Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-029 [b]
	Background blank/check deviation	Physical check	Physical check	Prior to use and at minimum daily	Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult lab manager	TtEC Laboratory Manager	HPO-Tt-029 [b]
	P10 gas supply	Physical check	Physical check	Daily	Adequate	Resupply	TtEC Laboratory Manager	HPO-Tt-029 [b]

SAP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (Continued)

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
Gas Flow Proportional Counter	1. Clean instrument 2. Inspect windows 3. QA check	1. Physical check 2. Physical check 3. Background and source count	1. Physical check 2. Physical check 3. Check deviation	1. Daily 2. High counts and/or background 3. Daily	1. None applicable 2. No physical defects 3. Within 3 sigma of 20 day population	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RD-0403
Gamma Spectrometer	1. Clean cave; fill dewar with N_2 2. QA check	1. Physical check 2. Background and source check	1. Physical check 2. Check deviation	1. Weekly 2. Daily	1. Acceptable background 2. Within 3 sigma of measured population	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RD-0102
Alpha Spectrometer	Clean planchette holders	Physical check	Physical check	Monthly	Acceptable background and calibration efficiencies	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RC-0210
Liquid Scintillation Counter	1. QA check 2. Clean dust and debris from sample deck 3. Photon multiplier tubes cleaned by manufacturer	1. Background and efficiency verification for C-14 and H-3 2. Physical check 3. Physical check	1. Review of daily control data 2. Physical check 3. Physical check	1. Daily 2. Monthly 3. Semi-annual or annual	For all three maintenance activities: within 3 sigma of established baselines and stable baselines for C-14 and H-3 efficiencies	• Recalibrate • Instrument maintenance • Consult with Technical Director	TestAmerica – St. Louis Group Leader / Analyst	ST-RD-0302

SAP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (Continued)

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
GCMS GC ICP-MS Cold Vapor AA	Parameter Setup	Physical check	Physical check	Initially; prior to DCC	Predetermined optimum parameter settings	Reset if incorrect	TestAmerica – St. Louis Analyst	ST-MS-0002, ST-GC-0014, ST-MS-0001, ST-GC-0015, ST-GC-0005, ST-MT-0001, ST-MT-0005, ST-MT-0007
GC/MS	Tune Check	Instrument Performance	Conformance to instrument tuning	Initially; prior to DCC	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.	TestAmerica – St. Louis Analyst	ST-MS-0002, ST-MS-0001
ICP-MS	ICS	Instrument Performance	Conformance to interference check	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.	TestAmerica – St. Louis Analyst	ST-MT-0001

SAP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (Continued)

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
ICP-MS	ICB/CCB	Instrument Performance	Instrument contamination check	After every calibration verification	ICB:No analytes detected > RL; CCB: no analyte detected > 3X MDL	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	TestAmerica – St. Louis Analyst	ST-MT-0001
Cold Vapor AA	ICB/CCB	Instrument Performance	Instrument contamination check	After every calibration verification	No analytes detected > RL	Determine possible source of contamination and apply appropriate measure to correct the problem. Reanalyze calibration blank and all associated samples.	TestAmerica – St. Louis Analyst	ST-MT-0005 ST-MT-0007
Balance	Clean and inspect balance weight check	Daily weight checks	Physical check	Daily	Meet method criteria	Clean balance; contact repair service; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0039, ST-WC-0036
Oven	Clean and inspect	Daily temp checks	Physical check	Day of use	Meet method criteria	Check temp settings – adjust as needed; contact repair service; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0036
Probe	Clean and inspect	Performance	QC check	Day of use	Meet method criteria	Clean probe; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0011
Flashpoint apparatus	Clean and inspect – annual check of rotator	Performance	QC check	Day of use	Meet method criteria	Call for repair; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0026

SAP Worksheet #25 – Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table (Continued)

Instrument Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference [a]
HACH	Maint. Not applicable – kits bought from vendor.	Performance	QC check	Day of use	Meet method criteria	Replace; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0004
Titration	Visual inspection of glassware used; pipette calibration	Performance	QC check	Day of use	Meet method criteria	Replace; reanalyze any affected samples	TestAmerica – St. Louis Analyst	ST-WC-0012
TRAACS	Check air pressure, change tubing as needed, finish run with wash out	Performance	QC check	Day of use	Meet method criteria	Contact repair service – reanalyze any affected samples.	TestAmerica – St. Louis Analyst	ST-WC-0002
Spectrophotometer	Change membrane as needed	Performance	QC check	Day of use	Meet method criteria	Contact repair service – reanalyze any affected samples.	TestAmerica – St. Louis Analyst	ST-WC-0017

Notes:
This worksheet represents the types of analyses that may be performed during basewide radiological activities.
[a] Analytical SOP revision number listed are current as of the date this SAP was published.
[b] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number is listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.

This page intentionally left blank.

SAP Worksheet #26 – Sample Handling System

Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Sampler / TtEC
Sample Packaging (Personnel/Organization): Sampler / TtEC
Coordination of Shipment (Personnel/Organization): Sampler / TtEC
Type of Shipment/Carrier: Courier or FedEx®
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): Sample Custodian / TtEC or TestAmerica-St. Louis
Sample Custody and Storage (Personnel/Organization): Sample Custodian / TtEC or TestAmerica-St. Louis
Sample Preparation (Personnel/Organization): Sample preparation personnel / TtEC or TestAmerica-St. Louis
Sample Determinative Analysis (Personnel/Organization): Analyst / TtEC or TestAmerica-St. Louis
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): 90 calendar days
Sample Extract/Digestate Storage (No. of days from extraction/digestion): up to 40 calendar days depending on method holding times
Biological Sample Storage (No. of days from sample collection): N/A
SAMPLE DISPOSAL
Personnel/Organization: Sample Custodian / TtEC or TestAmerica-St. Louis
Number of Days from Analysis: N/A (Samples are archived at the project site.)

This page intentionally left blank.

SAP Worksheet #27 – Sample Custody Requirements Table

An overriding consideration for data resulting from laboratory analyses is the ability to demonstrate that the data are legally defensible, i.e., that the samples were obtained from the locations stated and that they reached the laboratory without alteration. To accomplish this, evidence of collection, shipment, laboratory receipt, and laboratory custody until disposal will be documented through the COC record. A sample is considered to be in custody if the following conditions have been observed:

- In actual possession or in view of the person who collected the samples
- Locked in a secure area
- Placed in an area restricted to authorized personnel
- Placed in a container and secured with an official seal, so that the sample cannot be reached without breaking the seal

Appendix B presents an example of the COC record. The COC record lists each sample and the individuals performing the sample collection, shipment, and receipt. Appendix B presents an example of a custody seal that will seal samples and the cooler during transportation to the laboratory.

The COC record will be the controlling document to ensure that the sample custody is maintained. Typically, the COC will be prepared and produced by the approved TtEC COC database program prior to sample collection. Exceptions to the use of the COC database program are limited and may include pipe or manhole sediment samples collected in the field immediately upon excavation. Each time the sample custody is transferred, the former custodian will sign the COC on the _Relinquished By_ line, and the new custodian will sign the COC on the _Received By_ line. The date, time, and project or company affiliation will accompany each signature. The waybill number and courier name will be recorded on the COC when FedEx is used. The shipping container will be secured with two custody seals, thereby allowing for custody to be maintained by the shipping personnel until receipt by the laboratory.

Sample custody will be the responsibility of sampling personnel from the time of sample collection until the samples are accepted by the laboratory via courier or FedEx. Thereafter, the laboratory performing the analysis will maintain custody. The sample custodian will sign the COC from the courier or FedEx, inventory each shipment, and note on the original COC record any discrepancy in the sample custody, temperature of the cooler, or broken sample containers. The laboratory will note discrepancies on the sample receipt form. The laboratory project manager will immediately notify the Project Chemist. The Project Chemist, in consultation with the project team, will provide instructions in writing to the laboratory. The laboratory will have a system for tracking samples consistent with Section 5.8 of the Quality Systems Manual (QSM) (DoD 2009). The laboratory will archive the samples and maintain their custody up to 90 calendar days after sample collection, at which time the samples will be disposed of by the laboratory.

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

In addition to providing a custody exchange record for the samples, the COC record serves as a formal request for sample analyses. The COC records will be completed, signed, and distributed as follows:

- Two copies sent to the analytical laboratory with the sample shipment
- One copy retained on-site for inclusion in the project files
- A copy faxed/e-mailed to the Project Chemist on a daily basis to allow tracking of samples during shipment and confirm laboratory receipt of samples
- One copy sent to the Project Chemist

SAMPLE NUMBERING

The sample number will be recorded in the field logbook, on the labels, and the COC 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 nonradiological samples, samples will be numbered as follows:

WW-PX-IRYY-ZZZZ, where:
WW – Contract Task Order (CTO) or Task Order (TO) number
P – Abbreviation for Parcel
X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
IR – Abbreviation for Installation Restoration
YY – Two-character designation for IR site number
ZZZZ – consecutive number begins with 0001 for this project and continues consecutively throughout the project with no repeated numbers

For radiological samples, numbering schemes for RSY survey pads, pipe sediment, manhole sediment, pipe/manhole swipes, extraneous pipe sediment and swipes, trench survey units, import fill material, and waste will be used. Other numbering schemes as approved by the RSO may be used for special circumstances. The typical radiological sample numbering schemes are as follows:

- RSY Survey Pads: **WW-PX-AQQQQ-UU**, where:

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  A – Identifier to indicate that the sample is from a survey pad
  QQQQ – Four-character consecutive pile number that begins with 0001 for this project and continues consecutively throughout the project with no repeated numbers
  UU – Two-character consecutive sample number starting with 01 (number of samples collected from each survey pad)

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

- Reference Area: **WW-PX-RA-UU**, where:

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  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)

- Pipe Sediment: **WW-PXPI-QQQQ-UU**, where:

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  PI – Abbreviation to indicate a pipe sediment sample
  QQQQ – Four-character consecutive sample number that begins with 0001 for this project and continues consecutively throughout the project with no repeated numbers
  UU – Two-character consecutive sample number starting with 01 (number of sediment samples collected from each pipe)

- Manhole Sediment: **WW-PXMHYYY-QQQ-UU**, where:

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  MH – Indicates a manhole sediment sample
  YYY – Three-character manhole identification number
  QQQ – Three-character consecutive sample number that begins with 0001 for this project and continues consecutively throughout the project with no repeated numbers
  UU – Two-character consecutive sample number starting with 01 (number of samples collected from each manhole)

- Pipe/Manhole Swipes: **WW-PXS-YY-AABBCC-SS-UU**, where:

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  S – Identifier to indicate a swipe sample
  YY – Two-character component identifier (PI – Pipe, MH – Manhole)
  AA – Two-character work area number (06 for Area 6, 10 for Area 10, etc.)
  BB – Two-character identifier for IR site or "00" for non-IR site
  CC – Two-character trench identification number (4A, 8C, 1G, etc.)
  SS – Two-character pipe component number
  UU – Two-character consecutive sample number starting with 01 for this project (number of swipes performed for each pipe)

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

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

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  S/P – Use "S" to indicate a swipe sample and use "P" to indicate a 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 swipes performed or sediment samples collected from each pipe)

- Trench Survey Unit: **WW-PXT-YYY-UUU**, where

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  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)

- Import Fill Material: **WW-BACKFILL-UUU**, where

  WW – CTO or TO number
  UUU – Three-character consecutive sample number starting with 001 (number of samples collected from each survey unit)

- Radiological Waste: **WW-PX-UU**, where

  WW – CTO or TO number
  P – Abbreviation for Parcel
  X – Parcel designation (e.g., A for Parcel A, B for Parcel B, etc.)
  UU – Two-character consecutive sample number starting with 01 (number of samples collected from waste)

SAMPLE PACKAGING

Radiological Samples

Sampling packaging and shipping will be performed in accordance with the SOP HPO-Tt-009 (as provided in Appendix A of this SAP) governing sampling procedures for radiological surveys.

Chemical Samples

Immediately after sample labeling, custody seals will be affixed to each sample container. Each container will be placed in double-resealable plastic bags to protect the samples from moisture. For VOA vials and En Core samples, the custody seal will be placed on the outside of the first

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

resealable bag; then the containers will be placed in a second resealable bag. This will prevent any contact with the adhesive from the custody seal and the samples. VOA vials will be wrapped with bubble wrap (if transported by a commercial carrier), placed in a resealable bag, and then placed in another resealable bag following application of a custody seal over the first bag.

Samples to be transported to an off-site laboratory will be shipped in coolers. Each cooler will be shipped with a temperature blank. A temperature blank is a container filled with tap water and stored in the cooler during sample collection and transportation. The temperature of the cooler will be recorded by the laboratory on the COC record immediately upon receipt of the samples. Sample cooler drain spouts will be taped from the inside and outside of the cooler to prevent any leakage.

Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. The COC record will be completed and signed by the courier. The cooler(s) and the top two copies (white and pink) of the COC record will then be released to the courier for transportation to the laboratory. Samples to be shipped by commercial carrier will be packed in a sample cooler lined with a plastic bag. (All glass sample containers will be protected with bubble wrap, and then placed in resealable bags if transported by a commercial carrier.) Double-bagged ice will be added inside the plastic bag at the bottom of the cooler, one layer of sample containers will be placed on the ice, and more double-bagged ice will be placed on top of the containers. This will be repeated until the cooler is filled with ice as the top layer in the cooler.

The COC record will include the air bill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies of the COC record will be sealed in a double-resealable bag and then taped to the inside of the sample cooler lid. The cooler will be taped shut with strapping tape. Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. Clear tape will be applied to the custody seals to prevent accidental breakage during shipment. The pouch for the air bill will be placed on the cooler and secured with clear tape. The air bill will be completed for priority overnight delivery and placed in the pouch. If multiple coolers are being shipped, the original air bill will be placed on the cooler with the COC record, and copies of the air bill will be placed on the other coolers. The number of packages should be included on each air bill (1 of 2, 2 of 2). Saturday deliveries should be coordinated with the laboratory in advance, and field sampling personnel or their designee must ensure that Saturday delivery stickers are placed on each cooler by the commercial courier. "Dangerous goods" declarations will also be completed as applicable.

This page intentionally left blank.

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil

Matrix: Soil
Analytical Group: Gamma Isotopes
Analytical Method/SOP Reference [a]: Gamma/ HPO-Tt-028 [b] (on-site laboratory)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Background Sample	Daily	Absolute value less than analyte RL	[c]	TtEC Laboratory Manager	Accuracy	Absolute value less than analyte RL
LCS	Weekly	Gamma source check +/- 20% of known activity	[d]	TtEC Laboratory Manager	Accuracy	Gamma source check +/- 20% of known activity
Sample Duplicate	1 per preparatory batch and or every 20 samples	RPD ≤30	[e]	TtEC Laboratory Manager	Precision	RPD ≤30

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Gamma Isotopes
Analytical Method/SOP Reference [a]: EPA 901.1 MOD /SOP ST-RD-0102

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS	1 per preparatory batch	Within in-house limits (Limits are for tuna can LCS geometry until 250 mL Ra-226 geometry is active – Limits for Ra-226 listed are advisory until enough data points are generated to be statistically meaningful)	[d]	TestAmerica – St. Louis Analyst	Accuracy	Tuna Can: ^{137}Cs: 94–118% ^{60}Co: 90–110% ^{241}Am: 90–110% 250 mL Poly: ^{226}Ra: 70–130%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Strontium-90
Analytical Method/SOP Reference [a]: EPA 905 MOD or DOE SR-03-RC MOD/SOP ST-RD-0403

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	EPA 905 MOD: 69–137% DOE SR-03-RC MOD: 69–137% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	EPA 905 MOD: 70–130% DOE SR-03-RC MOD: 70–130% RPD ≤40% and/or RER ≤1
Carriers	Per sample, blank, LCS, MS, MSD	Sr and Yt carriers ≥40% and ≤110%	[g]	TestAmerica – St. Louis Analyst	Accuracy	Sr and Yt carriers ≥40% and ≤110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Isotopic Uranium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or [illegible]	1 per preparatory [illegible]	Within in-house limits	[d]	TestAmerica – St. Louis [illegible]	Accuracy	^{234}U: 70–122% [illegible]
[illegible]	[illegible]	Within in-house limits	[illegible]	TestAmerica [illegible] Analyst	[illegible]	[illegible]

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Isotopic Thorium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	^{230}Th: 83–120% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	^{230}Th: 70–130% RPD ≤40% and/or RER ≤1
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	[g]	TestAmerica – -St. Louis Analyst	Accuracy	^{229}Th: 30–110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Isotopic Plutonium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	^{238}Pu: 64–118 % ^{239}Pu/^{240}Pu: 75–18 % RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	^{238}Pu: 70–30% ^{239}Pu/^{240}Pu: 70–30% RPD ≤40% and/or RER ≤1
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	[g]	TestAmerica – St. Louis Analyst	Accuracy	^{242}Pu: 30–10%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Tritium
Analytical Method/SOP Reference [a]: EPA 906.0 MOD/SOP ST-RD-0302

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmeric – -St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	75–40% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	62–29% RPD ≤40% and/or RER ≤1
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: VOCs
Analytical Method/SOP Reference [a]: EPA 8260C/SOP ST-MS-0002

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	1,1-Dichloroethene 65–135% Benzene: 75–125% Chlorobenzene: 75–125% Toluene: 70–125% Trichloroethene: 75–125%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,1-Dichloroethene 65-135% Benzene: 75–125% Chlorobenzene: 75–125% Toluene: 70–125% Trichloroethene: 75–125%
MS/MSD	1 per preparatory batch per matrix	1,1-Dichloroethene 65–135% Benzene: 75–125% Chlorobenzene: 75–125% Toluene: 70–125% Trichloroethene: 75–125%	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,1-Dichloroethene 65-135% Benzene: 75–125% Chlorobenzene: 75–125% Toluene: 70–125% Trichloroethene: 75–125%
Surrogate	Per all field and QC samples	1,2-Dichloroethane-d_4: 80–131% 4-Bromofluorobenzene: 85–20% Toluene-d_8: 85–115%	[h]	TestAmerica – St. Louis Analyst	Accuracy	1,2-Dichloroethane-d_4: 80–131% 4-Bromofluorobenzene: 85–20% Toluene-d_8: 85–115%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: SVOCs
Analytical Method/SOP Reference [a]: EPA 8270D/SOP ST-MS-0001

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	1,2,4–Trichlorobenzene 45–110%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,2,4-Trichlorobenzene 45–10%
		1,4–Dichlorobenzene 35–105%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,4-Dichlorobenzene 35–05%
		2,4–Dinitrotoluene 50–115%	[d]	TestAmerica – St. Louis Analyst	Accuracy	2,4-Dinitrotoluene 50–15%
		Acenaphthene 45–110%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Acenaphthene 45–10%
		2–Chlorophenol 45–105%	[d]	TestAmerica – St. Louis Analyst	Accuracy	2-Chlorophenol 45–05%
		n–Nitrosodi–n–propylamine 40–115%	[d]	TestAmerica – St. Louis Analyst	Accuracy	n-Nitrosodi-n-propylamine 40–15%
		4–Chloro–3–methyl phenol 45–115%	[d]	TestAmerica – St. Louis Analyst	Accuracy	4-Chloro-3-methyl phenol 45–115%
		4–Nitrophenol 15–140%	[d]	TestAmerica – St. Louis Analyst	Accuracy	4-Nitrophenol 15–140%
		Pentachlorophenol 25–120%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Pentachlorophenol 25–120%
		Phenol 40–100%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Phenol 40–100%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
LCS (cont.)		Pyrene 45–125%	d	TestAmerica – St. Louis Analyst	Accuracy	Pyrene 45–125%
MS/MSD	1 per preparatory batch per matrix	1,2,4–Trichlorobenzene 45–110%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,2,4–Trichlorobenzene 45–110%
		1,4–Dichlorobenzene 35–105%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,4–Dichlorobenzene 35–105%
		2,4–Dinitrotoluene 50–115%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	2,4–Dinitrotoluene 50–115%
		Acenaphthene 45–110%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Acenaphthene 45–110%
		2–Chlorophenol 45–105%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	2–Chlorophenol 45–105%
		n–Nitrosodi–n–propylamine 40–115%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	n–Nitrosodi–n–propylamine 40–115%
		4–Chloro–3–methyl phenol 45–115	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4–Chloro–3–methyl phenol 45–115%
		4–Nitrophenol 15–140%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4–Nitrophenol 15–140%
		Pentachlorophenol 25–120%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Pentachlorophenol 25–120%
		Phenol 40–100%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Phenol 40–100%
		Pyrene 45–125%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Pyrene 45–125%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Surrogate	Per all field and QC samples	2,4,6–Tribromophenol 35–125%	f	TestAmerica – St. Louis Analyst	Accuracy	2,4,6–Tribromophenol 35–125%
		2–Fluorobiphenyl 45–105%	f	TestAmerica – St. Louis Analyst	Accuracy	2–Fluorobiphenyl 45–105%
		2–Fluorophenol 35–105%	f	TestAmerica – St. Louis Analyst	Accuracy	2–Fluorophenol 35–105%
		Nitrobenzene–d_5 35–100%	f	TestAmerica – St. Louis Analyst	Accuracy	Nitrobenzene–d_5 35–100%
		Phenol– d_5 40–100%	f	TestAmerica – St. Louis Analyst	Accuracy	Phenol– d_5 40–100%
		Terphenyl– d_{14} 30–125%	f	TestAmerica – St. Louis Analyst	Accuracy	Terphenyl– d_{14} 30–125%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Pesticides
Analytical Method/SOP Reference [a]: EPA 8081B/SOP ST-GC-0016

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	4,4′–DDT 45–140% Aldrin 45–140% Dieldrin 65–125% Endrin 60–135% Gamma–BHC (Lindane) 60–125% Heptachlor 50–140%	[d]	TestAmerica – St. Louis Analyst	Accuracy	4,4′–DDT 45–140% Aldrin 45–140% Dieldrin 65–125% Endrin 60–135% Gamma–BHC (Lindane) 60–125% Heptachlor 50–140%
MS/MSD	1 per preparatory batch per matrix	4,4′–DDT 45–140% Aldrin 45–140% Dieldrin 65–125% Endrin 60–135% Gamma–BHC (Lindane) 60–125% Heptachlor 50–140%	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4,4′–DDT 45–140% Aldrin 45–140% Dieldrin 65–125% Endrin 60–135% Gamma–BHC (Lindane) 60–125% Heptachlor 50–140%
Surrogate	Per all field and QC samples	Decachlorobiphenyl 55–130% Tetrachloro–m–xylene(TCMX) 70–125%	[h]	TestAmerica – St. Louis Analyst	Accuracy	Decachlorobiphenyl 55–130% Tetrachloro–m–xylene (TCMX) 70–125%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: PCBs
Analytical Method/SOP Reference [a]: EPA 8082A/SOP ST-GC-0015

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	Aroclor 1016: 40–140% Aroclor 1260: 60–130%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Aroclor 1016: 40–140% Aroclor 1260: 60–130%
MS/MSD	1 per preparatory batch per matrix	Aroclor 1016: 40–140% Aroclor 1260: 60–130% RPD ≤ 30	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Aroclor 1016: 40–140% Aroclor 1260: 60–130% RPD ≤ 30
Surrogate	Per all field and QC samples	Decachlorobiphenyl 60–125%	[h]	TestAmerica – St. Louis Analyst	Accuracy	Decachlorobiphenyl 60–125%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: TPH-purgeable
Analytical Method/SOP Reference [a]: EPA 8015B/SOP ST-GC-0014

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	TPH-gasoline: 57–127%	[d]	TestAmerica – St. Louis Analyst	Accuracy	TPH-gasoline: 57–127%
MS/MSD	1 per preparatory batch per matrix	TPH-gasoline: 50–114% RPD ≤ 30	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	TPH-gasoline: 50–114% RPD ≤ 30
Surrogate	Per all field and QC samples	4-Bromofluorobenzene: 78–141%	[h]	TestAmerica – St. Louis Analyst	Accuracy	4-Bromofluorobenzene: 78–141%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: TPH-extractable
Analytical Method/SOP Reference [a]: EPA 8015B/SOP ST-GC-0005

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	TPH-diesel: 50–121%	[d]	TestAmerica – St. Louis Analyst	Accuracy	TPH-diesel: 50–121%
MS/MSD	1 per preparatory batch per matrix	TPH-diesel: 18–150% RPD ≤ 30	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	TPH-diesel: 18–150% RPD ≤ 30
Surrogate	Per all field and QC samples	o-terphenyl: 79–150%	[h]	TestAmerica – St. Louis Analyst	Accuracy	o-terphenyl: 79–150%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Matrix: Soil
Analytical Group: Metals
Analytical Method/SOP Reference [a]: EPA 6020A and 7471B/SOP ST-MT-0001 and SOP ST-MT-0007

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
Calibration Blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence	No analytes detected > 2 × MDL	[c]	TestAmerica – St. Louis Analyst	Accuracy	No analytes detected > 2 × MDL
LCS	1 per preparatory batch	80–120%	[d]	TestAmerica – St. Louis Analyst	Accuracy	80–120%
MS/MSD (lab duplicate)	1 per preparatory batch per matrix	80–120% RPD ≤ 20	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	80–120% RPD ≤ 20
Serial dilution	Each new sample matrix	1:5 dilution must agree within ±10% of original determination.	[i]	TestAmerica – St. Louis Analyst	Accuracy	1:5 dilution must agree within ±10% of original determination.
Post-digestion spike	When serial dilution or matrix spike fails	75–125%	[j]	TestAmerica – St. Louis Analyst	Accuracy	75–125%

SAP Worksheet #28.1 – Laboratory QC Samples Table – Soil (Continued)

Notes:

This worksheet represents the types of analyses that may be performed during basewide radiological activities.

[a] Analytical SOP revision number listed are current as of the date this SAP was published.

[b] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number is listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.

[c] 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.

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

[e] 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.

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

[g] Truncate carriers/tracers above 100% recovery to eliminate low biased results. Re-prep 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.

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

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

[j] Reanalyze post-digestion spike.

This page intentionally left blank.

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water

Matrix: Water
Analytical Group: Strontium-90
Analytical Method/SOP Reference [a]: EPA 905 MOD or DOE SR-03-RC MOD/SOP ST-RD-0403

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	EPA 905.0 MOD: 75–135% DOE SR-03-RC MOD: 75–135% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	EPA 905.0 MOD: 33–150% DOE SR-03-RC MOD: 33–150% RPD ≤40% and/or RER ≤1
Carriers	Per sample, blank, LCS, MS, MSD	Sr and Yt carriers ≥40% and ≤110%	[g]	TestAmerica – St. Louis Analyst	Accuracy	Sr and Yt carriers ≥40% and ≤110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Gamma and Radium-226
Analytical Method/SOP Reference [a]: EPA 901.1 MOD and 903.0 MOD/SOP ST-RD-0102 and SOP ST-RD-0403

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	72–130 % RPD ≤ 40% and/or RER ≤ 1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	50–130 % RPD ≤ 40% and/or RER ≤ 1
Carriers	Per sample, blank, LCS, MS, MSD	Ba and Yt carriers ≥40% and ≤110%	[g]	TestAmerica – St. Louis Analyst	Accuracy	Ba and Yt carriers ≥40% and ≤110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Isotopic Uranium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	^{234}U: 87–127% ^{238}U: 87–128% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	^{234}U: 65–146% ^{238}U: 68–143% RPD ≤40% and/or RER ≤1
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	[g]	TestAmerica – St. Louis Analyst	Accuracy	^{232}U: 30–110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Isotopic Thorium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	^{230}Th: 92–138% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	^{230}Th: 82–139% RPD ≤40% and/or RER ≤1
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	[g]	TestAmerica – St. Louis Analyst	Accuracy	^{229}Th: 30–110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Isotopic Plutonium
Analytical Method/SOP Reference [a]: DOE A-01-R MOD/SOP ST-RC-0210

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	^{238}Pu: 80–110% ^{239}Pu/^{240}Pu: 84–115% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	^{238}Pu: 70–130% ^{239}Pu/^{240}Pu: 70–130% RPD ≤40% and/or RER ≤1
Tracer	Per sample, blank, LCS, MS, MSD	Within in-house limits	[g]	TestAmerica – St. Louis Analyst	Accuracy	^{242}Pu: 30–110%
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Tritium
Analytical Method/SOP Reference [a]: EPA 906.0 MOD/SOP ST-RD-0302

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < RL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < RL
LCS and/or LCD	1 per preparatory batch	Within in-house limits	[d]	TestAmerica – St. Louis Analyst	Accuracy	67–111% RPD ≤40% and/or RER ≤1
MS/MSD	As requested	Within in-house limits	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	27–150% RPD ≤40% and/or RER ≤1
Sample Duplicate	1 per preparatory batch	RPD ≤40% and/or RER ≤1	[e]	TestAmerica – St. Louis Analyst	Accuracy	RPD ≤40% and/or RER ≤1

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: VOCs
Analytical Method/SOP Reference [a]: EPA 8260C/SOP ST-MS-0002

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	1,1-Dichloroethene: 70–130% Benzene: 80–120% Chlorobenzene 80–120% Toluene: 75–120% Trichloroethene: 70–125%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,1-Dichloroethene: 70–130% Benzene: 80–120% Chlorobenzene 80–120% Toluene: 75–120% Trichloroethene: 70–125%
MS/MSD	1 per preparatory batch per matrix	1,1-Dichloroethene: 70–130% Benzene: 80–120% Chlorobenzene 80–120% Toluene: 75–120% Trichloroethene: 70–125% RPD ≤ 20	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,1-Dichloroethene: 70–130% Benzene: 80–120% Chlorobenzene 80–120% Toluene: 75–120% Trichloroethene: 70–125% RPD ≤ 20
Surrogate	Per all field and QC samples	1,2-Dichloroethane-d_4: 70–120% 4-Bromofluorobenzene: 75–120% Toluene-d_8: 85–120%	[h]	TestAmerica – St. Louis Analyst	Accuracy	1,2-Dichloroethane-d_4: 70–120% 4-Bromofluorobenzene: 75–120% Toluene-d_8: 85–120%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: SVOCs
Analytical Method/SOP Reference [a]: EPA 8270D/ SOP ST-MS-0001

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	1,2,4-Trichlorobenzene 35–105%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,2,4-Trichlorobenzene 35–105%
		1,4-Dichlorobenzene 30–100%	[d]	TestAmerica – St. Louis Analyst	Accuracy	1,4-Dichlorobenzene 30–100%
		2,4-Dinitrotoluene 50–120%	[d]	TestAmerica – St. Louis Analyst	Accuracy	2,4-Dinitrotoluene 50–120%
		Acenaphthene 45–110%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Acenaphthene 45–110%
		2-Chlorophenol 35–105%	[d]	TestAmerica – St. Louis Analyst	Accuracy	2-Chlorophenol 35–105%
		n-Nitrosodi-n-propylamine 35–130%	[d]	TestAmerica – St. Louis Analyst	Accuracy	n-Nitrosodi-n-propylamine 35–130%
		4-Chloro-3-methyl phenol 45–110%	[d]	TestAmerica – St. Louis Analyst	Accuracy	4-Chloro-3-methyl phenol 45–110%
		4-Nitrophenol 0–125%	[d]	TestAmerica – St. Louis Analyst	Accuracy	4-Nitrophenol 0–125%
		Pentachlorophenol 40–115%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Pentachlorophenol 40–115%
		Phenol 0–115%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Phenol 0–115%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
LCS (cont.)		Pyrene 50–130%	d	TestAmerica – St. Louis Analyst	Accuracy	Pyrene 50–130%
MS/MSD	1 per preparatory batch per matrix	1,2,4-Trichlorobenzene 35–105%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,2,4-Trichlorobenzene 35–105%
		1,4-Dichlorobenzene 30–100%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	1,4-Dichlorobenzene 30–100%
		2,4-Dinitrotoluene 50–120%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	2,4-Dinitrotoluene 50–120%
		Acenaphthene 45–110%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Acenaphthene 45–110%
		2-Chlorophenol 35–105%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	2-Chlorophenol 35–105%
		n-Nitrosodi-n-propylamine 35–130%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	n-Nitrosodi-n-propylamine 35–130%
		4-Chloro-3-methyl phenol 45–110%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4-Chloro-3-methyl phenol 45–110%
		4-Nitrophenol 0–125%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4-Nitrophenol 0–125%
		Pentachlorophenol 40–115%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Pentachlorophenol 40–115%
		Phenol 0–115%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Phenol 0–115%
		Pyrene 50–130%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Pyrene 50–130%
Surrogate	Per all field and QC samples	2,4,6-Tribromophenol 40–125%	h	TestAmerica – St. Louis Analyst	Accuracy	2,4,6-Tribromophenol 40–125%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Surrogate (cont.)		2-Fluorobiphenyl 50–110%	h	TestAmerica – St. Louis Analyst	Accuracy	2-Fluorobiphenyl 50–110%
		2-Fluorophenol 20–110%	h	TestAmerica – St. Louis Analyst	Accuracy	2-Fluorophenol 20–110%
		Nitrobenzene-d_5 40–110%	h	TestAmerica – St. Louis Analyst	Accuracy	Nitrobenzene-d_5 40–110%
		Phenol- d_5 10–59%	h	TestAmerica – St. Louis Analyst	Accuracy	Phenol- d_5 10–59%
		Terphenyl- d_{14} 50–135%	h	TestAmerica – St. Louis Analyst	Accuracy	Terphenyl- d_{14} 50–135%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Pesticides
Analytical Method/SOP Reference [a]: EPA 8081B/SOP ST-GC-0016

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	c	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	4,4'-DDT 45–140% Aldrin 25–140% Dieldrin 60–130% Endrin 55–135% Gamma-BHC (Lindane) 25–135% Heptachlor 40–130%	d	TestAmerica – St. Louis Analyst	Accuracy	4,4'-DDT 45–140% Aldrin 25–140% Dieldrin 60–130% Endrin 55–135% Gamma-BHC (Lindane) 25–135% Heptachlor 40–130%
MS/MSD	1 per preparatory batch per matrix	4,4'-DDT 45–140% Aldrin 25–140% Dieldrin 60–130% Endrin 55–135% Gamma-BHC (Lindane) 25–135% Heptachlor 40–130%	f	TestAmerica – St. Louis Analyst	Accuracy/ Precision	4,4'-DDT 45–140% Aldrin 25–140% Dieldrin 60–130% Endrin 55–135% Gamma-BHC (Lindane) 25–135% Heptachlor 40–130%
Surrogate	Per all field and QC samples	Decachlorobiphenyl 30–135% Tetrachloro-m-xylene (TCMX) 25–140%	h	TestAmerica – St. Louis Analyst	Accuracy	Decachlorobiphenyl 30–135% Tetrachloro-m-xylene (TCMX) 25–140%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: PCBs
Analytical Method/SOP Reference [a]: EPA 8082A/SOP ST-GC-0015

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	Aroclor 1016: 25–145% Aroclor 1260: 30–145%	[d]	TestAmerica – St. Louis Analyst	Accuracy	Aroclor 1016: 25–145% Aroclor 1260: 30–145%
MS/MSD	1 per preparatory batch per matrix	Aroclor 1016: 25–145% Aroclor 1260: 30–145%RPD ≤ 20	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	Aroclor 1016: 25–145% Aroclor 1260: 30–145%RPD ≤ 20
Surrogate	Per all field and QC samples	Decachlorobiphenyl: 40–135%	[h]	TestAmerica – St. Louis Analyst	Accuracy	Decachlorobiphenyl: 40–135%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: TPH-purgeable
Analytical Method/SOP Reference [a]: EPA 8015B/SOP ST-GC-0014

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	TPH-gasoline: 74–111%	[d]	TestAmerica – St. Louis Analyst	Accuracy	TPH-gasoline: 74–111%
MS/MSD	1 per preparatory batch per matrix	TPH-gasoline: 74–115% RPD ≤ 20	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	TPH-gasoline: 74–115% RPD ≤ 20
Surrogate	Per all field and QC samples	4-Bromofluorobenzene: 55–150%	[h]	TestAmerica – St. Louis Analyst	Accuracy	4-Bromofluorobenzene: 55–150%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: TPH-extractable
Analytical Method/SOP Reference [a]: EPA 8015B/SOP ST-GC-0005

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	TPH-diesel: 44–103%	[d]	TestAmerica – St. Louis Analyst	Accuracy	TPH-diesel: 70–140%
MS/MSD	1 per preparatory batch per matrix	TPH-diesel: 60–140% RPD ≤ 30	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	TPH-diesel: 60–140% RPD ≤ 30
Surrogate	Per all field and QC samples	Bromobenzene: 50–130% Hexacosane: 70–140%	[h]	TestAmerica – St. Louis Analyst	Accuracy	Bromobenzene: 50–130% Hexacosane: 70–140%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Metals
Analytical Method/SOP Reference [a]: EPA 6020A and 7470A/SOP ST-MT-0001 and SOP ST-MT-0005

QC Sample	Frequency/ Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	TestAmerica – St. Louis Analyst	Accuracy	Analytes < ½ QL
Calibration Blank	Before beginning a sample run, after every 10 samples, and at end of the analysis sequence	No analytes detected > 2 × MDL	[c]	TestAmerica – St. Louis Analyst	Accuracy	No analytes detected > 2 × MDL
LCS	1 per preparatory batch	80–120%	[d]	TestAmerica – St. Louis Analyst	Accuracy	80–120%
MS/MSD (lab duplicate)	1 per preparatory batch per matrix	80–120% RPD ≤ 20	[f]	TestAmerica – St. Louis Analyst	Accuracy/ Precision	80–120% RPD ≤ 20
Serial dilutions	Each new sample matrix	1:5 dilution must agree within ±10% of original determination.	[i]	TestAmerica – St. Louis Analyst	Accuracy	1:5 dilution must agree within ±10% of original determination.
Post-digestion spike	When serial dilution or matrix spike fails	75–125%	[j]	TestAmerica – St. Louis Analyst	Accuracy	75–125%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Herbicides
Analytical Method/SOP Reference [a]: EPA 8151A/SOP GC-0017

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	Dalapon 40–110%	[d]	Analyst	Accuracy	Dalapon 40–110%
MS/MSD	1 per preparatory batch per matrix	Dalapon 40–110% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	Dalapon 40–110% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Oil and Grease
Analytical Method/SOP Reference [a]: EPA 1664/SOP ST-WC-0039

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	Oil and Grease 78–114%	[d]	Analyst	Accuracy	Oil and Grease 78–114%
MS/MSD	1 per preparatory batch per matrix	Oil and Grease 78–114% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	Oil and Grease 78–114% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: TRPH
Analytical Method/SOP Reference [a]: EPA 1664/SOP ST-WC-0039

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	TRPH 64–132%	[d]	Analyst	Accuracy	TRPH 64–132%
MS/MSD	1 per preparatory batch per matrix	TRPH 64–132% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	TRPH 64–132% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: TSS
Analytical Method/SOP Reference [a]: EPA 160.1/SOP ST-WC-0036

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	67–130%	[d]	Analyst	Accuracy	67–130%
MS/MSD	1 per preparatory batch per matrix	N/A	[f]	Analyst	Accuracy/ Precision	N/A

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: pH
Analytical Method/SOP Reference [a]: EPA 150.1/SOP ST-WC-001

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	99–101%	[d]	Analyst	Accuracy	99–101%
MS/MSD	1 per preparatory batch per matrix	N/A	[f]	Analyst	Accuracy/ Precision	N/A

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Ignitability
Analytical Method/SOP Reference [a]: EPA 1010/SOP ST-WC-0026

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	95.9 – 104 deg C	[d]	Analyst	Accuracy	95.9 – 104 deg C
MS/MSD	1 per preparatory batch per matrix	N/A	[f]	Analyst	Accuracy/ Precision	N/A

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: COD
Analytical Method/SOP Reference [a]: EPA 410.4/SOP ST-WC-0004

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	90–110%	[d]	Analyst	Accuracy	90–110%
MS/MSD	1 per preparatory batch per matrix	90–110% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	90–110% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Total/Dissolved Sulfide
Analytical Method/SOP Reference [a]: EPA 376.1/SOP ST-WC-0012

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	90–110%	[d]	Analyst	Accuracy	90–110%
MS/MSD	1 per preparatory batch per matrix	90–110% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	90–110% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Cyanide
Analytical Method/SOP Reference [a]: EPA 335.4/SOP ST-WC-0002

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	85–115%	[d]	Analyst	Accuracy	85–115%
MS/MSD	1 per preparatory batch per matrix	66–120% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	66–120% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Matrix: Water
Analytical Group: Phenols
Analytical Method/SOP Reference [a]: EPA 420.1/SOP ST-WC-0017

QC Sample	Frequency / Number	Method/SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator	Measurement Performance Criteria
Method Blank	1 per preparatory batch	Analytes < ½ QL	[c]	Analyst	Accuracy	Analytes < ½ QL
LCS	1 per preparatory batch	79–113%	[d]	Analyst	Accuracy	79–113%
MS/MSD	1 per preparatory batch per matrix	54–131% RPD ≤ 20%	[f]	Analyst	Accuracy/ Precision	54–131% RPD ≤ 20%

SAP Worksheet #28.2 – Laboratory QC Samples Table – Water (Continued)

Notes:

This worksheet represents the types of analyses that may be performed during basewide radiological activities.

[a] Analytical SOP revision number listed are current as of the date this SAP was published.

[b] SOPs for on-site analysis have undergone review and approval by RASO. The final SOP number is listed. In addition, all analytical SOPs for on-site and off-site analysis will be provided as Appendix A in the final version of this SAP.

[c] 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.

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

[e] 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.

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

[g] Truncate carriers/tracers above 100% recovery to eliminate low biased results. Re-prep 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.

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

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

[j] Reanalyze post-digestion spike.

SAP Worksheet #29 – Project Documents and Records Table

Document	Where Maintained
Work Plan and associated SAP	Project file; NAVFAC SW Administrative Record
Field logbook	Project file
Field forms	Project file
COC	Laboratory; NAVFAC SW Administrative Record will receive original copy
Shipping records	Project file
Field surveillance reports	Project file
Field Change Requests	Project file
On-site laboratory results package including: • Copy of chain of custody • Sample results • Control check standard per batch • Laboratory duplicate results • Laboratory signed review page	Laboratory and project file; project file copy will subsequently be sent to NAVFAC SW Administrative Record
Off-site laboratory data package including: • Copy of chain of custody • Sample receipt and login • Laboratory internal chain of custody • Instrument calibration information • Chromatograms as applicable • Sample preparation logs • Sample analysis/run logs • Nonconformance Reports including corrective actions • Laboratory signed review page	Laboratory and project file; project file copy will subsequently be sent to NAVFAC SW Administrative Record
Data validation report	Validator and project file; project file copy will subsequently be sent to NAVFAC SW Administrative Record

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

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

Field Logbook

A permanently bound field logbook with consecutively numbered pages, used for sampling activities only, will be assigned to this project. All entries will be recorded in indelible black or blue ink. At the end of each work day, the logbook pages will be signed by the responsible sampler, and any unused portions of the logbook pages will be crossed out, signed, and dated. If it is necessary to transfer the logbook to another person, the person relinquishing the logbook will sign and date the last page used, and the person receiving the logbook will sign and date the next page to be used. At a minimum, the logbook will contain the following information:

- Project name and site location
- Date and time
- Personnel in attendance
- General weather information
- Work performed
- Field observations
- Sampling performed, including specifics such as location, type of sample, type of analyses, and sample identification
- Field analyses performed, including results, instrument checks, problems, and calibration records for field instruments
- Descriptions of deviations from this SAP
- Problems encountered and corrective action taken
- Identification of field QC samples
- QC activities
- Verbal or written instructions
- Any other events that may affect the samples

Sample Labels

Sample labels typically will be computer-generated at the time the COC is prepared and produced by the approved TtEC COC database program. Sample labels will be filled out in indelible black or blue ink and affixed to sample containers at the time of sample collection. An

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

example sample label is provided in Appendix B. Each sample label will be covered with clear tape. Each sample container will be labeled with the following, at a minimum:

- 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)
- Sample weight (data completed by laboratory)

When a plastic bag is used to collect samples (i.e., sediment) for radiological analysis, then the sample bag will be directly marked with indelible ink. If this sample is then transferred to a container, the lid of the container will be labeled. If containers are too small to fit all of the above-listed sample information, at a minimum the container will be labeled with the designation of the consecutive sample number.

Chain of Custody

COC information is described in Worksheet #27.

Sample Shipping Records

Samples will be transported to the laboratory via courier or FedEx. The courier who receives samples will sign the COC and accept the samples. For samples shipped via FedEx, the COC will be packaged within the cooler, and the sender's copy of the airbill will serve as custody documentation and will be maintained on-site in the project file. Sample shipping procedures are detailed in Worksheet #27.

Field Surveillance Reports

Field Surveillances will be performed in accordance with the three phases of inspection as required by the Remedial Action Contract 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 project. Daily field inspections and subsequent surveillances will be performed at the discretion of the PQCM or the Quality Control Program Manager (QCPM) throughout the duration of the project. The PQCM will use the Initial Inspection Checklist during inspection.

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

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. The FCR will include the revised worksheets from this SAP. Examples of worksheets that may be revised due to minor changes such as personnel changes would be Worksheets #3 (Distribution List), #4 (Project Personnel Sign-Off Sheet), #5 (Project Organizational Chart), #6 (Communication Pathways), and #7 (Personnel Responsibilities and Qualifications Table).

Major changes to work scope affecting the original 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 Naval Facilities Engineering Command Southwest (NAVFAC SW) Quality Assurance Officer (QAO) prior to conducting sampling and analysis.

Laboratory Documentation

On-site laboratory results packages will include the following at a minimum:

- Copy of COC
- Sample results
- Control check standard per batch
- Laboratory duplicate results
- Laboratory signed review page

Off-site laboratory data packages will include the following at a minimum:

- Sample receipt and login
- Laboratory internal COC
- Instrument calibration logs
- Sample preparation logs
- Sample analysis/run logs
- Sample results case narrative
- Sample disposal records
- Nonconformance reports including corrective actions

The off-site laboratory will prepare analytical data packages comprising the above documentation for each sample delivery group (SDG) and provide them to TtEC. Off-site laboratory deliverables will include two copies of the hard copy data package, submitted as either EPA Level III- or IV-equivalent packages as specified on the COC. Detailed information

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

on the requirement of hard copy data packages is provided below. The report pages will be sequentially numbered. The report will contain a table of contents referencing individual sections in the data package, the original, white copy of COC records, a copy of all corrective action reports, and a narrative documenting the resolution of all corrective actions and nonconformances. All samples will be cross-referenced to the associated QC samples. The packages will be assembled in the following sequence:

- 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
- Sample management records, including the original, white copy of COC records (including cooler temperature and sample condition), shipping documents, and laboratory sample receipt forms
- Cross-reference table
- Analytical results and quality assurance (QA)/QC information by test as follows:
  - Radiological raw data sequence
    a. Sample results forms, including method blanks
    b. Sample raw data (EPA Level IV only)
    c. QC summaries
    d. Initial calibration (ICAL)
    e. Calibration checks, including all related continuing calibration verifications (CCVs)
    f. Instrument run log
    g. Sample preparation log
  - Organic raw data sequence
    a. Sample result forms, including method blanks
    b. Sample raw data after each result form (EPA Level IV only)
    c. Surrogate summaries (surrogate results may appear on the sample result forms)
    d. QC summaries
    e. Tune data (gas chromatograph/mass spectrometer [GC/MS] only)
    f. ICAL
    g. Daily calibration checks, including related CCVs
    h. Resolution check standards (GC/MS and pesticides), if applicable
    i. QC LCS, MS/MSD raw data (EPA Level IV only)
    j. Instrument run log

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

k. Sample preparation log

- Inorganic raw data sequence

a. Sample results forms, including method blanks
b. Sample raw data (EPA Level IV only)
c. QC summaries
d. ICAL
e. Daily calibration checks, including all related CCVs
f. Calibration blanks, including all related continuing calibration blanks
g. Interference check standards A and B for inductively coupled plasma (ICP)-atomic emission spectrometer (AES) only
h. QC raw data (EPA Level IV only)
i. Post-digestion spike results
j. Analytical spike results
k. Method of standard additions
l. ICP-AES serial dilutions
m. Instrument run log
n. Sample preparation log

All 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. TtEC must be notified 30 days before disposal of any relevant records.

In addition to the hard copy data, an EDD will be submitted by the off-site laboratory in a format compatible with the Naval Electronic Data Deliverable standard. Both the EDDs and the hard copy report will present results to two or three significant figures. For radiological results, at least three significant figures will be used for all results. For organic results, at least two significant figures will be used for all results. 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 off-site data reports are required, the revised pages (an original and copy) will be stamped with the notation "amended or revised report." If revisions affect the off-site laboratory EDDs, the revised EDD will then be sent along with the revised hard copy pages. In addition, a hard copy or electronic copy of items submitted to the validator by the laboratory will also be submitted to the Project Chemist.

Data Validation Reports

All analytical data generated by the off-site laboratory (except for waste characterization data) will be validated by an independent data validation company. The validation report will include the data validation findings worksheets. The reports will be arranged in increasing SDG

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

numbers and grouped by the type of analysis; i.e., a group of reports will consist of SDGs with the same analysis arranged in increasing numerical order. Each SDG will be submitted as a separate data validation report. Reports covering multiple SDGs are not acceptable.

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, 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.
- Section headings for each analytical method will include the following:
  - Technical holding times
  - GC/MS instrument performance check (tune) if applicable
  - Calibration
    a. ICAL
    b. Initial calibration verification (second source standard)
    c. CCV
  - Laboratory blanks
  - Accuracy and precision data
    a. Surrogate spike recoveries
    b. MS/MSD
    c. LCSs/LCS duplicates (LCSDs)
    d. Internal standards
  - Target compound identification
  - System performance checks
  - Analyte quantitation and quantitation limit (QLs)
  - Field QC samples (if not applicable, report will note)
  - Overall assessment of data
  - Assessment of compliance with statement of work requirements
- QC deviation summaries, which will include in a tabular format the following:
  - Unique identification of QC run (e.g., date/time)
  - Associated project and sample numbers (not the laboratory internal sample IDs)
  - Associated constituents
  - Actual value for noted deviation

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

  - Applicable QC criteria
  - Applicable qualifiers
  - Qualifier classifications (advisory or protocol)

- Validation findings worksheets
- Qualifier classification

The following format will be used when preparing and submitting revised data validation reports and analytical result pages:

- The cover letter and revised text pages will clearly identify the revision number (e.g., **Revision 1**) typed in the upper right-hand corner of the page.
- A statement in the cover letter will be included indicating that an asterisk will be placed in the margin to the left of any revised item in the text.
- Every revised page in the text will have the following statement placed at the bottom of the page:

  ***Indicates revision based on report review.**

- The summary table will have an asterisk placed to the left of every revised item and a statement at the bottom of the page as follows:

  ***Indicates change as a result of report review.**

Revisions will be submitted within 1 week of receiving the review comments from the Project Chemist. Report revision submittal packages will include an original and copy of the cover page and revised pages.

In addition to a hard-copy report, the validator will receive the EDD and populate the final validation qualifiers in the EDD. The validated EDD will be returned to TtEC for upload into the database.

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

SAP Worksheet #30 – Analytical Services Table

Matrix	Analytical Group	Sampling Locations/ ID Number	Analytical Method	Data Package Turnaround Time	Laboratory/ Organization (contact information)	Backup Laboratory/ Organization (contact information)
Soil	Gamma isotopes	All	All analytical methods performed at on-site laboratory	Within 48 hours	TtEC On-site Laboratory Contact: Mr. Paul Wall 200 Fisher Avenue San Francisco, CA 94124 (415) 216-2739	TestAmerica Laboratories, Inc. St. Louis Contact: Erika Starman 13715 Rider Trail North Earth City, MO 63045 (314) 298-8566
All	All analyses performed at off-site laboratory	All	All analytical methods performed at off-site laboratory	20 business days	TestAmerica-St. Louis Laboratory Contact: Erika Starman 13715 Rider Trail North Earth City, MO 63045 (314) 298-8566	GEL Contact: Tasha Horton 2040 Savage Road Charleston, SC 29407 (843) 556-8171

On-Site Laboratory Quality Objectives

The TtEC on-site laboratory will perform gamma spectroscopy and gross alpha/beta analyses using analytical SOPs approved by the RASO. California Department of Health Services (DHS) certification and DoD ELAP certification are not required for the on-site radiological laboratory since this laboratory will only be used for screening analysis to assist in the continued remediation efforts in the field. Once on-site laboratory analysis confirms that samples used for decision-making purposes are below RROs, then all of those samples will subsequently be sent to the off-site laboratory for definitive analysis. In addition, any analyses required besides gamma spectroscopy or gross alpha/beta will be performed by the off-site laboratory since the on-site laboratory does not have capability at this time to perform any other analyses besides gamma spectroscopy and gross alpha/beta.

SAP Worksheet #30 – Analytical Services Table (Continued)

On-Site Laboratory Sample Custody and Documentation

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 handling of the samples and transferring of custody must be well-documented given the evidentiary nature of the analytical data. A sample is considered to be in one's custody if it meets any of the following criteria:

1. In actual possession or in view of the person who collected the sample
2. Locked in a secure area
3. Placed in an area restricted to authorized personnel

The samples will be delivered to the person in the on-site laboratory authorized to receive samples. Upon receipt of a sample, the sample condition is inspected, and verification of the information on the sample container is checked against that on the COC record. The sample is logged in the laboratory logbook. The sample will be stored in a secured room.

On-Site Laboratory Quality Control Requirements

The on-site analytical laboratory must have written SOPs defining the instrumentation, calibration, method detection, and QC requirements. The SOPs must be available to the analysts performing the work and are provided herein in Appendix A. The on-site laboratory must maintain logs of all activities that have an impact on the quality of the on-site laboratory results.

The on-site laboratory must maintain the instruments in the working condition required by the methods specified for the analyses. Sufficient redundancy in equipment must be available in the on-site laboratory to handle downtime situations.

On-site Laboratory Quality Control Checks

The following subsections describe in detail the on-site laboratory QC samples.

SAP Worksheet #30 – Analytical Services Table (Continued)

Calibration

All instruments and equipment must be calibrated in accordance with the manufacturer's requirements and/or the on-site laboratory SOPs. Each instrument must be calibrated with the standard appropriate to the type of instrument and the calibration range established for the method.

ICALs are performed when the method is first used and again whenever the continuing calibrations fail to meet their respective acceptance criteria. In addition, if the instrument undergoes significant maintenance, the ICAL must be repeated. Calibration of all equipment will be performed in accordance with the on-site laboratory SOPs.

Continuing calibrations verify that the instrument performance has remained within the limits set at the time of the ICAL. The frequency of continuing calibrations is specified in referenced methods.

For radiochemical analysis at the on-site laboratory, secondary and tertiary standards may be used provided the primary standard was National Institute of Standards and Technology (NIST)-traceable, and the expiration date of the secondary/tertiary standard does not exceed that of the primary standard.

Instrument Blanks

Instrument backgrounds are run to ensure that contaminants from previous runs are out of the system and do not contaminate succeeding runs. Instrument backgrounds are performed before sample analyses are performed and after samples containing high concentrations of potentially interfering materials are found, in accordance with the on-site laboratory SOPs.

Method Blanks

Method backgrounds are performed on a daily basis in the same manner as the samples, using the same container geometry used for samples. The purpose of the method backgrounds is to ensure that the equipment is free of contaminants that could interfere with the analysis.

SAP Worksheet #30 – Analytical Services Table (Continued)

Laboratory Duplicates

Laboratory sample duplicates are prepared and analyzed with each batch of systematic samples for most analyses. Laboratory duplicate samples will be analyzed independently as appropriate. For this project, a laboratory duplicate will be prepared and analyzed by gamma spectroscopy by the on-site laboratory for each batch of systematic samples collected. A batch is defined as the total number of systematic samples in a survey unit or less. The laboratory duplicate selection process is designed to be "blind" so that the process also applies to activities less than the MDA. If the sample analysis identifies no activity greater than the MDA to be present, the total activity of the sample will be used for comparison.

Preventive Maintenance

All instruments must be maintained in accordance with the manufacturers' recommended procedures. The on-site laboratory must define in its SOPs the frequency and type of maintenance for each instrument. The laboratory must also record all maintenance activities in an instrument logbook. The laboratory must maintain the instruments in working condition required by the methods specified for the analyses. Sufficient redundancy in equipment must be available in the laboratory to handle downtime situations. Method substitution because of instrumental failure will not be permitted without approval from the Radiological Technical Manager.

In addition to preventive maintenance, the on-site laboratory must keep a sufficient supply of replacement parts on hand for those parts known to require frequent changes due to wear and tear or contamination. Whenever preventive or corrective maintenance is applied to an instrument, the on-site laboratory must demonstrate the instrument's return to operating conditions and must recalibrate the instrument prior to resumption of sample analyses.

Monitoring of On-site Laboratory Performance

Although the on-site laboratory will solely be used as a screening laboratory to assist in remediation during field efforts, TtEC will perform quarterly assessments of the on-site laboratory's performance by reviewing the on-site laboratory's adherence to their SOPs and reviewing the on-site and off-site results that exceed the MDA produced for the definitive samples. Review of the on-site and off-site results will provide statistical data that TtEC can monitor over time to determine if the on-site laboratory requires further QC checks.

SAP Worksheet #30 – Analytical Services Table (Continued)

Off-Site Laboratory Quality Objectives

The following sections describe analytical laboratory requirements, including qualifications, sample custody, and QC procedures.

Off-Site Laboratory Qualifications

The off-site analytical laboratory selected to analyze samples for this project will be, at a minimum, certified by the DHS (or the California Department of Public Health [CDPH]) for all of the analytical methods required for the project, as applicable[1]. Additional state certifications may also be required for off-site radiological testing as required by the disposal facility. In addition, the laboratory must have successfully completed the DoD ELAP certification prior to sampling activities and maintain current status throughout the duration of the project.

The off-site laboratory selected for the project must be capable of providing the project QC and data deliverables required by this SAP.

The off-site laboratory must be capable of meeting all the requirements listed in this SAP including turnaround time, MDA requirements or QLs, QC criteria, data deliverables, and requirements in the Navy Installation Restoration Chemical Data Quality Manual (IRCDQM) (NFESC 1999), and the QSM for Environmental Laboratories (DoD 2009).

Off-Site Laboratory Sample Custody and Documentation

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 handling of the samples and transferring of custody must be well-documented given the evidentiary nature of the analytical data. A sample is considered to be in one's custody if it meets any of the following criteria:

1. In actual possession or in view of the person who collected the sample
2. Locked in a secure area

[1] DHS (or CDPH) does not provide for certification for soil or sediment radiochemical analysis. Therefore, no specific certification is required for the off-site laboratory.

SAP Worksheet #30 – Analytical Services Table (Continued)

3. Placed in an area restricted to authorized personnel

The samples will be delivered to the person in the off-site laboratory authorized to receive samples (referred to as the sample custodian). Upon receipt of a sample, the sample custodian will inspect the condition of the sample (including the temperature of the cooler as applicable) and the custody seal, reconcile the information on the sample label against that on the COC record, assign a unique laboratory tracking number, log the sample in the laboratory logbook, and store the sample in a secured sample storage room.

The TtEC Project Chemist will be informed immediately of any inconsistencies between the COC record and the sample containers received. Any deviations from accepted sample handling procedures will be documented, and the TtEC Project Chemist will be informed.

The off-site laboratory will have a system for tracking samples that is consistent with Section 5.8 of the QSM (DoD 2009). The laboratory will archive the samples and maintain their custody up to 90 calendar days after sample collection, at which time the laboratory will contact TtEC for shipment of the samples back into the custody of TtEC.

Off-Site Laboratory Quality Control Requirements

The off-site analytical laboratory will have written SOPs defining the instrument operation and maintenance, tuning, calibration, method detection limit (MDL) determination, QC acceptance criteria, blank requirements, and stepwise procedures for each analytical method. At a minimum, SOPs will be written for procedures and methods including sample receipt/control/disposal, sample preparation/extraction, sample analysis, result calculation, database management, health and safety, and corrective action. The SOPs, and all revisions, will be available to the analysts in the laboratory. The SOPs must meet the requirements of the analytical methods, the IRCDQM (NFESC 1999), and the QSM (DoD 2009), which defines the frequency, acceptance criteria, and corrective action for the following QC checks for each project-specific method:

<u>Radiological analyses:</u>

- Demonstrate acceptable analyst capability
- Initial calibration

SAP Worksheet #30 – Analytical Services Table (Continued)

- Second source calibration verification
- Calibration verification (initial and continuing calibration)
- Method blank
- LCS
- Background checks, efficiency checks, self-absorption curves as applicable

Organics by GC/MS:

- Demonstrate acceptable analyst capability
- MDL study
- Tuning
- Minimum five-point initial calibration
- Second source calibration verification
- Retention time window position establishment for each analyte and surrogate
- Retention time window verification for each analyte and surrogate
- Evaluation of relative retention times
- Calibration verification (initial and continuing calibration)
- Internal standards verification
- Method blank
- LCS
- MS/MSD
- Surrogate spike

SAP Worksheet #30 – Analytical Services Table (Continued)

Organics by Gas Chromatograph (GC):

- Demonstrate acceptable analyst capability
- MDL study
- Retention time window width calculated for each analyte and surrogate
- Breakdown check (8081A only)
- Minimum five-point initial calibration
- Second source calibration verification
- Retention time window position establishment for each analyte and surrogate
- Retention time window verification for each analyte and surrogate
- Calibration verification (initial and continuing calibration)
- Method blank
- LCS
- MS/MSD
- Surrogate spike
- Confirmation of positive results by second column (8081A only)

Inorganics:

- Demonstrate acceptable analyst capability
- MDL study
- Instrument detection limit study (ICP only)
- Initial calibration for all analytes (minimum one high standard and calibration blank for and minimum five standards and calibration blank for cold vapor atomic absorption)
- Second source calibration verification (ICP only)

SAP Worksheet #30 – Analytical Services Table (Continued)

- Continuing calibration verifications
- Low-level calibration check standard (ICP only)
- Method blank
- Calibration blank
- Interference check solutions (ICP only)
- LCS
- Dilution test (ICP only)
- Post-digestion spike addition (ICP only)
- Method of standard additions or internal standard calibration (ICP only)
- MS/MSD (MSD for ICP only)

The off-site laboratory must also maintain written records of all activities that have an impact on the quality of the off-site laboratory results.

Any portion of the method subcontracted by the off-site laboratory to another laboratory or sent to another facility of the same network of laboratories must have the prior approval of the Project Chemist or Radiological Technical Manager.

Off-Site Laboratory Quality Control Checks

The following subsections describe in detail the off-site laboratory QC checks required by this project.

Calibration

All instruments will be calibrated and the calibration acceptance criteria met before samples are analyzed. Calibration standards will be prepared with NIST-traceable standards and analyzed per method requirements. ICAL acceptance criteria documented in the off-site laboratory SOPs will meet those of applicable guidance documents. The ICAL will meet the following requirements:

SAP Worksheet #30 – Analytical Services Table (Continued)

- The lowest concentration of the calibration standard is less than or equal to the QLs based on the final volume of extract or sample.
- For gamma spectroscopy analysis, the calibration standard covers a wide array of energies, and the total sample activity contains approximately 1 microcurie of activity. The gamma spectroscopy standard will be of similar density and material to the samples being analyzed by this method. The typical calibration standard for gamma spectroscopy will utilize short-lived radionuclides that decay in as few as 90 days—therefore the standard will only be used for control checks and calibration for 1 year from date of certification.
- For each target analyte, at least one of the calibration standards will be at or below the regulatory limit (action level), as defined by the DQOs.
- Before samples are analyzed, ICAL will be verified with a second source standard prepared at the mid-point of the calibration curve. ICAL verification will meet the acceptance criteria expressed in the off-site laboratory SOPs.
- Daily calibration verification will be conducted at the method-prescribed frequencies and will meet the acceptance criteria of applicable guidance documents. Daily calibration verification will not be used for quantitation of target analytes.
- Calibration data (calibration tables, chromatograms, instrument printouts, and laboratory logbooks) will be clearly labeled to identify the source and preparation of the calibration standard and therefore be traceable to the standard preparation records.

Instrument Blanks

An instrument blank is used to monitor the cleanliness of the instrument system during sample analysis. Instrument blanks are solvent or acid solutions of the standard used to calibrate the instrument. During metals analyses, one instrument blank is usually analyzed for every ten samples. For GC/MS analysis, instrument blanks are analyzed on an as-needed basis for troubleshooting and chromatography column carryover determination.

Method Blanks

Method blanks are prepared in the same manner as the samples, using the same reagents and glassware used for samples. The purpose of the method blank is to ensure that the equipment and reagents used in preparing the samples are free of contaminants that could

SAP Worksheet #30 – Analytical Services Table (Continued)

interfere with the analysis. The method blank must be prepared and analyzed for each batch of 20 project samples or less per matrix (aqueous and solid) type.

The method blank must not exhibit analytes at concentrations greater than half the required MDA or QLs except for common contaminants as described by the QSM (DoD 2009). If contaminants are found that either contribute to the apparent concentration of a particular target analyte or interfere with the analysis, the analysis must be stopped, the source of contamination identified and corrected, and the analysis repeated. Contamination in the method blank above half the MDA or QLs (except for common contaminants) will require that the entire associated batch of extracts or digestates be reprepared and reanalyzed. Hence, it is very important to make sure that no such contamination is present.

Some methods of inorganic analysis do not have a distinctive preparation step. For these tests, an instrument blank, which contains all reagents used with samples, is considered to be the method blank.

Laboratory Control Samples

Laboratory control samples are matrix-equivalent QC check samples (analyte-free water, laboratory sand, or sodium sulfate) spiked with a known quantity of specific analytes carried through the entire sample preparation and analysis process. The spiking solution used for LCS/LCSD preparation is of a source different from the stock used to prepare calibration standards.

The LCS is prepared and run at a frequency of one per 20 project samples per matrix with the associated samples, using the same reagents and volumes. If insufficient quantity of sample is available for the MS/MSD, the LCS will be prepared and analyzed in duplicates.

Laboratory Duplicates

For laboratory sample duplicate analyses, a sample is prepared and analyzed twice. Laboratory sample duplicates are prepared and analyzed with each batch of samples for most inorganic analyses. For this project, a laboratory duplicate will be prepared and analyzed for the off-site laboratory for each batch of samples, defined as 20 samples or less.

SAP Worksheet #30 – Analytical Services Table (Continued)

Matrix Spikes

MSs are QC check samples that measure matrix-specific method performance for chemical analysis not to include radiological analysis. An MS sample is prepared by adding a known quantity of target analytes to a sample prior to sample digestion or extraction. In general, for organic compound and metal analyses, an MS/MSD pair is prepared and analyzed with each preparation batch or for every 20 samples. For inorganic compound analysis, a single MS and a laboratory sample duplicate are often prepared and analyzed with each batch. The MS results allow verifying the presence of matrix effects.

Surrogate Standards

Organic compound analyses include the addition, quantitation, and recovery calculation of surrogate standards. Compounds selected to serve as surrogate standards must meet all of the following requirements:

- Are not the target analytes
- Do not interfere with the determination of target analytes
- Are not naturally occurring, yet are chemically similar to the target analytes
- Are compounds exhibiting similar response to target analytes

Surrogate standards are added to every analytical and QC check sample at the beginning of the sample preparation. The surrogate standard recovery is used to monitor matrix effects and losses during sample preparation. Surrogate standard control criteria are applied to all analytical and QC check samples, and if surrogate criteria are not met, re-extraction and reanalysis may be performed.

Post-digestion Spikes and the Method of Standard Addition

A post-digestion spike is used during metal analysis to assess analytical interferences that may be caused by general matrix effects or high concentrations of analytes present in the sample. A digested sample is spiked with the analyte of interest at a known concentration, and the spike recovery is used to estimate the presence and the magnitude of interferences.

SAP Worksheet #30 – Analytical Services Table (Continued)

If a post-digestion spike recovery fails to meet acceptance criteria, the Method of Standard Addition (MSA) will be used to quantify the sample result. The MSA technique compensates for a sample constituent that enhances or depresses the analyte signal. To perform the MSA, known amounts of a standard at different concentrations are added to aliquots of digested sample, and each spiked sample and the original unspiked sample are analyzed. The absorbance is then plotted against the concentration, and the resulting line is extrapolated to zero absorbance. The point of interception with the concentration axis is the indigenous concentration of the analyte in the sample.

Preventive Maintenance

All instruments must be maintained in accordance with the manufacturers' recommended procedures. The off-site laboratory must define in its QA plan the frequency and type of maintenance for each instrument. The off-site laboratory must also record all maintenance activities in an instrument logbook. The off-site laboratory must maintain the instruments in working condition required by the methods specified for the analyses. Sufficient redundancy in equipment must be available in the off-site laboratory to handle downtime situations. Method substitution because of instrumental failure will not be permitted without approval from the Project Chemist or Radiological Technical Manager.

In addition to preventive maintenance, the off-site laboratory must keep a sufficient supply of replacement parts on hand for those parts known to require frequent changes due to wear and tear or contamination. Whenever preventive or corrective maintenance is applied to an instrument, the off-site laboratory must demonstrate the instrument's return to operating conditions and must recalibrate the instrument prior to resumption of sample analyses.

Definition of Detection and Quantitation Limits

MDA: From Multi-Agency Radiological Laboratory Analytical Protocols, the MDA can be calculated as a sample-specific value. Typically, these values assumed both a Type I (α) and Type II (β) error of 5 percent. However, for samples analyzed at the on-site and off-site laboratories, the project will utilize the MDL in calculations regarding MDA for gamma spectroscopy results. For purposes of and in discussions regarding gamma spectroscopy, any use of the term "MDA" will specifically describe the sample-specific MDL.

SAP Worksheet #30 – Analytical Services Table (Continued)

MDL: The MDL is an estimate of the measured concentration at which there is 99 percent confidence that a given analyte is present in a given sample matrix. The MDL is the concentration at which a decision is made regarding whether an analyte is detected by a given method. The MDL can be calculated from replicate analyses of a matrix containing the analyte and is functionally analogous to the "critical value" or the "limit of detection." For sample results, gamma spectroscopy analysis software will utilize a mathematical model that ensures that the reported sample-specific MDA values are equivalent to the sample-specific MDL. Project decisions, in concert with the reported measurement results, can be made using the MDL.

QL: The QL is defined as the concentration of an analyte in a laboratory sample at which the measurement process gives results with a specified relative standard deviation. Unless otherwise specified in a specific method or SOP, this relative standard deviation is 10 percent. QL calculations require the ability to estimate the standard deviation for the result of a hypothetical measurement and are not considered appropriate for use for radiological analysis.

SAP Worksheet #31 – Planned Project Assessments Table

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 (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
Operational Readiness Review	Prior to mobilization of the project and prior to initiating major phases of work	Internal	TtEC	Project Manager, TtEC	Project Manager, TtEC	Project Manager, TtEC	PQCM, TtEC
Field Sampling Surveillance (conducted during sampling)	At a minimum, once at the beginning, once during, and once toward the end of the project	Internal	TtEC	PQCM, TtEC	Project Manager, TtEC	Project Manager, TtEC	Project Manager and QCPM, TtEC
On-site Laboratory Assessment	Quarterly during operation of the on-site laboratory	Internal	TtEC	QCPM or designee, TtEC	On-site Laboratory Manager, TtEC RSO, TtEC	On-site Laboratory Manager, TtEC RSO, TtEC	QCPM or designee, TtEC
Data Review Surveillance (off-site laboratory data)	Once every six months during project duration	Internal	TtEC	Program Chemist, TtEC	Project Chemist, TtEC	Program Chemist, TtEC	QCPM, TtEC
Data Review Surveillance (on-site laboratory data)	Quarterly during operation of the on-site laboratory	Internal	TtEC	Radiological Technical Manager, Mr. Daryl DeLong	RSO, TtEC	RSO, TtEC	QCPM, TtEC

SAP Worksheet #31 – Planned Project Assessments Table (Continued)

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 (Title and Organizational Affiliation)	Person(s) Responsible for Monitoring Effectiveness of Corrective Actions (Title and Organizational Affiliation)
Management Review	Once during the project duration	Internal	TtEC	QCPM, TtEC	Project Manager, TtEC	Project Manager, TtEC	PQCM, TtEC

SAP Worksheet #32 – Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Title and Organizational Affiliation)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Title and Organizational Affiliation)	Time Frame for Response
Field Sampling Surveillance	Surveillance Report	Project Manager, TtEC	7 days after completion of the inspection	Corrective Action Report	Project Manager and QCPM, TtEC	5 days after notification
Data Review Surveillance (off-site laboratory data)	Surveillance Report	QCPM, TtEC	7 days after completion of the inspection	Corrective Action Report	QCPM, TtEC	14 days after notification
Data Review Surveillance (on-site laboratory data)	Surveillance Report	Project Manager, TtEC	7 days after completion of the inspection	Corrective Action Report	Project Manager, TtEC	14 days after notification
Management Review	Surveillance Report	Project Manager, TtEC	7 days after completion of the inspection	Corrective Action Report	Project Manager, TtEC	14 days after notification

This page intentionally left blank.

SAP Worksheet #33 – QA Management Reports Table

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 the beginning, once during, and once towards the end of field sampling activities	TBD	PQCM, TtEC	Project Manager and QCPM, TtEC
Data Review Surveillance Report (off-site laboratory data)	Once after all data are generated and reviewed	TBD	Program Chemist, TtEC	Project Manager and QCPM, TtEC
Data Review Surveillance Report (on-site laboratory data)	Once after all data are generated and reviewed	TBD	RSO, TtEC	Project Manager and QCPM, TtEC
Management Review Report	Once after management review is completed	TBD	QCPM, TtEC	Project Manager and Program Manager, TtEC

This page intentionally left blank.

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

Verification Input	Description	Internal/ External	Responsible for Verification (Title and Organizational Affiliation)
Field logbook	Field logbooks will be reviewed weekly and verified for information accuracy and completeness. The inspection will be documented in daily QC reports.	I	PQCM, TtEC
COC forms	COC forms will be reviewed daily upon their completion and verified for completeness.	I	PQCM, TtEC Project Chemist, TtEC Radiological Technical Manager, RSRS RSO, TtEC
Sample receipt	For samples shipped via courier or FedEx, the Project Chemist will verify receipt of samples by the laboratory the day following shipment.	I	Project Chemist, TtEC
Sample logins	Sample login information will be reviewed and verified for accuracy and completeness in accordance with the requirements in this SAP.	I E	Project Chemist, TtEC Laboratory Project Manager, TtEC/ TestAmerica – St. Louis
Laboratory data prior to release	Laboratory data will be reviewed to verify that the requirements in this SAP have been met. Prior to release, data will be verified as follows:	E	Laboratory Project Manager, TtEC/TestAmerica – St. Louis
	All data (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	Analyst, TtEC/TestAmerica – St. Louis
	All manual entries (100 percent) are free of transcription errors and manual calculations are accurate; computer calculations are spot-checked to verify program validity; data 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	Peer Analyst, TtEC/TestAmerica – St. Louis
	Data reported are compliant with method- and project-specific QC requirements; the reported information is complete; the information in the report narrative is complete and accurate; and results are reasonable.	E	Supervisor, TtEC/TestAmerica – St. Louis

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

Verification Input	Description	Internal/ External	Responsible for Verification (Title and Organizational Affiliation)
Laboratory data prior to release (Continued)	Data 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 data since reviews are done only on 10 percent of the data.	E	Quality Assurance Manager, TtEC/ TestAmerica – St. Louis
Laboratory data due at turnaround time listed on COC	Laboratory data will be verified for having been obtained following the protocols in this SAP and being of sufficient quality to satisfy DQOs.	I	Project Chemist, TtEC Radiological Technical Manager, RSRS
Laboratory data packages	All laboratory data packages will be verified by the laboratory performing the work for completeness and technical accuracy prior to submittal. Data packages will then be reviewed by the Project Chemist for accuracy against faxed/e-mailed data and for completeness in accordance with the data package requirements described in Worksheet #29. Subsequently, data packages will be evaluated externally by undergoing third-party data validation as described in Worksheet #36.	E I I	Laboratory, TtEC/TestAmerica – St. Louis Project Chemist, TtEC Radiological Technical Manager, RSRS
Field and electronic data	One hundred percent of manual entries will be reviewed against the hard-copy information and 10 percent of electronic uploads will be checked against the hard copy.	I I	Project Chemist, TtEC Radiological Technical Manager, RSRS

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

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Title and Organizational Affiliation)
IIa	Field logbook	Field logbooks will be reviewed weekly for accuracy associated with each sampling event. The inspection will be documented in daily QC reports.	PQCM, TtEC
IIa	COC forms	COC forms will be reviewed daily to ensure that project information, sample analyses requested, number of field QC samples collected, and percent level III or IV validation chosen are accurate and in accordance with the requirements in this SAP.	PQCM, TtEC Project Chemist, TtEC Radiological Technical Manager, RSRS
IIa	Sample receipt	The sample cooler will be checked for compliance with temperature and packaging requirements listed in Worksheet #27 of this SAP.	Laboratory sample custodian, TtEC/TestAmerica – St. Louis
IIa	Sample logins	Sample login will be reviewed for accuracy against the COC form.	Project Chemist, TtEC Laboratory Project Manager, TtEC/TestAmerica-St. Louis
IIa	Laboratory data prior to release	Laboratory data will be reviewed to ensure that the data are accurate and meet the requirements in this SAP. Prior to release, data will be validated as follows:	Laboratory Project Manager, TtEC/TestAmerica-St. Louis
		All data (100 percent) comply with the method- and project-specific requirements and any deviations or failure to meet criteria is documented for the project file.	Laboratory Analyst, TtEC/TestAmerica – St. Louis
		All manual entries (100 percent) are free of transcription errors and manual calculations are accurate; computer calculations are spot-checked to verify program validity; data 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.	Laboratory Peer Analyst, TtEC/TestAmerica – St. Louis
		Data reported are compliant with method- and project-specific QC requirements; the reported information is complete; the information in the report narrative is complete and accurate; and results are reasonable.	Laboratory Supervisor, TtEC/TestAmerica – St. Louis
		Data 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 data since only 10 percent of the data is reviewed.	Laboratory Quality Assurance Manager, TtEC/Tes – America-St. Louis

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

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Title and Organizational Affiliation)
IIa	Laboratory data due at turnaround time listed on COC	Laboratory data will be reviewed to ensure that the data reported met the analyte list and limits listed in this SAP.	Project Chemist, TtEC Radiological Technical Manager, RSRS
IIa	Laboratory data packages	All laboratory data packages will be validated by the laboratory performing the work for technical accuracy prior to submittal.	Laboratory Project Manager, TtEC/TestAmerica – St. Louis
		Data packages will then be reviewed for accuracy against the laboratory data that was faxed/e-mailed at the turnaround time listed on the COC.	Project Chemist, TtEC Radiological Technical Manager, RSRS
		Data packages will be evaluated externally by undergoing data validation as described in Worksheet #36.	Third-party data validator, LDC.
IIb	Data validation reports	Data validation reports will be reviewed in conjunction with the project DQOs and data usability assessment (Worksheet #37).	Project Chemist, TtEC

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

Step IIa / IIb	Matrix	Analytical Group	Validation Criteria	Data Validator (Title and Organizational Affiliation)
IIa	Soil/Water	All	In accordance with TestAmerica SOPs listed in Worksheet 23, NAVFAC SW EWI #1, and EPA Level III and IV guidelines	Laboratory Project Manager/TestAmerica – St. Louis
IIb	Soil/Water	All	In accordance with LDC SOPs, NAVFAC SW EWI #1, and EPA Level III and IV guidelines	Third-party data validator / LDC

The following documents will be used as guidance for validating all data: Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA 540/R-99-008 (EPA 1999); Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA 540-R-04-004 (EPA 2004); EWI #1, 3EN2.1, Chemical Data Validation (SWDIV 2001); Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846, Third Edition and final updates (EPA 1986); QSM (DOD, 2009); and the QC criteria specified in this SAP. Currently, there are no standards for data validation of radiological analyses. Therefore, guidance documents on validation of radiological data and modified functional guidelines will be used by the validator.

All sample results produced by the off-site laboratory with the exception of waste characterization results will be validated by an independent data validation company. (Data validation is not required for the on-site laboratory results since these results are being used as screening data.) Data validation will be performed by an independent data validation company. For this project, 80 percent of the data will require EPA Level III-equivalent data validation and 20 percent EPA Level IV-equivalent data validation. EPA Level III-equivalent data validation includes the comparison of QC parameters to the appropriate criteria or limits. (QC parameters include holding times, tune, calibration, blanks, spikes, surrogates, and internal standards, as applicable.) EPA Level IV-equivalent data validation includes not only what is performed in a Level III-equivalent validation but also includes review of raw data and backup documentation (for calibrations, standards, analysis run logs, etc.). This information is used for checking calculations of quantified analytical data during a Level IV-equivalent data validation review.

Data may be qualified as protocol or advisory. Protocol violations are when the laboratory deviates from the referenced analytical methods or the project-specific QLs, QC limits, or QC criteria. Advisory violations are when technical validation criteria have not been met.

Field QC samples will be discussed in the validation reports as follows:

- **Field Duplicates** – Field duplicate identifications will be provided on the COC form for each SDG by TtEC if collected. A section showing relative percent difference (RPD) values will be included to demonstrate field duplicate precision. If the results cannot be calculated, this will be noted in the report.

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

- **Field Blanks** – Identifications for field blanks, including trip blanks, equipment blanks, and source blanks, will be provided on the COC forms by TtEC. Any analyte detected above the QL in field blanks will be discussed in this section of the report.

SAP Worksheet #37 – Usability Assessment

After the analytical data have been reviewed, verified, and validated in accordance with Worksheets #34 to 36, a data quality assessment (DQA) report may be prepared to assess data quality and usability. The DQA will include review of the following:

- Sample collection and analytical methods to verify that these were performed as discussed in Worksheets #14 and #17
- Field QC samples to verify that these were collected in accordance with Worksheet #12
- Project-specific QLs as listed in Worksheet #15 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 the measure of the reproducibility of a set of replicate results or the agreement among repeat observations made under the same conditions. Analytical precision is the measurement of the variability associated with duplicate or replicate analyses. Field duplicate, laboratory duplicate, MSD, and LCSD (if analyzed) samples will be used to assess field and analytical precision. The precision measurement will be determined using the RPD between the duplicate sample results as follows:

$$RPD = 100 \times 2 \times (\text{result - duplicate result})/(\text{result + duplicate result})$$

The RPD limits for laboratory duplicate, MSD, and LCSD are presented in Worksheet #28, and the field duplicate limits are listed in Worksheet #12. Associated samples that do not meet the criteria will be evaluated by the validator.

If a comparative analysis is required for gamma spectroscopy, the indicated radionuclide concentrations between the on-site and off-site laboratory will be compared as follows:

- ^{137}Cs activity that is reported above the MDL or reporting limit from both laboratories
- ^{226}Ra activity that is reported above the MDL or reporting limit from both laboratories and the acceptance criterion is an RPD less than or equal to 30

SAP Worksheet #37 – Usability Assessment (Continued)

- ^{90}Sr activity that is reported above the quantification or reporting limit from both laboratories

The comparison (if required) will be performed using the RPD calculation, and the acceptance criteria are specified in Worksheet #28. Additionally, other radionuclides that may be present in samples from both laboratories may also be compared using an RPD less than or equal to 30.

On-site samples that do not report positive activity will not have an RPD calculation performed. However, on-site sample results will still be compared with the off-site laboratory results to verify no activity is reported above the remediation limit. An RPD less than or equal to 30 is acceptable if the on-site laboratory reported activity is greater than the off-site laboratory activity without further investigation. Any off-site laboratory results greater than the remediation limit will be compared to the on-site laboratory results. If the on-site laboratory results did not report activity above the remediation limit, then an investigation will be conducted to resolve the discrepancy.

Accuracy

Accuracy is defined as the nearness of a result or the mean of a set of results to the true or accepted value. Analytical accuracy is measured by comparing the percent recovery (%R) of analytes spiked into a sample against a control limit. Spiked samples (typically from wet chemical analysis and separation processes) include MS, MSD, and LCS analyzed for every batch of up to 20 samples. They serve as a measure of analytical accuracy and surrogate standards added to all samples, blanks, MS, MSD, and LCS analyzed for organic contaminants to evaluate the method's accuracy and help to determine matrix interferences. %R is calculated as follows:

$$\%R = 100 \times (\text{spiked sample result} - \text{unspiked sample result})/\text{amount of spike added}$$

The laboratory will review the QC samples and surrogate standard recoveries for each analysis to ensure that the %R lies within the control limits listed in Worksheet #28. Otherwise, data will be flagged.

Representativeness

Unlike precision and accuracy, which can be expressed in quantitative terms, representativeness is a qualitative parameter. Representativeness is the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or an environmental condition. It is a qualitative parameter that depends on proper design of the sampling program.

Field personnel will be responsible for ensuring that samples are representative of field conditions by collecting and handling samples according to the procedures in this SAP. Errors in sample

SAP Worksheet #37 – Usability Assessment (Continued)

collection, packaging, preservation, or COC procedures may result in samples being judged non-representative and may form a basis for rejecting the data.

Completeness

Completeness is the percentage of measurements made that is judged to be valid. The completeness goal is to generate a sufficient amount of valid data to meet project needs. Completeness is calculated and reported for each method, matrix, and analyte combination. The number of valid results divided by the number of possible individual analyte results, expressed as a percentage, determines the completeness of the data set. For completeness requirements, valid results are all results not qualified with a rejected (R) flag. The requirement of completeness is 95 percent for samples and is determined using the following equation:

$$\% \text{ completeness} = 100 \times (\text{number of valid analyte results/number of possible results})$$

Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another, whether it was generated by a single laboratory or during interlaboratory studies. The use of standardized field and analytical procedures ensures comparability of analytical data.

Sample collection and handling procedures will adhere to EPA-approved protocols. Laboratory procedures will follow standard analytical protocols, use standard units and standardized report formats, follow the calculations as referenced in approved analytical methods, and use a standard statistical approach for QC measurements.

This page intentionally left blank.

REFERENCES

AEC (Atomic Energy Commission). 1974. Regulatory Guide 1.86. Termination of Operating Licenses for Nuclear Reactors. June.

DoD (Department of Defense). 2009. Quality Systems Manual for Environmental Laboratories. Version 3. January.

DoD, DOE (Department of Energy), Nuclear Regulatory Commission, and EPA (U.S. Environmental Protection Agency). 2000. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM), NUREG-1575. August.

DON (Department of the Navy). 2006. Final Base-wide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco, California.

DTSC (Department of Toxic Substances Control). 2001. Information Advisory on Clean Imported Fill Material.

EPA (U.S. Environmental Protection Agency). 1986. Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846. Third Edition and final updates.

————. 1999. National Functional Guidelines for Organic Data Review, EPA 540/ R-99/008. Contract Laboratory Program. October.

————. 2000. Radionuclides Notice of Data Availability Technical Support Document. Targeting and Analysis Branch, Standards and Risk Management Division, Office of Groundwater and Drinking Water, EPA. March.

————. 2004. National Functional Guidelines for Inorganic Data Review, EPA 540/R-04/004. Contract Laboratory Program. October.

————. 2005. Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP). March.

————. 2006a. Guidance on Systematic Planning using the Data Quality Objectives Process, EPA QA/G-4, QAMS. February.

————. 2006b. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS. May.

NAVFAC SW (Naval Facilities Engineering Command Southwest). 2006. Environmental Work Instruction (EWI) #2, 3EVR.2, Review, Approval, Revision, and Amendment of Sampling and Analysis Plans (SAPs). April.

NAVSEA (Naval Sea Systems Command). 2004. Final Historical Radiological Assessment, Volume II. August 31.

NFESC (Naval Facilities Engineering Service Center). 1999. Navy Installation Restoration Chemical Data Quality Manual (IRCDQM). October.

SWDIV (Southwest Division Naval Facilities Engineering Command). 2001. Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical Data Validation. November.

———. 2005. Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards.

TtEC (Tetra Tech EC, Inc.). 2010a. Final Base-Wide Storm Drain and Sanitary Sewer Removal Sampling and Analysis Plan. July. Revision 4.

———. 2010b. Modification of the Memorandum of Understanding, Hunters Point Shipyard, San Francisco, California. October 7.

TtEMI (Tetra Tech EMI). 2000. Draft Phase IV Radiation Investigation Report, HPS, San Francisco, California. May 15.

———. 2001. Basewide Radiological Removal Action, Action Memorandum, HPS, San Francisco, California. November 19

APPENDIX A

HUNTERS POINT SHIPYARD STANDARD OPERATING PROCEDURES (on CD only)

This page intentionally left blank.

APPENDIX B

EXAMPLE OF CHAIN-OF-CUSTODY, SAMPLE LABEL, AND CUSTODY SEAL

This page intentionally left blank.

TETRA TECH
1230 Columbia Street, Suite 500
San Diego, CA 92101 (619) 234-8696

NUMBER 21700

CHAIN-OF-CUSTODY RECORD

PROJECT NAME	PURCHASE ORDER NO.
PROJECT LOCATION	PROJECT NO
SAMPLER NAME	AIRBILL NUMBER
PROJECT CONTACT	PROJECT CONTACT PHONE NUMBER

ANALYSES REQUIRED

LABORATORY NAME

LABORATORY ID (FOR LABORATORY)

Project Information Section Do not submit to Laboratory

SAMPLE ID	DATE COLLECTED	TIME COLLECTED	NO. OF CONTAINER	LEVEL 3	LEVEL 4	TYPE	TAT									COMMENTS	LOCATION	DEPTH START	DEPTH END	QC

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	LABORATORY INSTRUCTIONS/COMMENTS
COMPANY	TIME	COMPANY	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	COMPOSITE DESCRIPTION
COMPANY	TIME	COMPANY	
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
COMPANY	TIME	COMPANY	TEMPERATURE: _____ SAMPLE CONDITION: ☐ INTACT ☐ BROKEN COOLER SEAL: ☐ INTACT ☐ BROKEN

SAMPLING COMMENT:

White - Laboratory; Pink - Laboratory; Canary - Project File; Manila - Data Management

SAMPLE LABEL (EXAMPLE)

SAMPLE NO.:_____
PROJECT:_____
DATE:____/____/____ **TIME:**_____**HRS**_____
MEDIUM: **WATER**_____ **SOIL**_____ **SEDIMENT**_____
OTHER_____**(Specify)**
TYPE: **GRAB**_____ **COMPOSITE**_____ **OTHER**_____
PRESERVATION:_____
ANALYSIS:_____
SAMPLED BY:_____
REMARKS:_____
_____

CUSTODY SEAL (EXAMPLE)

CUSTODY SEAL

Person Collecting Sample:_____ Sample No.:_____
(Signature)
Date Collected:_____ Time_____
_____

ATTACHMENT 2

PROJECT CONTRACTOR QUALITY CONTROL PLAN

This page intentionally left blank.

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-10-D-0809
CTO NO. 0004

FINAL
PROJECT CONTRACTOR QUALITY CONTROL PLAN
January 21, 2011

BASEWIDE RADIOLOGICAL SUPPORT
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: RMAC-0809-0004-0003

TETRA TECH EC, INC.
1230 Columbia Street, Suite 750
San Diego, California 92101-8536

Greg Joyce
QC Program Manager

TABLE OF CONTENTS

PAGE

ABBREVIATIONS AND ACRONYMS v

1.0 INTRODUCTION 1-1
1.1 SITE BACKGROUND 1-1
1.2 PURPOSE 1-1

2.0 PROJECT ORGANIZATION, RESPONSIBILITY, AND POINTS OF CONTACT 2-1
2.1 REMEDIAL PROJECT MANAGER 2-1
2.2 QUALITY ASSURANCE OFFICER 2-1
2.3 RESIDENT OFFICER IN CHARGE OF CONSTRUCTION 2-2
2.4 RADIOLOGICAL SITE MANAGER 2-2
2.5 PROJECT MANAGER 2-2
2.6 LABORATORY COORDINATOR 2-3
2.7 RADIOLOGICAL SCREENING YARD MANAGER 2-4
2.8 DATA MANAGER 2-4
2.9 BASEWIDE SUPPORT SERVICES COORDINATOR 2-5
2.10 PROJECT ENVIRONMENTAL SAFETY MANAGER 2-5
2.11 QUALITY CONTROL PROGRAM MANAGER 2-6
2.12 PROJECT SUPERINTENDENT 2-6
2.13 PROJECT QUALITY CONTROL MANAGER 2-7
2.14 SITE SAFETY AND HEALTH OFFICER 2-8
2.15 PROGRAM CHEMIST 2-9
2.16 LICENSE RADIATION SAFETY OFFICER (CORPORATE HEALTH AND PHYSICS MANAGER) 2-9
2.17 SUBCONTRACTORS AND VENDORS 2-11
2.18 POINTS OF CONTACT 2-11

3.0 DEFINABLE FEATURES OF WORK 3-1

4.0 SUBMITTALS 4-1
4.1 REVIEW OF SUBMITTALS 4-1
4.2 SUBMITTAL PROCESS 4-2
4.3 REVIEW AND PROCESSING OF SUBMITTALS THAT DO NOT REQUIRE DON APPROVAL 4-2
4.4 REVIEW AND PROCESSING OF SUBMITTALS THAT REQUIRE DON APPROVAL 4-2
4.5 REVISED SUBMITTALS 4-3

5.0 TESTING 5-1
5.1 DOCUMENTATION 5-1
5.2 LABORATORY SERVICES 5-1
5.3 TESTING PLAN LOG 5-1

TABLE OF CONTENTS
(Continued)

PAGE

6.0 QUALITY CONTROL MEETINGS 6-1
6.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING 6-1
6.2 QC MEETINGS 6-1

7.0 INSPECTION 7-1
7.1 PREPARATORY PHASE INSPECTION 7-1
7.2 INITIAL PHASE INSPECTION 7-2
7.3 FOLLOW-UP PHASE INSPECTION 7-2
7.4 RECEIPT INSPECTION 7-3
7.5 ADDITIONAL INSPECTIONS 7-3
7.6 COMPLETION INSPECTION 7-3
7.6.1 Construction Quality Control Completion Inspections 7-3
7.6.2 Prefinal Inspection 7-3
7.6.3 Final Acceptance Inspection 7-4
7.7 INSPECTION DOCUMENTATION 7-4

8.0 DOCUMENTATION 8-1
8.1 DAILY CONTRACTOR QUALITY CONTROL REPORT 8-1
8.2 CONTRACTOR PRODUCTION REPORT 8-2
8.3 LOGBOOKS 8-3
8.4 PHOTOGRAPHS AND PHOTOGRAPH LOGS 8-3
8.5 CONFERENCE NOTES AND CONFIRMATION NOTES 8-3

9.0 CHANGE MANAGEMENT 9-1
9.1 DESIGN CHANGE NOTICES 9-1
9.1.1 Identification 9-1
9.1.2 Preparation 9-1
9.1.3 Review and Approval 9-1
9.1.4 Implementation of Approved DCNs 9-1
9.1.5 Records 9-1
9.2 FIELD CHANGE REQUEST 9-2
9.3 DISTRIBUTION OF DCN AND FCR FORMS 9-2

10.0 NONCONFORMANCE 10-1
10.1 ROOT CAUSE ANALYSIS 10-1
10.2 CORRECTIVE ACTION 10-2
10.3 CONDITION REQUIRING STOP WORK 10-2

11.0 QUALITY MANAGEMENT 11-1

12.0 REFERENCES 12-1

TABLE OF CONTENTS
(Continued)

TABLES

Table 3-1 Definable Features of Work

FIGURES

Figure 2-1 Project Organization Chart

APPENDICES

Appendix A Delegation of Authority Letters and Resumes

Appendix B Contractor Quality Control Forms

Appendix C TestAmerica-St. Louis Accreditations

This page intentionally left blank.

ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
APP	Accident Prevention Plan
BRAC	Base Realignment and Closure
CHPM	Corporate Health and Physics Manager
CMT	Construction Management Technician
CQC	Contractor Quality Control
CSO	Caretaker Site Office
CTO	Contract Task Order
DCN	Design Change Notice
DFW	definable feature of work
DN	deficiency notice
DON	Department of the Navy
EHS	Environmental Health and Safety
EM	Engineer Manual
FCR	Field Change Request
HPS	Hunters Point Shipyard
IR	Installation Restoration (Program)
LLRW	low-level radioactive waste
NCR	Nonconformance Report
PCQC	Project Contractor Quality Control
PESM	Project Environmental Safety Manager
PjM	Project Manager
PQCM	Project Quality Control Manager
QA	quality assurance
QAO	Quality Assurance Officer
QC	quality control
QCPM	Quality Control Program Manager

ABBREVIATIONS AND ACRONYMS
(Continued)

RASO	Radiological Affairs Support Office
RML	Radioactive Material License
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RPP	Radiation Protection Plan
RSO	Radiation Safety Officer
RSOR	Radiation Safety Officer Representative
RSY	radiological screening yard
SFRA	San Francisco Redevelopment Agency
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
Triple A	Triple A Machine Shop, Inc.
TtEC	Tetra Tech EC, Inc.
UFGS	Unified Facilities Guide Specification

1.0 INTRODUCTION

This Project Contractor Quality Control (PCQC) Plan establishes the procedures and methods to be implemented for specific activities to be performed by Tetra Tech EC, Inc. (TtEC) while providing basewide support to other remediation contractors at Hunters Point Shipyard (HPS), San Francisco, California. TtEC has been contracted by the Department of the Navy (DON) to perform this work at HPS for the Base Realignment and Closure (BRAC) Program Management Office West under Naval Facilities Engineering Command Southwest Contract No. N62473-10-D-0809, Contract Task Order (CTO) 0004. This PCQC Plan fulfills the TtEC quality control (QC) system requirements.

1.1 SITE BACKGROUND

HPS is located in the southeastern part of San Francisco on a long promontory that extends east into San Francisco Bay. Presently, HPS encompasses approximately 866 acres, including approximately 420 acres on land. 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 when the DON deactivated HPS. From 1976 to 1986, the DON leased HPS 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, HPS was placed on the DON's BRAC list, and its mission as a DON shipyard ended in April 1994.

A 1998 BRAC decision requires full closure and cleanup of HPS. Essentially, this may entail removal of buildings and structures, including subsurface systems, as well as removal of contaminated materials. HPS was divided into 11 parcels, A B, C, D-1, D-2, E, E-2, F, G, UC1 and UC2. Parcel A, consisting of the most inland 75 acres, was transferred to the San Francisco Redevelopment Agency (SFRA) in 2004. The remainder of HPS will be conveyed to the SFRA once the environmental cleanup is complete.

1.2 PURPOSE

The purpose of this PCQC Plan is to establish specific procedures and methods for field inspections, and provide an effective QC system to ensure the quality of all work performed by TtEC and its subcontractor personnel while providing basewide support to other remediation contractors at HPS.

This plan is applicable to all definable features of work (DFWs) listed in Section 3.0 and will be available at the project field office. All work activities will be conducted in accordance with this PCQC Plan and the Execution Plan to which it is attached.

This page intentionally left blank.

2.0 PROJECT ORGANIZATION, RESPONSIBILITY, AND POINTS OF CONTACT

This section describes the organization and authority of project personnel. The organizational structure, functional responsibilities, levels of authority, and lines of communication within the organization have been established to ensure high-quality work. The project organization chart showing the reporting lines for key personnel is provided on Figure 2-1. The responsibilities of key personnel are described in the following subsections. A listing of the points of contact for the project is provided in Section 2.18.

2.1 REMEDIAL PROJECT MANAGER

The Remedial Project Manager (RPM) has primary responsibility with the DON for day-to-day management of the project activities performed under this Execution Plan and for its successful completion. The RPM is responsible for the following:

- Perform project management for the DON.
- Ensure the project scope of work requirements are fulfilled.
- Oversee the project cost and schedule.
- Provide formal technical direction to the TtEC project team, as needed.
- Coordinate with other RPMs for other projects being performed to ensure that proper controls are in place.
- Act as lead in interacting with regulatory agencies.

2.2 QUALITY ASSURANCE OFFICER

The Quality Assurance Officer (QAO) is the DON representative with primary responsibility for ensuring that the contract-required quality assurance (QA) measures are in place and effective for the work performed. The QAO is responsible for the following:

- Review and approval of Sampling and Analysis Plans.
- Provide DON oversight of the TtEC QA Program.
- Provide quality-related directives through the Contracting Officer.
- Act as the point of contact for matters pertaining to generating data and maintaining the quality of data.
- Authorize the suspension of project execution if QA requirements are not adequately met.

2.3 RESIDENT OFFICER IN CHARGE OF CONSTRUCTION

The Resident Officer in Charge of Construction (ROICC) is the DON representative with the primary responsibility for providing on-site QA and safety oversight of contractors. The ROICC is responsible for the following:

- Verify that all work has been completed per contract and technical specifications prior to final government acceptance.
- Perform field verification for QA of contractor's implementation of the QC Program.
- Notify the contractor of any work not in compliance.
- Notify the contractor of any work being performed in an unsafe manner.
- Interact with the contractor's Project Quality Control Manager (PQCM) on quality-related issues.
- Review and sign waste manifests as the generator's representative.
- Review daily Contract Quality Control (CQC) Reports for completeness and accuracy.
- Attend preparatory phase, initial phase, prefinal, and final acceptance inspections.
- Attend weekly QC meetings.

2.4 RADIOLOGICAL SITE MANAGER

The Radiological Site Manager is the technical lead for the Radiological Affairs Support Office (RASO) and is responsible for the technical oversight and review of the project documents and all issues related to radiological activities. The RASO acts as the lead interface with regulatory agencies on radiological issues, survey plans and reports, and radiological release criteria.

2.5 PROJECT MANAGER

The Project Manager (PjM) is the TtEC representative responsible for the direction, execution, and successful completion of project tasks to achieve overall project goals. The PjM has responsibility for and the authority to direct all segments of the project including technical, construction, and administrative activities. The PjM will be assisted by the Laboratory Coordinator, Radiological Screening Yard (RSY) Manager, Data Manager, and Basewide Support Services Coordinator to ensure successful completion of project tasks to achieve overall project goals. The PjM is responsible for the following:

- Coordinate work activities of subcontractors and TtEC personnel and ensure that all personnel adhere to the administrative and technical requirements of the project.
- Monitor the status and progress of work and ensure that project deliverables are completed on time and within the project budget.

- Monitor the budget and schedule, and notify the client and the Program Manager of any changes that may require administrative actions.
- Ensure adherence to the quality requirements of the contract, project scope of work, and the QC plans.
- Ensure that all work meets the requirements of the project plans, procedures, and technical specifications and complies with applicable codes and regulations.
- Ensure that all work activities are conducted in a safe manner in accordance with the Accident Prevention Plan (APP)/Site Safety and Health Plan (SSHP) – Safety and Health Requirements (Engineer Manual [EM] 385-1-1) (USACE 2008), and all applicable Occupational Safety and Health Administration regulations.
- Ensure that change conditions are properly identified and documented with the appropriate approvals.
- Serve as the primary contact with the DON and TtEC for actions and information related to the work and make sure to include appropriate TtEC lead and experts in decision-making.
- Coordinate satisfactory resolution and completion of evaluation and acceptance for Nonconformance Reports (NCRs).
- Attend required meetings, including the preconstruction conference, weekly QC meetings, pre- and postconstruction site inspections, and other scheduled and unscheduled meetings.

2.6 LABORATORY COORDINATOR

The Laboratory Coordinator will be the point of contact for on-site and off-site laboratory matters. The Laboratory Coordinator will:

- Coordinate with other remediation contractors, the low-level radioactive waste (LLRW) contractor, and the non-radiological waste disposal contractor as well as the RASO, BRAC, and ROICC regarding their sample and analytical requirements.
- Coordinate the submittal of samples to both the on-site and off-site laboratories.
- Coordinate the distribution of analytical results to the various contractors.
- Ensure that the Final Status Survey, alpha spectroscopy, and quality assurance samples are transferred to the off-site laboratory.
- Ensure that soil samples are collected for chemical analysis from RSY stockpiles identified by the remediation contractors as being derived from Installation Restoration (IR) 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 so the contractor can determine any additional analyses required for waste characterization purposes.
- Ensure the proper archiving and storage of the soil and sediment samples.

ED_004747_00027038-00312

2.7 RADIOLOGICAL SCREENING YARD MANAGER

The RSY Manager will provide overall management and operation of the three RSYs to ensure a smooth and consistent process. The RSY Manager will:

- Ensure the on-site radiological remediation contractors coordinate with the trained RSY staff to determine which RSY will be used for excavated soil processing on a daily basis.
- Ensure the remediation contractors provide the RSY staff with truck tickets that include proper information related to each load, including the trench segment from which the soil was generated, volume, load number, the associated IR (or non-IR) site, any noted staining or odors, screening pad number, and unique stockpile number.
- Ensure that the truck tickets are gathered and the applicable information entered into the database management system on a daily basis.
- Ensure the remediation contractors keep RSY staff informed of how much soil will be coming from an excavation area and when excavation activities in IR sites are complete so that RSY support can be planned accordingly.

2.8 DATA MANAGER

The Data Manager will be responsible for managing the "cradle-to-grave" data management system to ensure that it seamlessly integrates all phases of the sanitary sewer and storm drain radiological and construction work process from the initial survey, excavation, and remediation activities through backfilling of survey units and site restoration, as well as building FSS activities to support free release. The Data Manager will:

- Ensure the Excavated Soil Module tracks each truckload and stockpile of excavated sanitary sewer and storm drain soil to facilitate backfilling within the same general area from which the soil was excavated.
- Ensure the RSY Operations Module tracks 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 remediation contractor or the LLRW or non-LLRW waste contractors.
- Ensure the Chain-of-Custody Module tracks samples from generation through delivery to both the on-site or off-site laboratories.
- Ensure the Piping Module tracks radiological survey swipe and sediment samples so that TtEC can identify when additional investigative samples are required from those trenches with elevated cesium-137 activity.
- Ensure the Waste Management Module tracks quantities of LLRW and IR site contaminated soil for disposal by the DON's waste contractors.
- Ensure the Analytical Results Module tracks the status of each sample submitted and supports the generation of laboratory analytical reports for both off-site and on-site laboratory analytical results.

2.9 BASEWIDE SUPPORT SERVICES COORDINATOR

The Basewide Support Services Coordinator will be the point of contact for the DON and other contractors in coordinating the following basewide support services:

- Perform incoming and outgoing equipment surveys.
- Provide dosimetry for staff and nonradiological remediation contractors performing work in radiologically impacted areas.
- Institute radiological controls and postings in impacted areas not covered by an on-site radiological remediation contractor.
- Conduct routine radiological surveys.
- Operate the on-site portal monitor for incoming and outgoing trucks.
- Conduct radiological awareness briefings for contractors executing work in radiologically impacted areas.
- Prepare and/or update HPS standard operating procedures and develop succinct work instructions.

2.10 PROJECT ENVIRONMENTAL SAFETY MANAGER

The Project Environmental Safety Manager (PESM) is the TtEC representative responsible for implementing and overseeing the Contract Health and Safety Program and for developing, implementing, and approving all APP/SSHP documents. Any changes to the established Contract Health and Safety Program or APP/SSHP must be at the direction and approval of the PESM, with concurrence of the DON Administrative Contracting Officer. The PESM or designee will not necessarily be on-site during all basewide support activities but will be readily available for consultation when required.

The PESM or designee is a Certified Industrial Hygienist who is certified by the American Board of Industrial Hygiene. The PESM supervises and directs the activities of the Site Safety and Health Officer (SSHO). The PESM has the authority to stop unsafe operations, remove unqualified personnel from the work area, and approve changes to the APP/SSHP. The PESM is responsible for the following:

- Oversee all aspects of the APP/SSHP from development to implementation.
- Advise the SSHO on all related health and safety matters.
- Review site-specific plans for completeness and compliance.
- Review other site documents as they affect health and safety (e.g., Activity Hazard Analyses [AHAs] and sampling plans).
- Review and evaluate all monitoring results.

ED_004747_00027038-00314

- Establish and monitor all related health and safety procedures through site safety inspections and audits.
- Ensure that TtEC employees receive required Environmental Health and Safety (EHS) regulatory training.
- Fulfill specific responsibilities for project EHS personnel that are identified within each EHS procedure.
- Function as a technical resource for all environmental compliance, safety, loss control, and industrial hygiene issues.

2.11 QUALITY CONTROL PROGRAM MANAGER

The Quality Control Program Manager (QCPM) is the TtEC representative responsible for the oversight of program QC, including field activities and data acquisition. The QCPM is responsible for the following:

- Coordinate and resolve quality concerns.
- Provide quality-related direction and ensure the training of the PQCM and others performing quality-related functions.
- Suspend project activities if quality standards are not maintained.
- Interact with the DON, including the QAO, on quality-related issues.
- Review audit and surveillance reports.
- Implement the DON technical directives related to quality.

2.12 PROJECT SUPERINTENDENT

The Project Superintendent is a TtEC representative who reports to the PjM and is responsible for coordinating, directing, implementing, and supervising site construction activities. The Project Superintendent or designated representative will be on-site at all times during field activities. The Project Superintendent is responsible for the following:

- Implement field activities in accordance with the Execution Plan.
- Direct support personnel and subcontractors.
- Administer site access and communication.
- Maintain the work site, facilities, vehicles, and equipment.
- Coordinate work activities and ensure all personnel adhere to the administrative and technical requirements of the project.
- Prepare status reports and estimate future scheduling needs.
- Prepare daily Contractor Production Reports.

- Monitor the status and progress of field activities and ensure that project deliverables are completed on time and within the project budget.
- Ensure work activities in the field are conducted in a safe manner in accordance with the APP/SSHP.
- Investigate with the SSHO all incidents, accidents, injuries, illnesses, and near misses.

2.13 PROJECT QUALITY CONTROL MANAGER

The PQCM is the TtEC representative responsible for overall management of project QC and reports to the QCPM. The PQCM has the authority to stop work on site-related issues affecting the quality of the work performed and for directing the correction of all nonconforming work. The PQCM or designated representative will be on-site at all times during field activities. The PQCM is responsible for the following:

- Provide and maintain an effective QC system for all site activities.
- Perform ongoing field inspection to verify that all work is in compliance with both contract and technical specifications.
- Monitor QC activities to ensure conformance with authorized policies, procedures, contract specifications, required standards, and methods of quality construction.
- Prepare the daily CQC Reports.
- Coordinate and perform the three phases of inspection (preparatory, initial, and follow-up) for all DFWs.
- Responsible for issuance, maintenance, and enforcement of NCRs and other quality actions.
- Ensure that on-site and off-site inspections, testing, and sampling are performed in accordance with the plans, procedures, specifications, and applicable codes.
- Ensure that all required tests and inspections are performed and documented.
- Conduct required QC meetings, including the coordination and mutual understanding meeting, site survey visits, and other scheduled meetings.
- Coordinate and maintain submittal register, photograph log sheet, request for information, and NCR log and other required logs or registers.
- Review and maintain records of approved submittals, Design Change Notices (DCNs), and Field Change Requests (FCRs) for construction activities.
- Inspect material delivery handling and storage in accordance with technical specifications.
- Review and approve submittals and shop drawings and/or forward submittals as information only or for approval.
- Review project plans and procedures for quality issues.

- Confirm the removal or rework of material, equipment, or work activity that is not in compliance with plans and specifications.
- Maintain the Submittal Register Log.
- Perform daily QC safety inspections and logging in the QC logs (EM 385-1-1 01.A.12.b) (USACE 2008).

The PQCM will not be designated as the safety competent person.

2.14 SITE SAFETY AND HEALTH OFFICER

The SSHO is the TtEC representative who reports directly to the PESM and ensures all elements of the APP/SSHP are implemented and enforced on-site. The SSHO has full authority to issue stop work orders or evacuation orders when work operations or noncompliance(s) may threaten the health and safety of site workers or the public. The SSHO is responsible for the following:

- Ensure that all personnel understand the requirements of the TtEC EHS program and procedures through training and communication.
- Investigate with the Project Superintendent all incidents, accidents, injuries, illnesses, and near misses.
- Ensure project personnel are trained in the hazards of substances used on the project, maintain Material Safety Data Sheets and make them accessible to project personnel, and perform inspections and oversight to ensure the Waste Management Plan is being followed.
- Ensure tailgate safety meetings are conducted daily prior to start of work and are documented.
- Ensure project safety equipment is inspected and in good working order as required by the EHS program.
- Coordinate site health and safety requirements with the Project Superintendent and PjM.
- Ensure that all health and safety monitoring equipment and personal protective equipment are maintained and direct site-monitoring activities.
- Coordinate daily field activities with the Project Superintendent.
- Coordinate site safety and emergency response duties and verify site communications system with site personnel.
- Report incidents to the ROICC as required by EM 385-1-1 (USACE 2008).
- Report immediately to the PjM, RPM, and ROICC any fatal injury, persons admitted to a hospital, or damage to government property.
- Ensure all personnel have the required training and medical clearance prior to entering the exclusion zone at the site; inform the Project Superintendent of any site personnel with medical restrictions.

- Determine and post routes to medical facilities and telephone numbers for emergency transportation to medical facilities.
- Serve as the Project Hazard Communication Coordinator.
- Maintain training records and medical certifications for all on-site personnel, including subcontractors.
- Initiate revisions or changes to the APP/SSHP to support changing site conditions.
- Maintain site control procedures.
- Maintain current records of certification for first aid and cardiopulmonary resuscitation training for field personnel.
- Attend meetings, including the preconstruction conference, weekly QC meetings, pre- and postconstruction site inspections, and other project meetings.

2.15 PROGRAM CHEMIST

The Program Chemist is the TtEC representative who oversees sample collection, handling, analysis, and analytical data reporting. The Program Chemist is responsible for the following:

- Develop the Sampling and Analysis Plan.
- Evaluate and select qualified subcontract laboratories.
- Implement data QC procedures and perform audits of field performance.
- Review off-site laboratory data prior to use.
- Ensure that a proper review of on-site laboratory data is performed.
- Coordinate data validation of off-site laboratory data.
- Review data validation reports.
- Prepare analytical reports and supporting project reports.

2.16 LICENSE RADIATION SAFETY OFFICER (CORPORATE HEALTH AND PHYSICS MANAGER)

The Corporate Health and Physics Manager (CHPM) (also referred to as the Radiation Safety Officer [RSO]) is responsible for the following:

- Review and make recommended revisions to:
  - The Radiation Protection Plan (RPP), Radioactive Material License (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

- Act as the Health Physics Resource Manager, also referred to as the corporate level or license RSO.
- Designate a Project Health Physicist, also referred to as the project-level RSO Representative (RSOR), to provide day-to-day guidance on radiological protection issues.
- Maintain compliance as the license RSO, with RML No. 29-31396-01, including the following responsibilities:
  - Serve as primary point of contact for all communications to the NRC.
  - Identify and train RML authorized users.
  - Assign project RSORs.
  - Coordinate investigations involving radiological occurrences to include review and approval of a resulting Corrective Action Plan.
  - Notify NRC in advance in writing at least 14 days before initiating at a temporary job site under TtEC 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.
  - Notify NRC in advance 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.
  - Place reciprocity request with applicable Agreement States when necessary.
  - Maintain radiological exposure records.
  - Develop and/or obtain approval of radiation safety training materials and/or courses.
  - Perform program audits as detailed in corporate procedure NLP-08, Radiation Protection Program Audits.
  - Provide guidance on radiological protection issues.
  - Identify appropriate project staffing needs to implement RPP requirements.
  - Assist with the development of site 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 for Task Initiation Procedures for proposed projects involving exposure to radiation or radioactive materials.
- Delegate project responsibilities to other company health physicists (also referred to as RSORs), as necessary.

2.17 SUBCONTRACTORS AND VENDORS

Qualified subcontractors may be selected to provide various construction services for this project. The subcontractor is required to provide labor, material, and equipment necessary to conduct construction activities as directed by the PjM. Subcontractors and vendors will conform to TtEC's quality requirements including all approved procedures, technical specifications, and contract provisions.

The subcontractor is responsible for field inspection of their construction and operating activities. TtEC personnel will monitor, oversee, and make on-site observations and inspections of work in progress to determine whether the subcontractor's work is proceeding in accordance with TtEC's quality requirements.

Subcontractor personnel are responsible for maintaining a daily log of the project activities they perform and for providing information needed to complete the daily CQC Report. All inspection records, including inspection reports, deficiency reports, and reinspections of corrective actions, will be documented.

The following subcontractors and their services are anticipated to be used in support of the basewide operations:

- Radiological Survey & Remedial Services, LLC – Health physics support, data evaluation, on-site radiological laboratory services
- IO Environmental & Infrastructure – Data management, air sampling, off-site radiological laboratory services
- Aleut World Solutions, LLC – Health physics support

2.18 POINTS OF CONTACT

The following is a list of the key project, DON, and regulatory points of contact:

Entity	Project Title	Contact Information
BRAC PMO West 1455 Frazee Road, Ste. 900 San Diego, CA 92108-4310	RPM	Mr. Jim Whitcomb (619) 532-0936 james.h.whitcomb@navy.mil
NAVFAC SW 1455 Frazee Road, Ste. 900 San Diego, CA 92108-4310	Contract Specialist	Ms. Cindy Mafara (619) 532-0978 cindy.mafara@navy.mil
NAVFAC SW 2450 Saratoga Street, Building 114, Ste. 200 Alameda Point, Alameda, CA 94501-7545	ROICC	Ms. Shirley Ng (510) 749-5939 shirley.ng@navy.mil
NAVFAC SW 2450 Saratoga Street, Building 114, Ste. 200 Alameda Point, Alameda, CA 94501-7545	ROICC	Andy Uehisa (510) 749-5875 andrew.uehisa@navy.mil

Entity	Project Title	Contact Information
BRAC PMO West CSO – San Francisco Bay Area 410 Palm Ave., Building 1, Ste. 161 San Francisco, CA 94130-1806	CSO (Field Team Leader)	Mike Mentink (415) 743-4729 mike.mentink@navy.mil
BRAC PMO West CSO – San Francisco Bay Area 410 Palm Ave., Building 1, Ste. 161 San Francisco, CA 94130-180	CSO	Mel Asuncion (415) 743-4721 melecio.asuncion@navy.mil
NAVSEA Detachment RASO Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260	Radiological Site Manager	Laurie Lowman (757) 887-4692 laurie.lowman@navy.mil
NAVFAC SW 1220 Pacific Coast Highway San Diego, CA 92132-5190	QAO	Mr. Narciso Ancog (619) 532-3046 narciso.ancog@navy.mil
EPA, Region IX 75 Hawthorne Street (SFD-8-1) San Francisco, CA 94105	EPA RPM	Mark Ripperda (415) 972-3028 ripperda.mark@epa.gov
Cal/EPA DTSC Office of Military Facilities 700 Heinz Ave., Building F, Ste. 200 Berkeley, CA 94710	Cal/EPA DTSC RPM	Ryan Miya (510) 540-3775 rmiya@dtsc.ca.gov
California Water Board 1515 Clay Street, Ste. 1400 Oakland, CA 94612	Water Board RPM	Ross Steenson (510) 622-2445 rsteenson@waterboards.ca.gov
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	Project Manager	Bill Dougherty (415) 216-2731 bill.dougherty@tetratech.com
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	Laboratory Coordinator	Rick Weingarz (415) 216-2733 richard.weingarz@tetratech.com
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	RSY Manager	Shanti Montgomery (415) 216-2772 shanti.montgomery@tetratech.com
TtEC Twin Oaks, Suite 309 5700 Lake Wright Drive Norfolk, VA 23502	RSO	Erik Abkemeier (757) 944-0921 erik.abkemeier@tetratech.com
TtEC 1230 Columbia St., Ste. 750 San Diego, CA 92101-8536	QCPM	Mr. Greg Joyce (360) 780-0371 greg.joyce@tetratech.com

Entity	Project Title	Contact Information
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	PQCM	Mr. Rich Kanaya (415) 216-2759 rich.kanaya@tetratech.com
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	Alternate PQCM	Mr. Adam Berry (415) 216-2758 adam.berry@tetratech.com
TtEC 1230 Columbia St., Ste. 750 San Diego, CA 92101-8536	PESM	Mr. Roger Margotto, CIH, CSP (619) 471-3503 roger.margotto@tetratech.com.
TtEC Hunters Point Shipyard 200 Fisher Avenue San Francisco, CA 94124	SSHO	Mr. Daniel Keenan, ASP (415) 671-1990 daniel.keenan@tetratech.com
TtEC 17885 Von Karman Avenue, Ste. 500 Irvine, CA 92614-6213	Program Chemist	Ms. Lisa Bienkowski (949) 809-5028 lisa.bienkowski@tetratech.com
TtEC 143 Union Blvd., Ste. 1010 Lakewood, CO 80228	Data Manager	Terry Sindelar (303) 980-3514 terry.sindelar@tetratech.com
TtEC 17885 Von Karman Avenue, Ste. 500 Irvine, CA 92614-6213	Regulatory Compliance Specialist	Ms. Jennifer Dessort (949) 809-5063 jennifer.dessort@tetratech.com

Abbreviations and Acronyms:

ASP – Associate Safety Professional
BRAC – Base Realignment and Closure
Cal/EPA – California Environmental Protection Agency
CIH – Certified Industrial Hygienist
CSO – Caretaker Site Office
CSP – Certified Safety Professional
DTSC – Department of Toxic Substances Control
EPA – U.S. Environmental Protection Agency
NAVFAC SW – Naval Facilities Engineering Command Southwest
NAVSEA – Naval Sea Systems Command
PESM – Project Environmental Safety Manager
PjM – Project Manager
PMO – Program Management Office
PQCM – Project Quality Control Manager
QAO – Quality Assurance Officer
QCPM – Quality Control Program Manager
RASO – Radiological Affairs Support Office
ROICC – Resident Officer in Charge of Construction
RPM – Remedial Project Manager
RSO – Radiation Safety Officer
RSY – radiological screening yard
SSHO – Site Safety and Health Officer
TtEC – Tetra Tech EC, Inc.
Water Board – Regional Water Quality Control Board

ED_004747_00027038-00322

This page intentionally left blank.

3.0 DEFINABLE FEATURES OF WORK

A DFW is an activity or task separate and distinct from other activities that requires separate control activities. The DFW establishes the control measures required to verify both the quality of work performed and compliance with specified requirements, which include inspecting materials and workmanship before, during, and after each DFW. Preparatory and initial inspections will be performed on all DFWs, with the exception of mobilization and demobilization. Activities that will be covered by the PQCM during the inspections are listed in Table 3-1, except that the inspection requirements for verifying the quality for the on-site and off-site laboratory services are provided in the Basewide Radiological Support Sampling and Analysis Plan (Attachment 1 to the main Execution Plan). The following DFWs have been identified for the project:

- Operating Radiological Screening Yards (RSYs-2, -3, and -4)
- Providing on-site and off-site laboratory services
- Providing basewide support services

This page intentionally left blank.

4.0 SUBMITTALS

This section describes the review and approval process for submittals. TtEC will institute and maintain a submittal register (Appendix B) to track submittals from issuance to approval. A list of required submittals will be developed at the initiation of project activities and revised as necessary. Submittals will be scheduled, reviewed, certified, and managed in accordance with the procedures defined in this section.

Standard Unified Facilities Guide Specification (UFGS) submittal titles are as follow:

- SD-01 Preconstruction Submittals
- SD-02 Shop Drawings
- SD-03 Product Data
- SD-04 Samples
- SD-05 Design Data
- SD-06 Test Reports
- SD-07 Certificates
- SD-08 Manufacturer's Instructions
- SD-09 Manufacturer's Field Reports
- SD-10 Operation and Maintenance Data
- SD-11 Closeout Submittals

Descriptions of the submittals listed above are provided in UFGS Section 014502 (NAVFAC 2009). Not all submittals listed above are necessarily applicable to the DON's scope of work for this project.

4.1 REVIEW OF SUBMITTALS

Submittals will be reviewed to ensure completeness, accuracy, and contract compliance. Submittal of a certification will be inspected and approved by the PQCM for conformance to the project specifications or certification criteria. All items will be checked and approved by the PQCM or designated representative. Any submittals requiring modifications or changes will be returned to the originating organization for correction and then resubmitted for review and approval prior to acceptance. Approved submittals will be stamped, signed or initialed, and dated. During the preparatory phase of the QC inspections, the PQCM or designated representative will ensure that all materials and equipment have been tested and approved. No field activities will be performed without the required approval of applicable submittals.

4.2 SUBMITTAL PROCESS

Required submittals will be provided to project personnel as determined by the distribution schedule. Each submittal will be assigned a unique document control number.

A transmittal form will accompany each submittal. Each transmittal will be identified with:

- Contract and CTO number
- Name and address of the submitting organization
- Date of submittal
- Description of item being submitted, including reference to specification section (if applicable)
- Approval of submitting organization indicating conformance to the requirements

The PQCM will update the submittal register regularly.

4.3 REVIEW AND PROCESSING OF SUBMITTALS THAT DO NOT REQUIRE DON APPROVAL

Material submitted for review by the PQCM will indicate whether or not it conforms to established requirements. The PQCM will inform the submitter of the results of the review. The submittal log will be updated to indicate the status and will be submitted with the last CQC report of each month.

Conforming submittals will be transmitted to project and DON personnel as determined by the distribution schedule. Submittals identified in the Statement of Work that are to be submitted as approved for Government Use will be certified by the PQCM and will be transmitted to the DON. A transmittal form will accompany all items sent to the DON and will list each item transmitted, the date it was reviewed by the PQCM, and its review status.

Nonconforming submittals will be returned to the submitter for correction, resolution of comments, and resubmitted.

4.4 REVIEW AND PROCESSING OF SUBMITTALS THAT REQUIRE DON APPROVAL

Submittals reviewed by the PQCM will be transmitted to the DON in accordance with the project distribution schedule for further review and approval. All items sent to the DON will use a transmittal form that will indicate each item transmitted, the date reviewed by the PQCM, and its review status. Upon completion of review, the ROICC will either return the transmittal form to the PQCM for further action or accept the submittal as complete.

The PQCM will advise the submitter of the results of the review in writing and include any comments. The submittal log will be updated to indicate status.

Nonconforming submittals may be returned to the submitter for correction, resolution of comments, and resubmitted, if required.

4.5 REVISED SUBMITTALS

Revised submittals will be logged, reviewed, and processed in a manner identical to the initial submittal. Revisions to a submittal will be identified using an alphabetic suffix to the original submittal number, e.g., submittal 18 will be revised to 18(a).

This page intentionally left blank.

5.0 TESTING

The PQCM or designated representative will verify the performance of all tests specified or required by the project-specific plans to ensure that control measures are adequate to provide a product conforming to contract specifications. General requirements for testing procedures to be implemented for this project are included in the Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Revision 4 (TtEC 2010) and the Base-wide Radiological Work Plan, Revision 1 (TtEC 2007). The type, number, and frequency of required tests are specified in the Test Plan and Log (Appendix B). These tests include both operational and acceptance testing as appropriate.

5.1 DOCUMENTATION

All test results, both passing and failing, will be documented in the daily CQC Report for the day the results are obtained. Paragraph reference, location where tests were taken, and the sequential control number identifying the test will be given. The test reports will be available for review by the ROICC and transmitted to the applicable remediation contractor.

5.2 LABORATORY SERVICES

An independent testing laboratory will provide laboratory services, as needed. The laboratory will be selected and qualified in accordance with recognized industry and applicable project requirements. TtEC intends to use TestAmerica-St. Louis, a Department of Defense and California Department of Public Health-accredited laboratory for radiological and chemical analyses under subcontract to IO Environmental & Infrastructure. Copies of the accreditations are provided in Appendix C. QC for radiological and chemical analyses is addressed in the Basewide Radiological Support Sampling and Analysis Plan (Attachment 1 to the main Execution Plan).

5.3 TESTING PLAN LOG

The Test Plan and Log (Appendix B) lists tests required by the project specifications and drawings. The Test Plan and Log will be submitted with the last CQC report of each month. Testing will be conducted to verify that control measures are adequate to provide a product conforming to contract specifications. General requirements for testing procedures to be implemented for this project are included in the Basewide Radiological Support Sampling and Analysis Plan (Attachment 1 to the main Execution Plan).

This page intentionally left blank.

6.0 QUALITY CONTROL MEETINGS

6.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to the start of site work, a coordination and mutual understanding meeting will be held to discuss the QC Program requirements. DON personnel attending the meeting will include the RPM, ROICC, the ROICC's Construction Management Technician (CMT), and the BRAC Environmental Compliance Manager. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used, administration of on-site and off-site work, coordination of the field activities, production, and the PQCM duties with the ROICC. At a minimum, the TtEC personnel required to attend the meeting will include the PjM, Field Engineer, Project Superintendent, PQCM, and SSHO. Minutes of the meeting shall be prepared by the PQCM and signed by the PjM and the DON's RPM and/or ROICC or designated representative. The meeting may be held in conjunction with the preconstruction meeting.

6.2 QC MEETINGS

After the start of field activities, the PQCM will conduct QC meetings at a frequency of once per week or as required by the ROICC. The meetings will be held at the project site and will be attended by the ROICC, ROICC CMT, Project Superintendent, SSHO, and PQCM. The PQCM will notify the ROICC at least 48 hours in advance of each meeting. The following will be covered at each meeting:

- Review the minutes of the previous meeting.
- Review the schedule:
  - Work or testing accomplished since last meeting
  - Rework items identified since last meeting
  - Rework items completed since last meeting
- Review the status of submittals:
  - Submittals reviewed and approved since last meeting
  - Submittals required in the near future
- Review the work to be accomplished in the following 3 weeks, documentation required, and schedule for the three phases of control and testing:
  - Establish completion date for rework items
  - Required preparatory phase inspections
  - Required initial phase inspections
  - Required follow-up phase inspections

ED_004747_00027038-00332

- Required testing
- Status of off-site work or testing
- Required documentation

- Identify deficient conditions.
- Resolve QC and production problems.
- Address items that may require revisions to the PCQC Plan.

7.0 INSPECTION

This section discusses the inspection process for the DFWs that will ensure compliance with the contract. The DFWs for this project are identified in Section 3.0 and listed in Table 3-1.

The PCQC Plan includes implementing the following three control phases for all aspects of the work specified:

- Preparatory phase
- Initial phase
- Follow-up phase

7.1 PREPARATORY PHASE INSPECTION

The PQCM will conduct preparatory phase inspections prior to starting the DFWs listed in Table 3-1 with the exception of mobilization and demobilization. These inspections shall include the following:

- Review the project-specific plans (Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Base-wide Radiological Work Plan, Execution Plan, Sampling and Analysis Plan, etc.).
- Ensure that all required procurement forms for supplies and services are approved.
- Ensure that provisions have been made to provide the required QC inspection.
- Ensure that all personnel have the required training and certifications needed to perform the work.
- Examine the work area to ensure that all required preliminary work has been completed and is in compliance with the approved project plans.
- Examine the required materials and equipment to ensure that they are properly delivered to the site, conform to specifications, and are properly stored.
- Review the appropriate AHAs to ensure that safety requirements are met.
- Discuss procedures for performing the work, including potential repetitive deficiencies.
- Document workmanship standards for the particular phase of work.
- Ensure that the PCQC Plan for the work to be performed has been accepted by the DON.

The PQCM will conduct frequent internal inspections of mobilization and demobilization. The PQCM is not required to notify the DON or the PjM prior to these inspections.

The PjM, DON RPM, and ROICC will be notified at least 2 working days in advance of each preparatory phase activity. This phase will include a meeting conducted by the PQCM and attended by the Project Superintendent and any personnel involved in performing the DFW. When a subcontractor will accomplish a DFW, that subcontractor foreman shall attend the preparatory phase meeting.

The issues discussed during the preparatory phase meetings will be documented on the Preparatory Inspection Checklist (Appendix B). The PQCM will explain the acceptable level of workmanship required to personnel performing work activities.

7.2 INITIAL PHASE INSPECTION

An initial inspection will be performed at the beginning of a DFW and will include the following:

- Check preliminary work to ensure that it is in compliance with contract requirements.
- Review the Inspection Checklist documenting results of the preparatory meeting.
- Verify full contract compliance, including required control inspections.
- Establish the required level of workmanship, testing, and inspection to ensure that work meets minimum acceptable standards.
- Resolve all differences.
- Check safety requirements to include compliance with and upgrading of the APP/SSHP and AHAs.

The PjM, DON RPM, and ROICC will be notified at least 2 working days in advance of each initial phase activity. The PQCM will document initial inspections for each item using the Initial Phase Inspection Checklist (Appendix B) and attach it to the daily CQC Report. The location of the initial phase inspection and documentation will be identified for future reference and comparison with follow-up inspections.

The initial phase inspection will be reviewed each time a new crew arrives on-site or when DFWs change.

7.3 FOLLOW-UP PHASE INSPECTION

During the completion of a particular DFW, follow-up inspections will be conducted to ensure compliance with contract requirements. The frequency of the follow-up inspections will depend on the extent of the work being performed. Each follow-up inspection will be documented on the daily CQC Report. A Follow-up Inspection Checklist will be generated for any deficient conditions identified during the initial inspection and attached to the daily CQC Report when all

items are resolved. A final follow-up check will be conducted on any completed work phase prior to the commencement of a subsequent phase.

7.4 RECEIPT INSPECTION

The PQCM will conduct inspections of materials prior to their use and installation. These inspections will be documented on a receipt inspection form and maintained on-site. Any material(s) that does not meet design specifications will be rejected and returned to the vendor. Nonconforming material will be segregated and marked accordingly, to prevent inadvertent use. The PQCM will record on the daily CQC Report that a material inspection was performed.

7.5 ADDITIONAL INSPECTIONS

The PQCM may conduct additional inspections on the same DFWs under the following circumstances:

- If the quality of ongoing work is unacceptable as determined by the PQCM, PjM, Project Superintendent, DON RPM, or ROICC
- If the quality of the work is suspected of being below the established criteria of acceptance
- If work on a DFW is resumed after a substantial period of inactivity
- If other problems develop

7.6 COMPLETION INSPECTION

Completion inspections will be performed as summarized in this section.

7.6.1 Construction Quality Control Completion Inspections

The PQCM will conduct a detailed inspection prior to the prefinal inspection, when all of the work or an increment of work is deemed to be substantially complete. The work will be inspected for conformance to plans and specifications, workmanship, and completeness. The PQCM will prepare an itemized list of work that does not conform to plans and specifications, inferior workmanship, or incomplete work. The list will also include outstanding administrative items, such as record (as-built) drawings. The list will be included in the QC documentation and submitted to the PjM following the inspection and will specify an estimated date for correction of each deficiency. The completion inspection will be documented on the Completion Inspection Checklist.

7.6.2 Prefinal Inspection

The PjM or designated representative will conduct the prefinal inspection. The DON RPM, ROICC, PQCM, Project Superintendent, and other primary management representative(s), as

ED_004747_00027038-00336

applicable, will attend. The PjM will schedule the prefinal inspection when notified by the PQCM that the work is ready for inspection. The PQCM is required to verify at this time that all specific items previously identified as being unacceptable, along with all remaining project work, will be complete and acceptable by the date scheduled for the prefinal inspection. If incomplete or unacceptable work is found during the prefinal inspection, a punch list will be generated by TtEC in consultation with the ROICC and Caretaker Site Office (CSO). A copy of the punch list will be forwarded to the ROICC and CSO, the on-site DON representatives for the Contracting Officer, and the RPM. The original will be maintained by the PQCM.

7.6.3 Final Acceptance Inspection

The PjM will schedule the final acceptance inspection based on notification from the PQCM of readiness. The DON RPM, Project Superintendent, ROICC, PQCM, and other primary management representative(s), as applicable, will attend. Notification will be provided prior to the planned final acceptance inspection date and must include verification that all specific items previously identified as being unacceptable, along with all remaining work performed under the contract, will be complete and acceptable by the date scheduled for the final acceptance inspection.

7.7 INSPECTION DOCUMENTATION

The PQCM is responsible for maintaining the inspection records. Inspection records will be legible and clearly provide all information necessary to verify that the items or activities inspected conform to the specified requirements. In the case of nonconforming conditions, the PQCM will provide evidence that the conditions were brought into conformance or otherwise accepted by the ROICC. All inspection records will be made available to the DON.

8.0 DOCUMENTATION

Preparation, review, approval, and issuance of documents affecting quality will be controlled to the extent necessary to ensure compliance to specified requirements. Project documents that will be controlled, if issued, include the following:

- Meeting minutes, conference notes, and confirmation notes
- Submittal Register
- Inspection documentation
- Contractor Production Report
- Daily CQC Report
- Material inspection and shipping logs
- NCRs
- Deficiency Notices (DNs)
- DCNs
- NCR log
- FCRs
- FCR/DCN log
- Rework Items List
- Photograph log
- Field logbooks

8.1 DAILY CONTRACTOR QUALITY CONTROL REPORT

The PQCM is responsible for maintenance of current records of QC operation, activities, inspections, and tests performed, including the work of subcontractors and suppliers. The records will include factual evidence that required QC activities and tests were performed. The daily CQC Report will be completed to document site activities covered by the PCQC Plan and will include:

- Records of inspection and /or testing performed
- Identification and location of each DFW and its current phase (preparatory, initial, follow-up) of completion
- Results of inspections and/or testing
- Location and description of deficiencies

- Deficiencies corrected as of the date of the report
- Rework items
- Deviations from plans, difficulties, and resolution
- Test and/or control activities performed with results and references to specifications and/or plan requirements, including the control phase (preparatory, initial, and follow-up) and deficiencies (along with corrective action)
- Material received, with statement as to its acceptability and storage
- Submittals reviewed with contract reference, reviewer, and action taken
- Off-site surveillance activities, including actions taken

The records will describe both conforming and nonconforming features and include a statement that equipment and materials incorporated in the work and workmanship comply with the contract. The daily CQC Report attached to the Contractor Production Report will be furnished to the ROICC by 10:00 a.m. on the first work day following the date covered by the report, or as agreed to by the ROICC. The report need not be submitted for days in which no work is performed. At a minimum, one report will be prepared and submitted for every 7 days of no work and on the last day of a no-work period. All calendar days will be accounted for throughout the life of the contract. The first report following a day of no work will summarize work for that day only. The report submitted on the last work day of each month will include the Rework Items List, Submittal Register, and Test Plan and Log. Copies of the reports will be maintained on-site and will be available for review during business hours.

The daily CQC Report will be signed and dated by the PQCM and contain the following statement: "On behalf of the Contactor, I certify that this report is complete and correct, and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report." Other appropriate personnel, including subcontractors responsible for completion of activities, will sign and date the report as required. The report will include copies of test reports.

8.2 CONTRACTOR PRODUCTION REPORT

The Contractor Production Report will be prepared for each day work is performed and will be attached to the daily CQC Report prepared for the same day. The Contractor Production Report will be prepared, signed, and dated by the Project Superintendent or designated representative, and will contain the following information:

- Contractor and subcontractor(s) and their area of responsibility
- Trades working on the project that day and number of personnel
- Operating equipment, with hours worked, idle, or down for repair

- Work performed that day, including location, description, weather conditions, and who did the work
- Any delays encountered
- Site visitors and the purpose of the visit
- Job safety evaluations stating what was checked, results, and instructions or corrective actions
- A list of instructions given and/or received and conflicts in plans and/or specifications
- Contractor's verification statement

8.3 LOGBOOKS

The PQCM will maintain a logbook to document QC activities. The information in the logbook is intended to serve as a phone log and memory aide in the preparation of the daily CQC Report and in addressing follow-up questions that may arise.

8.4 PHOTOGRAPHS AND PHOTOGRAPH LOGS

The PQCM will maintain photographs and a photograph log to document site activities. Each photograph will have a date and time stamp on it or the photograph will show a sign board documenting the date and time clearly and legibly in the photograph. The photograph log will identify each photograph by date, time, location, and activity.

8.5 CONFERENCE NOTES AND CONFIRMATION NOTES

In addition to other required documentation, the PQCM is responsible for taking notes and preparing the reports of all conferences. Conference notes will be typed and the original report furnished to the DON within 5 days of the date of the conference for concurrence and subsequent distribution to all attendees. At a minimum, this report will include the following:

- Date and place the conference was held
- List of attendees, including name, organization, and telephone number
- Comments made during the conference and decisions affecting criteria changes
- Conference notes that augment the written comments

The PjM is also responsible for providing a record of all discussions, verbal directions, telephone conversations, and so forth in which TtEC personnel or their representatives participate on matters relating to this contract and work. These records, titled Confirmation Notices, will be numbered sequentially and will fully identify participating personnel, subject discussed, and any conclusions reached. The PjM or designated representative will forward a reproducible copy of the confirmation notices to the DON RPM and ROICC within 5 working days.

This page intentionally left blank.

9.0 CHANGE MANAGEMENT

This section describes the DCN and FCR, the two main vehicles to document project changes.

9.1 DESIGN CHANGE NOTICES

The following sections detail the identification, preparation, and review and approval process for DCNs.

9.1.1 Identification

Any member of the Project Team may identify the need for a change to the design specifications or drawings. The Project Team member will notify the Field Engineer, who will evaluate the request and initiate a DCN, if determined necessary.

9.1.2 Preparation

The Field Engineer will generate a DCN form (Appendix B) and submit it to the Design Engineer for review and disposition. The DCN will identify the specification requirements, the proposed change, and the reason for the change.

9.1.3 Review and Approval

The PjM, Project Superintendent, and PQCM will review and approve the DCN. It is the responsibility of the PjM to notify the DON for approval of the DCN prior to making any changes identified on the DCN.

9.1.4 Implementation of Approved DCNs

The Project Superintendent is responsible for the implementation of approved DCNs.

9.1.5 Records

Each approved DCN will be sequentially numbered as follows:

DCN-CTO X-YY

Where:

X is the task order number and YY is the DCN number, beginning with 01.

A DCN log shall be maintained by the PQCM that provides the DCN number, date of DCN, and brief description of contents.

Each DCN will be copied to all the management signatories, the Project Superintendent, PQCM, SHSS, and other personnel as deemed appropriate by the PjM.

Copies of the approved DCN should be posted or otherwise included in daily site briefings as appropriate to ensure that all site personnel are aware of the changes to the task order program. Copies of DCN will be issued to all holders of controlled copies. The DCNs will be required to be maintained with the controlled copy of the document that has been changed.

9.2 FIELD CHANGE REQUEST

Site personnel will document changes to the approved plans (except the design specifications and drawings) in the field through the FCR form (Appendix B). At a minimum, the following information will be documented in the FCR form:

- Project name
- CTO number
- FCR number
- Documents to which a change is requested (including revision number if applicable)
- Description of the item or condition for which the change is requested
- Reason for the change
- Recommended disposition
- Cost and schedule implication of the change, if any
- Approval of disciplines
- Approval of the PjM, Project Superintendent, PQCM, PESM, and QCPM and concurrence from the RPM or ROICC

9.3 DISTRIBUTION OF DCN AND FCR FORMS

Approved DCN and FCR forms will be distributed to the CTO file record, all CTO personnel that received the original document, and the ROICC and RPM. The DON may request DCNs or FCRs be submitted to the Contracting Officer or designee.

10.0 NONCONFORMANCE

All deficiencies or nonconforming conditions discovered during inspections or other QC functions will be noted on either a DN or an NCR, as appropriate.

A DN is used to document the failure to develop, document, or implement effectively any applicable element of approved plans or to follow established procedures. A deficiency could lead to a nonconformance.

An NCR is used to document a nonconforming condition that renders the quality of an item, process, or product that has been defined in the specifications or drawings as unacceptable or indeterminate.

Copies of these forms are provided in Appendix B along with the logs used for tracking these documents. All deficiencies and nonconforming conditions will be resolved prior to completion of the project and in the timeliest manner possible. The DN will be used for all conditions that do not affect the final work product. An NCR will be used when a condition may affect the final work product.

The PQCM will be notified of all deficiencies and nonconforming conditions identified during the course of the field activities to ensure that each of these occurrences is documented, reported, and tracked; and that corrective actions are taken and follow-up verification is conducted.

The PQCM will also document deficiencies and nonconforming conditions in the daily CQC Report, noting the items found to be deficient or nonconforming; the date; time, and location; the person who identified the deficiency or nonconformance; and the status of the item to which the deficiency or nonconformance applies.

The PQCM will update the status of the deficiency when it changes. Before the work activities of the day begin, the PQCM will note the deficiencies or nonconforming conditions that require follow-up verification that day. New or changed status will be entered into the file at the end of each day. The daily CQC Report will document completion of the corrective action for each deficiency or nonconformance for that day. Nonconforming conditions or deficiencies that require rework for resolution will be noted on the Rework Items List included in Appendix B.

10.1 ROOT CAUSE ANALYSIS

The DN and the NCR forms both include space to enter information regarding the cause of the problem and the proposed resolution. The determination of the root cause of a deficiency or nonconformance is an integral part of the QC process. Root cause analysis will be made by the

PQCM in conjunction with other appropriate site personnel such as the Project Superintendent and the SHSO. Criteria considered in the analysis will include:

- Staff qualifications and training
- Adequacy of procedures and methods
- Adequacy of equipment
- Adequacy of QC measures

Input will be obtained, as necessary, from field staff and technical advisors in order to identify the factors that led to the problem.

10.2 CORRECTIVE ACTION

Following the root cause analysis, the PQCM will evaluate potential solutions (corrective actions) to determine which remedy is most effective in correcting the problem. This process will include all appropriate staff. Potential remedies considered will include:

- Supplemental staff training
- Changes of equipment or modification of equipment currently in use
- Acquisition of supplemental equipment
- Implementation of new procedures or modification of existing procedures
- Changes in QC procedures

Final approval of all remedies will be the responsibility of the PjM.

Successful implementation of corrective action will be documented by the PQCM in the appropriate areas of the DN or NCR. This documentation will be supported by changes to the inspection procedures or schedule as warranted (i.e., the PQCM will not certify that corrective action has been taken until inspection of the actions and the resulting changes in the program are complete).

10.3 CONDITION REQUIRING STOP WORK

If corrective actions are insufficient, resolution cannot be reached, or results of prior work are indeterminate, work may be stopped. The PQCM will direct the PjM to suspend work associated with the nonconformance until corrective action is complete. If there is a disagreement between the PQCM and the PjM, the difference will be brought to the attention of the QCPM until resolution is achieved.

The conditions of the suspension of work will be described in detail on the daily CQC Report and on the Rework Items List, if corrective action is not completed by the end of the working day. Work will not continue until the directed by the individual who authorized it.

This page intentionally left blank.

11.0 QUALITY MANAGEMENT

In addition to the required QC field inspections, the TtEC Quality Program requires a quality management overview of the site QA/QC Program implementation. The PQCM will perform regular internal QC checks on the site implementation of the QA/QC Program. Reports of any deficiencies will be provided to the PjM for corrective action.

Inspections will be performed and checked for the following:

- Conformance with the Execution Plan and associated plans
- Thoroughness of performance
- Identification and completeness of documentation generated during performance

The PQCM will maintain the Rework Item List. This is a list of work items that do not comply with the contract and identify each item that needs rework, the date the item was discovered, the date the item will be corrected, and the date the item was corrected.

The PQCM will ensure that as-built drawings are kept current on a daily basis. The PQCM (or designee) will initial each revision. At the end of the project, updated as-built drawings will be submitted.

This page intentionally left blank.

12.0 REFERENCES

NAVFAC (Naval Facilities Engineering Command). 2009. Unified Facilities Guide Specifications (UFGS) 014502, Submittal Procedures. February.

TtEC (Tetra Tech EC, Inc.). 2007. Base-wide Radiological Work Plan, Revision 1, Hunters Point Shipyard, San Francisco, California. October 5.

————. 2010. Final Base-wide Storm Drain and Sanitary Sewer Removal Work Plan, Revision 4, Hunters Point Shipyard, San Francisco, California. July 30 (or most current revision).

USACE (United States Army Corps of Engineers). 2008. Safety – Safety and Health Requirements. EM-385-1-1. September 15.

This page intentionally left blank.

TABLES

This page intentionally left blank.

TABLE 3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Operating RSYs 2, 3, and 4	• Verify that RPM, RASO, and CSO have been notified. • Verify that an approved RWP is available and has been read and signed by assigned personnel. • Verify that Base-wide Storm Drain and Sanitary Sewer Work Plan/Base-wide Radiological Work Plan, AHAs, and sampling procedures have been reviewed. • Verify that assigned personnel are trained and qualified. • Verify that training record documentation is being maintained. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimetry have completed NRC Form 4. • Verify that relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used for radiological surveys. • Verify that limits and boundaries of surveys have been established and are understood. • Verify background check. • Verify background activity and what constitutes a deviation. • Verify that equipment, instruments, and materials are on site, calibrated, and in working order. • Verify that calibration of survey instrument is within 1 year.		• Verify that radiological instruments are as specified in the Base-wide Storm Drain and Sanitary Sewer Work Plan/Base-wide Radiological Work Plan. • Verify that qualified RCT and SSHO are present at active work areas. • Verify that site activities are being photographed. • Verify that the reference area measurements have been obtained using the procedure described in the Base-wide Storm Drain and Sanitary Sewer Work Plan/Base-wide Radiological Work Plan. • Verify that daily checks are performed on all portable survey instruments. • Verify that required dosimetry is being worn. • Verify that RWP is available at work site. • Verify that field logbooks and proper forms are in use. • Verify that measurements are being collected in accordance with the Base-wide Storm Drain and Sanitary Sewer Work Plan/ Base-wide Radiological Work Plan, SAP, and relevant SOPs.		• Verify that site is properly posted and secured, if necessary. • Conduct ongoing inspection of material and equipment. • Verify that qualified RCT and SSHO are present at active work areas. • Verify that required dosimetry is being worn. • Verify that any suspected material location is marked, flagged, and documented. • Verify that daily instrument checks and background measurements are obtained and documented. • Verify that survey results are documented. • Verify that RWP is available at work site. • Verify that personnel have read and signed the revised RWP, if revision is required. • Verify that survey data and sample analysis results are reviewed as required by the SOPs. • Verify that survey activities conform to the Base-wide Storm Drain and Sanitary Sewer Work Plan/Base-wide Radiological Work Plan, and SOPs. • Verify that boundaries of the survey have been met. • Verify that survey instrument is recalibrated after repairs or modifications.	

TABLE 3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• Verify that required stockpile and staging areas are established. • Verify that PPE is available and meets requirements of the SSHP. • Verify that a log and database are established for identified material.		• Verify that limits and boundaries of survey are being met. • Review sample handling procedures. • Verify PPE of all workers. • Verify that RTM has evaluated radiological impact of the material prior to any action for each material. • Verify that RCT is present during removal of any source. • Verify that all boxes and drums have been surveyed and surface radiation measurements are collected. • Verify that site activities are being photographed. • Verify that proper logging, recording, and photography of found point sources are being done.		• Verify that personnel surveys are performed for all personnel leaving a radiological controlled area. • Verify that RASO is notified of discovered radioactive material. • Verify that area known or suspected to contain radioactive material is isolated. • Verify that removal of radioactive material is conducted in accordance with the procedures and project plans. • Verify that an additional 1 foot of soil in every direction is excavated after removal of material. • Verify that RCT scanned the excavated area after radioactive material removal. • Verify that personnel surveys are performed for all personnel leaving a radiological controlled area. • Review radiological logbook for completeness of documentation. • Verify that removed point source has unique identification, documented in the logbook and the inventory sheet. • Verify that removed point source storage and management procedure is in accordance with the Base-wide Storm Drain and Sanitary Sewer Work Plan/Base-wide Radiological Work Plan, and RPP. • Verify that all boxes and drums are marked with a unique identification and information is recorded in the logbook.	

TABLE 3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
					• Verify that filled boxes and drums are stored in approved storage areas. • Verify that liner remains in good condition. • Verify that the log of radioactive material is routinely reviewed by the CHP. • Verify that samples are collected in accordance with the sample handling procedures. • Inspect field documentation. • Verify that personnel surveys are performed for all personnel leaving the radiological controlled area. • Verify that sample locations are surveyed. • Verify sample chain-of-custody form. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Operation of on-site and off-site laboratory services	Requirements for the Preparatory, Initial, and Follow-up Inspections will be developed using the Basewide Radiological Support SAP (Attachment 1 to the main Execution Plan) prior to starting laboratory support services.					
Basewide Support Services	• Verify that RPM and CSO have been notified. • Review the Base-wide Radiological Work Plan, SAP, and RPP. • Verify that radiation awareness training has been completed and training is documented. • Verify that designated personnel have assigned		• Verify that RCT is present in an active work area. • Verify that required dosimetry is being worn. • Review sample handling procedures.		• Verify that RCT is present in an active work area. • Verify that required dosimetry is being worn. • Verify that samples are collected in accordance with the sample handling	

TABLE 3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	dosimeters and completed the NRC Form 4. • Verify that PPE is available. • Verify that equipment, instruments, and materials are on site, calibrated, and in working order. • Verify that calibration of survey instrument is within 1 year.		• Verify PPE is being worn. • Verify that daily checks are performed on all portable survey instruments.		procedures. • Inspect field documentation. • Verify that personnel surveys are performed for all personnel leaving the radiological controlled area. • Verify that site activities are being photographed. • Verify activities are performed in accordance with the RPP and in accordance with TtEC's NRC Radioactive Material License. • Verify that photographs are logged and stored. • Verify that sample locations are surveyed. • Verify sample chain-of-custody form. • Review radiological logbook for completeness of documentation. • Verify that daily instrument checks and background measurements are obtained and documented. • Verify that site is properly posted and secured, if necessary.	

Abbreviations and Acronyms:

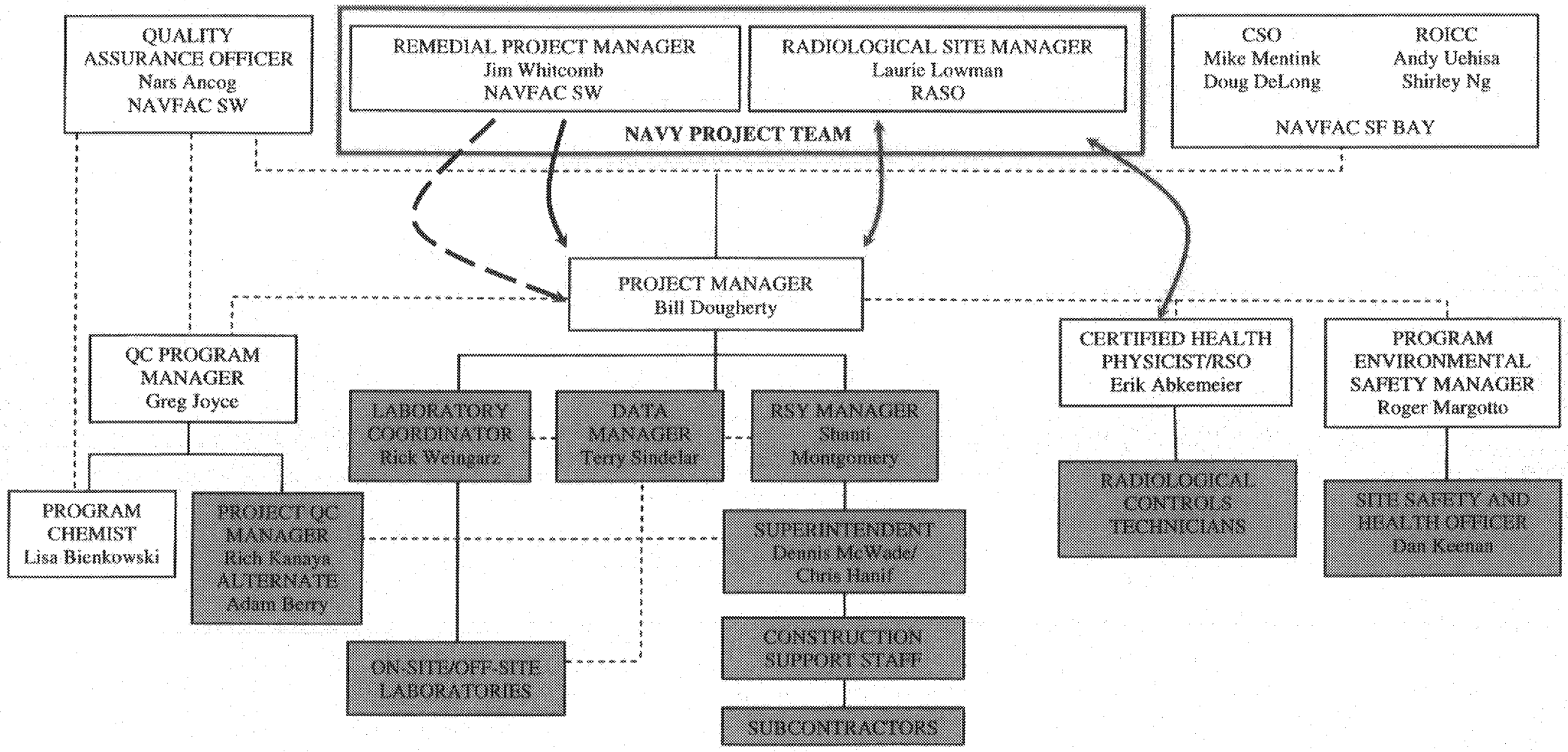
AHA – Activity Hazard Analysis
CHP – Certified Health Physicist
CSO – Caretaker Site Office
NRC – Nuclear Regulatory Commission
PPE – personal protective equipment
RASO – Radiological Affairs Support Office
RCT – Radiological Control Technician
RPM – Remedial Project Manager
RPP – Radiation Protection Plan
RTM – Radiological Task Manager
RWP – Radiation Work Permit
SAP – Sampling and Analysis Plan
SOP – Standard Operating Procedure
SSHO – Site Safety and Health Officer
SSHP – Site Safety and Health Plan
TtEC – Tetra Tech EC, Inc.

FIGURES

This page intentionally left blank.

FIGURE 2-1

PROJECT ORGANIZATION CHART



Legend

Formal reporting relationship

Supporting relationship

Primary lines of technical communication

Line of technical direction (alternate where dashed)

Abbreviations and Acronyms:
CSO – Caretaker Site Office
HPS – Hunters Point Shipyard
NAVFAC SW – Naval Facilities Engineering Command Southwest
RASO – Radiological Affairs Support Office
ROICC – Resident Officer in Charge of Construction
RSO – Radiation Safety Office
RSY – Radiological Screening Yard
QC – Quality Control
SF – San Francisco

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

The Construction Manager (Jeff Bray) has overall responsibility for coordinating the activities of on-site technical staff.

ED_004747_00027038-00360

APPENDIX A

DELEGATION OF AUTHORITY LETTERS

AND RESUMES

This page intentionally left blank.

TETRA TECH EC, INC.

August 16, 2010

Mr. Richard Kanaya
Tetra Tech EC, Inc.
1230 Columbia St., Suite 750
San Diego, CA 92101

Subject: **Project Quality Control Manager**

Reference: Program Construction Quality Control Management Plan, March 11, 2010, Radiological Environmental Multi-award Contract (RAD EMAC), Contract Task Orders (CTOs) at Hunters Point Shipyard, San Francisco, California

Dear Mr. Kanaya:

In accordance with the RAD EMAC Program Construction Quality Control Management Plan, March 11, 2010, this letter notifies you of your appointment as the Project Quality Control Manager for CTOs at Hunters Point Shipyard, San Francisco, California issued under the above contract as directed by the Program QC Manager.

As the designated Project Quality Control Manager, you will be responsible for managing the site-specific quality control requirements in accordance with the approved plan. You will be responsible for conducting quality control meetings, performing the three phases of control, and performing submittal review. You will be required to be present during all field activities to ensure that any testing is conducted in accordance with approved plans. In addition, you will be required to prepare the necessary quality control certification and documentation.

You have the authority and responsibility for suspending work when conditions adverse to quality are identified and for directing the correction of all nonconforming work.

This letter is effective immediately until modified by the Quality Control Program Manager with concurrence of the TtEC Project Manager, the NAVFAC SW Remedial Project Manager, and the Resident Officer in Charge of Construction.

Sincerely,

Tetra Tech EC, Inc.

Gregory D Joyce

Gregory D Joyce, ASQ CQM
Quality Control Program Manager

cc: Bill Dougherty
Richard Kanaya

ISO 14001 SGS

1230 Columbia Street, Suite 750, San Diego, CA 92101
Tel 619.234.8690 Fax 619.234.8591
www.tteci.com

EXPERIENCE SUMMARY

Worked 13 months at Hunters Point Shipyard, serving as a quality engineer/inspector, project manager assistant, project engineer/back-up superintendent and as the Project Quality Control Manager. QC responsibilities have included: performing surveillances and inspections; audits; record keeping; photographing activities; generating daily reports; leading and assisting quality investigations; processing FCR's, leading Preparatory and Initial Phase meetings, facilitating CQC Meetings and staff meetings, managing staff and creating the quality program for Hunters Point Shipyard. PM Assistant responsibilities have included generating: the Hunters Point Shipyard TCRA report, the Base Closure Team Presentation (PowerPoint), the CTO-72 Monthly Progress Report, CTO-72 Weekly Progress Reports, tracking inventory, providing support to the Wetlands Mitigation Project at MSA, providing support to the sand monitoring project at MDR and attending various client meetings. Project Engineer and superintendent responsibilities have included generating daily engineering reports, providing site data for management or clients (Navy), providing guidance to construction crew, leading safety meetings and facilitating sites when necessary. Became Hunters Point PQCM in January 2007 and performed all duties as described below, as well as continuing those of Project Manager Assistant and Field Engineer. In April 2007, became Radiological Screening Yard Manager; responsibilities included coordinating subcontractor activities (taking soil samples, scanning soil filled pads for radioactive contamination, COC tracking, remediating contaminated pads/filling intermodels/roll-off bins with Low Level Radioactive Waste, decontaminating equipment/vehicles) providing oversight for craft personnel (supervising and training operating engineers and laborers performing soil movement activities in the RSY relative to MARSSIM standards) and performing quality control checks on RSY activities. In March 2008, resumed the position of Project Quality Control Manager.

EDUCATION

Christian Leadership, San Jose Christian College, 2000
Financial Accounting, San Diego State University, 1989
Certificate, General Education, College of San Mateo, 1988

REGISTRATIONS/CERTIFICATIONS

Certified Nuclear Gauge Operator, CA, Number 2777-01, Earned 4/8/99

TRAINING

40-Hour OSHA Hazardous Waste Health and Safety Training – 2006
Radiation Safety for Hazardous Material Workers – 2006
Construction Quality Management For Contractors – 2006
American Red Cross Standard First Aid – 2006
American Red Cross Adult CPR – 2006
TtEC Superintendents' Training – 2007
8-Hour Hazwoper Refresher Training – 2007
Confined Space Supervisor's Training – 2007
Defensive Driving Certification – 2007
Loss Control Certification – 2007
HIPAA Training – 2007

CORPORATION PROJECT EXPERIENCE

Quality Engineer/Inspector, March 2006 – November 2006
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
Quality Engineer responsible for quality control of Metal Debris Reef And Metal Slag Area (time critical removal action to remove metal slag and debris associated with radiological contamination, and to address any non-radiological chemical contamination incidental to the removal, and to restore the sites),

ED_004747_00027038-00364

Building 813 Characterization Survey (survey to assess if residual radioactivity above the established release criteria is present in the area) and Building 142 Scoping Survey (survey to determine if residual radioactivity is present at this site).

Led investigation as requested by Client (Navy) into device with elevated readings being detected at the portal monitor in a truck exiting site. Interviewed over 40 individuals, from management to craft/labor; inspected related equipment (conveyor belt systems, with radiation detector arrays) and generated a report with recommendations to assist in preventing incident from occurring again. The client was satisfied with the findings, report and recommendations and allowed soil processing activities to resume at sites using conveyor belt systems, upon implementation of recommendations.

Generated and performed surveillances; performed SWPPP Inspections, audits, photo documentation, and supported QIR investigations as required by the project.

Project Manager Assistant, June 2006 – December 2006
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
Responsibilities included movement of infrastructure from Contract Task Order (72) to Contract Task Order (06). Attended staff, client and contractor meetings. Helped facilitate progress of Metal Slag Area Wetlands Mitigation Plan. Generated progress reports for CTO-72 and put together Base Closure Team PowerPoint Presentations and Weekly TCRA Excavation Summaries for Client. Performed assorted administrative duties.

Project Engineer, June 2006 – December 2006
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
Responsibilities included generating daily progress reports and facilitated sites during weekly superintendent home leaves or whenever necessary. Tracked project progress and documented daily production data, including soil volume processed and where it was staged.

Project Quality Control Manager, January 2007 – April 2007
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
PQCM is responsible for overall management of project QC and will report to the QCM (Quality Control Program Manager). The PQCM will be on-site at all times during field activities.

Responsibilities included: monitoring activities to ensure conformance with the Base-wide Plan and that policies, procedures, contract specifications, and sound practices are followed; preparing Daily QC Reports, Ensuring that the three phases of inspection (preparatory, initial and follow-up) are implemented for all the definable features of work; ensuring that required tests and inspections are performed and the results reported; facilitating weekly QC meeting; attending required meetings (including the pre-construction conference, pre- and post-construction site inspections and other scheduled and unscheduled meetings; issuing and maintaining Field Change Requests and Nonconformance Reports for project activities; maintaining and NCR and FCR log; ensuring that planning documents are current and controlled; maintaining the Submittal Register and a Submittal Log; stopping work that is not in compliance with the contract.

Organized and moderated CQC Meetings. Developed checklists and surveillances for critical activities for CTO-06 & TO-70—provided oversight for their implementation. Scope of project work activities were to perform remediation of radiologically impacted sewer and storm drain piping components. This process involved the excavation, surveying and disposal of piping components and excavated material.

ED_004747_00027038-00365

Radiological Screening Yard Manager, April 2007 – March 2008
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
Provided oversight for the handling of excavated soil being removed above and around piping components, potentially contaminated with low level radioactive waste. Tracked the status of excavated material from excavation to backfill or disposal, overseeing lay down, surveying, sampling, remediation and off-haul. Responsibilities included development of field checklists for critical activities in the yard and helping craft personnel understand the specifications for compliance under MARSSIM. Coordinated yard activities, including: filling, scanning, sampling, remediating and clearing of excavated soil placed on lay down pads. Acted as field engineer when necessary, marking pad areas to be sampled or remediated and then tracking and documenting material volume as it's removed and disposed. Worked closely with all levels of craft, as well as subcontractors to insure job quality. Trained project personnel from Alameda Naval Air Station (Nathan Smith, Rad Supervisor and Bob Wells, Site Superintendent) to familiarize them with RSY operations for their project. Managed the RSY for CTO-06 and TO-70.

Project Quality Control Manager, March 2008 – Present
Department of the Navy, Hunters Point Shipyard, San Francisco, CA
PQCM is responsible for overall management of project QC and will report to the QCM (Quality Control Program Manager). The PQCM will be on-site at all times during field activities.

Responsibilities include: monitoring activities to ensure conformance with the Base-wide Plan and that policies, procedures, contract specifications, and sound practices are followed; prepare Daily QC Reports, ensure that the three phases of inspection (preparatory, initial and follow-up) are implemented for the definable features of work; ensure that required tests and inspections are performed and the results reported; facilitate weekly QC meeting; attend required meetings (including the pre-construction conference, pre- and post-construction site inspections and other scheduled and unscheduled meetings; issue and maintain Field Change Requests and Nonconformance Reports for project activities; maintain an NCR and FCR log; ensure that planning documents are current and controlled; maintain the Submittal Register and a Submittal Log; stop work that is not in compliance with the contract.

Organize and moderate CQC Meetings. Developed checklists and surveillances for critical activities for CTO-06, TO-70, CTO-72X and the EMAC—provided oversight for their implementation. Developed correction notice system of accountability; implemented it in the field to reduce errors and mistakes. Mentored new QC staff personnel; demonstrated effective use of deficiency notices for project quality. Scope of project work activities were to perform remediation of radiologically impacted sewer and storm drain piping components and the surveying and remediation of impacted buildings. The sewer and storm drain projects involved the excavation, surveying, sampling and disposal of piping components & excavated material. The building surveys and remediation involved: radiological scanning; sampling; demolition; soil, asbestos and structural remediation; and stage by stage mapping & documentation.

PREVIOUS EXPERIENCE

Public Works Inspection Consultant, March 1999 – June 2003
City of Newark
Assignments included inspection of nationwide fiber optic installations passing through the city (directional boring and open trenching) city wide pipeline installations, multiple trenching and backfill projects and assorted paving and concrete projects.

Responsibilities included: attendance of pre-job, daily, weekly, and project closing meetings; inspection of projects to insure compliance with all City/CalTrans specifications, as well as supporting other public agencies in specification compliance; detailed documentation of job progress, accidents, complaints and

ED_004747_00027038-00366

comments; punch list generation and inspection to completion, insuring any/all facilities affected by the project are restored to as good or better than pre-existing conditions. Performed trench backfill inspection and testing using a nuclear gauge. Enforced approved traffic control plans, erosion control measures and inspected and closed an assortment of utility permits. Established and maintained working relationships with contractors, developers, utilities, business owners and residents to foster open communication, to insure job progress and completion.

Vickers Concrete Sawing, Technician, 1998 - 1999
Responsibilities included core drilling, concrete demolition, estimating, sales, admin., and customer service.

Metals Technician, 1997 – 1998
Endovascular Technologies/Guidant Corporation
Primary responsibility was supporting laser welding, testing and design of elgiloy metal frames in a controlled environment room, for medical devices to treat abdominal aortic aneurisms. Performed laser welding, elgiloy frame fabrication, quality testing, quality control, document control, operator training and data entry.

Lab Technician, 1989 -1997
Bear Testing Lab
Responsibilities included testing & inspecting construction materials and collecting field data for engineering reports. Performed: concrete demolition for rebar studies/inspections; various concrete anchor pull tests for earthquake retrofit projects; core drilling for samples; testing on concrete/asphalt samples; testing on weld samples; masonry sheer wall tests on existing structures; friction tests; and documentation for tasks performed. Clients included The San Francisco-Moscone Convention Center, San Francisco International Airport, The Clorox Corp., Stanford University, The Nikko Hotel and others.

1978 – 1988
Kanaya Construction Inc.
Worked as laborer, carpenter, superintendent, bid representative, etc…for family owned general contracting firm, specializing in commercial and industrial concrete building construction.

Associate Pastor, 1998 – 2001
Pathway Community Church
Responsibilities included sermons, men's support groups, youth ministry & mentoring, marriage & family counseling, officiating weddings, funerals and assorted services.

Youth Pastor, 1988 – 1994
Sturge Presbyterian Church,
Responsibilities included sermons, young adult/college/high school/jr. high ministry, staffing and training personnel for youth programs, youth counseling and mentoring.

PUBLICATIONS & PRESENTATIONS

PROFESSIONAL ACCOMPLISHMENTS

PROFESSIONAL AFFILIATIONS

American Society for Quality-Member

ED_004747_00027038-00367

DISCIPLINE CODES

02 Administrative, N
16 Construction Manager, N
15 Construction Inspector, Y
Technician/Field Supervisor, N

SKILL SET

Community Relations
Community Survey
Compliance Monitoring
Erosion Control
Field Sampling
Sampling - Soil
Low Level Radioactive Waste
Sediment Control
Soils
Storm Water

TECHNICAL EXPERTISE

LANGUAGE SKILLS

Knowledge Level:

PROFESSIONAL REFERENCES

Bill Dougherty, RMPM/CSQ, TtEC, 415-216-2731, Bill.Dougherty@tteci.com
Greg Joyce, Quality Control Program Manager, TtEC, 360-780-0371, Greg.Joyce@tteci.com
Gerard Slattery, PG, RMPM/CSQ, TtEC, 415-862-1689, Gerard.L.Slattery@usace.army.mil
Phil Bartley, CIH CSP, VP Environmental Safety and Quality Services, 509-732-5818, Philip.Bartley@tteci.com
Jamshid Sadeghipour, RMPM/CSQ, TtEC, 949-756-7519, Jamshid.Sadeghipour@tteci.com
Ajay Kurup, Public Works Inspector Supervisor, City of Newark, 510-790-7260, jay.kurup@newark.org
Soren Fajeau, P.E., Associate Civil Engineer, City of Newark, 510-790-7243, Soren.Fajeau@newark.org
Kevin Jow, Manufacturing Engineer, Guidant Corp., 650-903-1106, kjow@guidant.com
Neal Kanaya, Civil Engineer/Principal, Bear Testing Lab, 650-964-1107, office@beartest.com

RELATED COMPANY INFORMATION

Payroll Number: 519641
Employment Status: Full
Preferred First Name: Rich
Office Location:
Hire Date: 3/13/06
Years with Other Firms: 24
Years with Current Firm: 2
Total Years Experience: 26
Supervisor: Gregory D. Joyce, Program Quality Control Manager
Office Phone: (415) 216-2759
Cell Phone: (415) 516-9583
Fax: (415) 671-1995
E-mail Address: rich.kanaya@tteci.com
Other E-mail Address (if any): richard_kanaya@hotmail.com
Resume Last Revised: 2008-10-17

ED_004747_00027038-00368

NAVAL FACILITIES ENGINEERING COMMAND SOUTHWEST

NAVFAC

PRESENTS THIS CERTIFICATE TO

Richard Kanaya

WHO HAS SUCCESSFULLY COMPLETED

U.S.A.C.E. Construction Quality Management for Contractors

GIVEN AT
AGC, San Diego Chapter, Inc.

CQM Facilitator
Kugan Panchadsaram

THE ASSOCIATED GENERAL CONTRACTORS · SAN DIEGO CHAPTER

Date
April 11th & 12th, 2006

CQM Facilitator
Glen Schaffer

This certificate is valid for 5 years

TETRA TECH EC, INC.

October 11, 2010

Mr. Adam Berry
Tetra Tech EC, Inc.
1230 Columbia St. , Suite 750
San Diego, CA. 92101

Subject: **Alternate Project Quality Control Manager**

Reference: Program Construction Quality Control Management Plan, March 11, 2010, Radiological Environmental Multi-award Contract (RAD EMAC), Contract Task Orders (CTOs) at Hunters Point Shipyard, San Francisco, California

Dear Mr. Berry:

In accordance with the RAD EMAC Program Construction Quality Control Management Plan, March 11, 2010, this letter notifies you of your appointment as the Alternate Project Quality Control Manager for CTOs at Hunters Point Shipyard, San Francisco, California issued under the above contract as directed by the Program QC Manager.

As the designated Alternate Project Quality Control Manager, you will be responsible for managing the site-specific quality control requirements in accordance with the approved plan as directed by the Quality Control Program Manager, when Mr. Richard Kanaya is not available. You will be responsible for conducting quality control meetings, performing the three phases of control, and performing submittal review. You will be required to be present during all field activities to ensure that any testing is conducted in accordance with approved plans, if Mr. Kanaya cannot perform these functions. In addition, you will be required to prepare the necessary quality control certification and documentation.

You have the authority and responsibility for suspending work when conditions adverse to quality are identified and for directing the correction of all nonconforming work.

This letter is effective immediately until modified by the Quality Control Program Manager with concurrence of the TtEC Project Manager, the NAVFAC SW Remedial Project Manager, and the Resident Officer in Charge of Construction.

Sincerely,

Tetra Tech EC, Inc.

Gregory D Joyce

Gregory D Joyce, ASQ CQM
Quality Control Program Manager

cc: Bill Dougherty
Richard Kanaya

1230 Columbia Street, Suite 750, San Diego, CA 92101
Tel 619.234.8690 Fax 619.234.8591
www.tteci.com

Mobile: (713) 410-7928 Fax: (530) 272-2241
E-mail: abprci@yahoo.com

ADAM BERRY

EXPERIENCE

Mr. Berry specializes in a spectrum of radiological program responsibilities, including the supervision of radiological technicians at remediation work sites, management of radiation safety and remediation instrumentation laboratory, operation of a gamma spectroscopy laboratory, and radioactive materials shipping.

His radiological experience includes air sample and dosimetry database management; air sample compliance reporting; portable radiation measurement instrumentation calibration, maintenance and repair; continuous field surveying and sampling during large-scale earth moving remediation operations; job coverage and access control of remediation work in radioactive material areas; routine radiological surveys for clearance of materials; operation of a high-throughput on-site gamma spectroscopy laboratory.

In addition to Mr. Berry's experience, his formal training includes OSHA 40-Hour Safety Training, Current 8-Hour Refresher ;OSHA First Responder Operations, OSHA Excavation Safety, Ludlum Measurements Inc., 40-hour Instrumentation Training; Radioactive and Hazardous Waste Management and Transportation Training; Radworker Training current certification; ORTEC Gamma Spectroscopy, System Management, and Algorithms Training; Canberra ISOCS Advanced System Operation Training.

EMPLOYMENT

7/9/07 – 9/9/07: Cabrera Services Inc.

Radiation Safety Officer

Mr. Berry was contracted to provide radiological oversight/management during characterization and remediation of an aged army depot where uranium tailings and other hazardous materials were stored. Duties included conducting daily safety meetings, air sample database management, dosimetry tracking, sample log generation, daily heath and safety inspections. In addition, Mr. Berry lead a surgical excavation which generated only 600 yards of waste material from a five acre plot. This plot was free released based on a MARRSIM suvvey.

8/15/05 – 8/29/06: Professional Radiation Consulting, Incorporated

Senior Health Physics Technician / Radiation Safety Office/ / Lead Instrumentation Technician / Gamma Spectroscopy Technician

Mr. Berry was contracted to execute company and project specific radiological oversight, while maintaining various databases and programs. Mr. Berry's responsibilities included but were not limited to: instrumentation program management, generating company and site specific standard operating procedures, creation of radiological programs, and radiological materials license package support for clients. Mr. Berry's field duties include: Supervision of radiological technicians at remediation work sites, site characterization with sampling support, waste characterization via gamma spectroscopy to support shipping documentation and waste acceptance criteria, air sampling with database

maintance, field instrumentation repairs and calibrations, general health physics surveys and MARRSIM based release surveys.

1/22/03 – 7/31/05: URS Corporation, Hicksville, NY

Lead Excavation Technician/ Lead Instrumentation Technician/ Assistant Radiation Safety Officer/ Health Physics Technician.

GTEOSI Soil Remediation Project

Mr Berry was contracted to participate in initial project efforts by developing radiological operations procedures, implement instrumentation tracking, maintenance, repairs (down to surface component level) and to perform daily response checks. Upon project ramp-up added responsibilities included leading a radiological and geological excavation team to discover, define and sample various uranium and thorium contaminated soil and debris media for on/off site lab analysis while tracking all anomalies via a state plane laser positioning system and/or global positioning system, working with on/off site engineers to achieve excavation depths of 24'-40', escorting various state and government department officials within controlled areas, performing radiological surveys on persons, equipment and soils and performing job coverage.

10/10/02 – 11/20/02 US Ecology/Field Services, Oak Ridge, TN

Subproject Operations Manager/ Health Physics Technician

Manufacturing Sciences Corporation waste stream processed at US Ecology Recycle Center

Mr. Berry was contracted to actively oversee and participate in the sorting and segregation of 2.3 million pounds of waste from the MSC/BNFL decommissioning project. Daily activities included but were not limited to: daily instrument response checks, waste survey for restricted release, daily written surveys for all process areas and container storage areas, waste packaging for disposal, decontamination and release of various designed waste containers, incoming and release surveys, incoming/outgoing waste tracking, on-site procurement, process and waste cost tracking, Assisted in the implementation of the Bulk Survey For Release (BSFR) program which reduced unprocessed waste volume designated for Envirocare to less than 5% of the total waste stream.

8/27/02 – 10/9/02: US Ecology/Field Services, Oak Ridge, TN

Decommissioning Team Lead/ Health Physics Technician

Manufacturing Sciences Corporation/BNFL

Mr. Berry was contracted to actively lead a decontamination team to meet stringent contractual deadlines for final survey and license termination of a metal recycle center. Scope of work included the removal, by pneumatic equipment, of various building media (concrete, epoxy and various other high temperature/endurance finishes.

7/18/02 – 8/26/02 US Ecology/Field Services Festus, MO

Project Site Manager/ Health Physics Technician

Westinghouse/ Hematite Nuclear Fuel Fabrication Facility

Mr. Berry was contracted to actively manage and participate in the sorting and segregation of a DAW waste stream and conduct a characterization of soil from an aged nuclear fuel fabrication facility. Waste stream contained enriched uranium and TCLP metals. Daily operations consisted of performing waste surveys for process segregation, collecting daily smear samples around and in work/process area, assisting with incoming and release surveys, collected, packaged and delivered all analytical samples to various labs, tracking and controlling project finances/costs, on site procurement, change order negotiations, document control and the implementation of the Bulk Survey For Release (BSFR) program which allows for decreased disposal costs and increased disposal options.

1/9/02 – 7/6/02 US Ecology/Field Services Webster, TX

Assistant Project Manager/ Decontamination Technician

Gulf Nuclear Incorporated D&D – EPA Superfund

Mr. Berry was contracted to assist in the broad spectrum of responsibilities involved with the emergency response remediation of a dilapidated source manufacturing facility. Daily activities included but were not limited to: on/off site procurement, project finance/cost tracking, weekly invoice generation and submittal for approval, count room assistant, instrumentation response checks, dosimetry tracking (both whole body and appendage), daily written boundary surveys, daily large area and standard smear collection with field and lab analyzation, collected and packaged all analytical samples for shipment, document control, client relations, large component decontamination and source packaging for both transportation and disposal.

12/5/00 – 1/4/02 Natural Data Knoxville, TN

Eastern Regional Manager

Mr. Berry was promoted and transferred to the Knoxville, Tn location to penetrate the Eastern region market. Startup process consisted of staff selection/training, implementation of information technology systems and the creation of contract employee logs in accordance with federal and state regulation. Day to day operations consisted of maintaining client/vendor relationships through personal selling techniques, presentation solicitation and various after-hours and weekend activities spawned for the purpose of building strong business relationships. Competitive bidding and proposal production was required for authorized business to occur as a sub-contractor to various radiological industry clients including the Department of Energy. Contract negotiations occurred often to define/gather work scopes, deadlines and purchase orders. Areas of staff augmentation included but were not limited to: environmental engineering, radiological and/or chemical decommissioning and electro-mechanical engineering.

4/5/00 – 11/15/01 Natural Data Phoenix, AZ

Head Recruiter

Co-founder and recruiter for the Engineering Services Group (ESG). Daily routine consisted of verifying client needs, prospecting various candidate pools, interviewing qualified candidates, both on phone and on a face to face basis, conducting criminal/credit background surveillance and submitting all state and federal documentation in accordance to mandated hiring practices. Other activities included recruiter/management training, scheduling client meetings with ESG sales staff and employee timecard verification and submittal for payrolling services.

EDUCATION

1995 – 2000 Arizona State University Tempe, AZ

Bachelor of Interdisciplinary Studies

- Degree of focus was based on business and psychology studies with minor and audited emphasis in mechanical engineering

QUALIFICATIONS

- Ortec Gamma Spectroscopy Theory and Operation (24 hours)
- Canberra ISOCS Advanced System Operation (40 hours)
- Ludlum Instrument Calibration and Repairs (24 hours)
- DOT Hazardous Materials Shipment Training (40 hours)
- Trimble/Arc Second Laser Positioning System Operation (16 hours)
- Multi-Rae 3/5 gas environ monitoring systems (3 hours)
- RADēCO Air Sampler Theory, Calibration and Repairs (8 hours)

- OSHA HAZWOPER certified (40 hours with current 8 hour refresher)
- OSHA Excavation Training for Competent Persons (4 hours)
- OSHA First Responder Operations (8 hours)
- DOT Hazardous Material Shipment Training/General Worker (4 hours)
- AHA First Aid/CPR Provider with Heartsaver AED (8 hours)
- MS Office Suite

U.S. ARMY CORPS OF ENGINEERS

PROFESSIONAL DEVELOPMENT SUPPORT CENTER
HUNTSVILLE, ALABAMA

CERTIFICATE

This is to certify that

ADAM BERRY

has completed the Corps of Engineers Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS

Given at TACOMA, WA (Location) By SEATTLE (Instructional District) April 9, 2009 (Date)

Facilitator

Chief, USACE Professional Development Support Center

THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE

APPENDIX B

CONTRACTOR QUALITY CONTROL FORMS

This page intentionally left blank.

TETRA TECH EC, INC.		Date:
CONTRACTOR PRODUCTION REPORT		
Contract No. N62473-10-D-0809	Title & Location:	Report No.
Contractor:	Superintendent:	
AM Weather:	PM Weather:	

Work Performed Today

Work Location & Description	Employer	Number	Trade	Hours

Was a job safety meeting held this date? (If yes, attach a copy of meeting minutes.)	Yes: No:		Total work hours on site this date:	0.0
Were there any lost time accidents this date? (If yes, attach a copy of completed OSHA report.)	Yes: No:		Cumulative work hours from previous report:	
Was trenching/scaffolding/HV electrical/high work done this date? (If yes, attach statement or checklist showing inspection performed.)	Yes: No:			
Was hazardous material/waste released to the environment? (If yes, attach description of incident and proposed action.)	Yes: No:		Cumulative work hours since start of work:	

List safety actions taken today/safety inspections conducted:

Remarks:

Contractor Superintendent

Date

1 Contractor Production Report.xls

CONTRACTOR PRODUCTION REPORT

Date: 1/0/1900

Contract No. N62473-10-D-0809

Title & Location:

Report No. 0

Rental Equipment	Vendor	PO/MOA#	Charge #	Start Date	Rate	Daily Hrs	P.O.P. Expires

Materials	Vendor	PO #	Charge #	QTY REC'D	ACCUM QTY	P O QTY	P.O.P. Expires

Contractor Superintendent

01/00/00
Date

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

DEFICIENCY NOTICE

TASK ORDER # _____ DN # _____ DATE _____
LOCATION: _____ ROICC / RPM

1. Plan, Procedure, Specification, or Drawing (Clearly state the requirement)

2. Description of Deficiency

QC verification of corrective action required: **Yes** _____ **No** _____

Prepared by: _____ **Approved by:** _____

3. Corrective Action

Organization _____ Signature _____ Date _____

4.
Corrective action verified by: _____ Date _____

Comments:

Program Quality Control Manager _____ Date _____

TETRA TECH EC, INC.

NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)

CONTRACT NO. N62473-10-D-0809

DESIGN CHANGE NOTICE (DCN)

TASK ORDER # _____ DCN # _____ DATE _____

LOCATION _____ NTR / RPM _____

1. Document to be changed. Identify revision, date, section, drawing, etc.

2. Description of Change (Items involved, submit sketch, if applicable): (Use continuation sheet if necessary)

Engineering "HOLD" placed on all activities in area defined herein pending receipt of formally revised document(s) and / or DCN.
Released for construction basis of modifications prescribed by this DCN.

3. Reason for Change (Attach additional information if needed)

4. Originator (Print name and sign)		Title	Date
Reviewed by: (Print name and sign)		Title	Date
Task Order Manager (Print name and sign)	Date	Program Quality Manager (Print name and sign)	Date
NTR Acknowledgement (Print name and sign)	Date	RPM Approval (Print name and sign)	Date

ED_004747_00027038-00382

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

DESIGN CLARIFICATION REQUEST

TASK ORDER # _____ DC# _____ DATE _____

Submitted to: _____

1. Document reference. Identify revision, date, section, drawing, etc.

2. Clearly state requirement or describe drawing as shown. (Attach additional info if needed)

3. Information requested or proposed change. (Attach additional information if needed)

4. Response

Does response require an FCR or DCN YES ☐ NO ☐

FCR ☐ DCN ☐

Task Order Manager (Print name and sign)	Date

TETRA TECH EC, INC.

NAVY RADIOLOGICAL ENVIRONMENTAL MULITPLE AWARD ACTION CONTRACT (Rad EMAC)

CONTRACT NO. N62473-10-D-0809

FIELD CHANGE REQUEST (FCR)

TASK ORDER # _____ FCR # _____ DATE _____

LOCATION: _____ NTR / RPM _____

1. Document to be changed. Identify revision, date, section, drawing, etc.

2. Description of existing requirement and proposed change (Attach sheet if necessary)

3. Reason for Change (Attach sheet if necessary)

4. Originator: (print name and sign)		Title	Date
Reviewed by: (print name and sign)		Title	Date
Site Superintendent (Print name and sign)	Date	Task Order Manager (Print name and sign)	Date
TtEC Program QC Manager (Print Name and Sign)	Date	NTR Acknowledgement (Print name and sign)	Date

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

Initial Phase Inspection Checklist

Task Order No.: _____ Date: _____
Definable Feature: _____ Spec Section: _____

I. Personnel Present:

	Name	Position	Company / Government
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

(List additional personnel on reverse side)

II Identify full compliance with procedures identified at preparatory inspection. Coordinate plans, specifications, and submittals.
Comments:

III Preliminary Work. Ensure preliminary work is complete and correct. If not, what action is taken?
Actions:

IV Establish Levels of Workmanship

1. Where is the work located? _____
2. Is a sample panel required? Yes _____ No _____
3. Will the initial wok be considered as a sample? Yes _____ No _____
   (If yes, maintain in present condition as long as possible.)

V Resolve any differences.
Comments:

VI Check Safety
1. Review job conditions using Site Health and Safety Plan and job hazard analysis.
2. Review job conditions using using EM-385-1-B151.

ED_004747_00027038-00385

Initial Phase Inspection Checklist

Comments:

Site CQC Representative

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

MONTHLY REWORK ITEMS LIST

Task Order Number: _____ Project: _____ Date: _____

Number	Identification of item requiring rework	Date Identified	Date Corrected	Remarks

_____
Site CQC Representative Date

ED_004747_00027038-00387

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

NONCONFORMANCE REPORT

TASK ORDER # _____ NCR# _____ DATE _____
LOCATION: _____ ROICC/RPM

1. Plan, Procedure, Specification, or Drawing (Clearly state the requirement)

2. Description of Nonconforming Item or Condition

Did nonconforming condition require suspension of work activities Yes ☐ No ☐
If yes, explain requirement to restart work activities: _____

Prepared by: _____ Title _____ Date _____

3. Corrective Action

- ☐ use-as-is
- ☐ repair
- ☐ rework to specificaion
- ☐ other - specify: _____

Comments:

Organization _____ Signature _____ Date _____

NONCONFORMANCE REPORT

4. Evaluation of Proposed Disposition

Evaluator _____ Title _____

Accept	
Accept with comments	
Reject	
Reject with comments	

Comments:

Signature _____ Date _____

Evaluator _____ Title _____

Accept	
Accept with comments	
Reject	
Reject with comments	

Comments:

Signature _____ Date _____

5. Verification

Verification required Yes ☐ No ☐

Verified by: _____ Signature _____ Title _____ Date

Approved by: _____ Program QC Manager _____ Date

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

Preparatory Inspection Checklist

Task Order No.: _____ Date: _____
Definable Feature: _____ Spec Section: _____
NAVFAC SW notification _____ 48 Hours in Advance Yes ____ No ____

I Submittals

1. Review submittals and/or submittal register. Have all applicable submittals been approved?
   Yes _____ No _____

If No, what items have not been submitted?
Comments

2. Are all materials on hand? Yes _____ No _____

If No, what items are missing?
Comments

3. Check approved submittals against delivered materials. (This should be done as materials arrive.)
Comments

II Material Storage

Are materials stored properly? Yes _____ No _____

If No, what actions is taken?

III Specifications

1. Review each paragraph of Specification

ED_004747_00027038-00390

2. Discuss procedure for accomplishing the work.

3. Clarify any differences.

IV Preliminary Work and Permits

Ensure preliminary work is correct and permits are on file. Yes _____ No _____

If No, what action is taken?

V Testing

1. Identify test to be performed, frequency, and by whom.

2. When required?

3. Where required?

4. Review testing play.

5. Has test facilities been approved?

Preparatory Inspection Checklist

VI Safety

1. Review applicable portion of the Task Order Site Health and Safety Plan.
2. Review applicable portion of EM385-1-1.

Comments

3. Activity Hazard Analysis approved? Yes _____ No _____

VIII Navy comments during meeting.

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

Preparatory Inspection Checklist

I. Personnel Present:

	Name	Position	Company / Government
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			

(List additional personnel on reverse side)

Site CQC Representative

TETRA TECH EC, INC	REPORT NO:	
NAVFAC SW RADIOLOGICAL EMAC CONTRACT NO. N62473-10-D-0809 SAN DIEGO, CA	PROJECT:	
	PROJECT NO:	
	SUBCONTRACTOR:	
	LOWER TIER SUB:	
CONTRACTOR QUALITY CONTROL REPORT	DATE:	
	TASK:	
	LOCATION	

SEE CONTRACTOR DAILY PRODUCTION SUMMARY REPORT FOR INFORMATION ON SAFETY, WEATHER, SUBCONTRACTOR HOURS AND AREAS OF RESPONSIBILITY:

SUMMARY OF CONSTRUCTION PROGRESS AND QUALITY CONTROL ACTIVITIES PERFORMED:

Tests Performed and Results:

Materials Received:

Deficiencies Noted with Proposed or Implemented Corrective Action:

JOB SAFETY: (LIST OBSERVATIONS)

COMMENTS: ADDRESS ANY CHANGES (FCR/DCN), MEETING RESULTS OR OTHER INFORMATION

Contractor's Verification: On behalf of the Contractor, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications to the best of my knowledge, except as may be noted above.

NAME:	TITLE/COMPANY: PQCM
SIGNATURE:	DATE:

ED_004747_00027038-00394

SUBMITTAL REGISTER

Contract Number: N62473-10-D-0809

Task Order: 0004
Basewide Radiological Support

Location: Hunters Point Shipyard
San Francisco, California

Contractor: Tetra Tech EC, Incorporated

								Contractor Action			Approving Authority Action				Contracting Officer / Contractor	
	Specification Section Number	SD No and Type of Submittal Material or Product	Specification Paragraph Number	Classification/ Approval By CO?	Govt or A/E Reviewer	Transmittal Control No	Planned Submittal Date	Action Code	Date of Action	Date FWD to Approving Authority, Date recd from Contractor	Date FWD to Other Reviewers	Date Received from Other Reviewers	Action Code	Date of Action	Mailed to Contractor/ Received from Approving Authority	Remarks
	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
1	Base Contract	As-Built Records	5.13.4		NAVY		Upon completion of work									
2	Base Contract	Combined Contractor Production Report / Contractor Quality Control Report	5.13.1/5.13.2		ROICC		10 a.m. next working day									
3	Base Contract	Testing Plan and Log	5.4		ROICC		Last working day of month									
4	Base Contract	Monthly Summary Report of Field Tests	5.4		ROICC		Last working day of month									
5	Base Contract	Weekly QC Meeting Minutes	6.4.4		NAVY		Two working days after each meeting									
6	Base Contract	Rework Items List	5.13.3		ROICC		With Weekly QC meeting minutes									
7	Base Contract	Contractor Quality Control Report Certification	5.12.1		ROICC		Daily - Included on Daily CQC Report									
8	Base Contract	Invoice Certification	5.12.2		NAVY		End of month concurrent with Invoice									
9	Base Contract	Completion Certification	5.12.3		NAVY		Project Completion									
10	Task Order Contract	Monthly Progress Reports and Sched Updates	SOW 2.1.5		NAVY		Concurrent with Invoice by 10th calendar day of following month									
11	Task Order Contract	Weekly Conference Call Agenda and Minutes	SOW 2.1.5		NAVY		1 working day prior to weekly call									
12	Task Order Contract	Kick Off Meeting Minutes	SOW 2.1.1		NAVY		10 days after meeting									
13	Task Order Contract	Community Meeting Presentations	SOW 2.1.3		NAVY		1 week prior to meeting									
14	Task Order Contract	Contractor Coordination Meeting	SOW 2.1.4		NAVY											
15	Task Order Contract	Daily Field Report	SOW 2.1.4		NAVY		2 working days following field activities									
16	Task Order Contract	Execution Plan - Draft Final	SOW 2.2.3		NAVY		45 days after kickoff meeting 45 days after draft									Includes SAP, EPP, DCP, RPP, WMP, and QA/QC Plan

	SUBMITTAL REGISTER															
Contract Number: N62473-10-D-0809	Task Order: 0004 Basewide Radiological Support							Location: Hunters Point Shipyard San Francisco, California						Contractor: Tetra Tech EC, Incorporated		
								Contractor Action			Approving Authority Action				Contracting Officer / Contractor	
Specification Section Number	SD No. and Type of Submittal Material or Product	Specification Paragraph Number	Classification / Approval By CO	Gov't or A/E Reviewer	Transmittal Control No.	Planned Submittal Date	Action Code	Date of Action	Date FWD to Approving Authority / Date rec'd from Contractor	Date FWD to other Reviewers	Date Received from other Reviewers	Action Code	Date of Action	Mailed to Contractor / Received from Approving Authority	Remarks
(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)
17 Task Order Contract	APP/SSHP - Draft Final	SOW 2.2.3.1		NAVY		45 days after kickoff meeting 30 days after comments									Contractor Asbestos Abatement Plan to be submitted to ROICC for review and acceptance.

TETRA TECH EC, INC.
NAVY RADIOLOGICAL ENVIRONMENTAL MULTIPLE AWARD CONTRACT (Rad EMAC)
CONTRACT NO. N62473-10-D-0809

TEST PLAN and LOG

Task Order Number: CTO 0004 Task Order Manager: B. Dougherty
Project Basewide Radiological Support Location: Hunters Point Shipyard

Spec. Section	Paragraph No.	Test Procedure	Test Name	Test Frequency	Test Responsibility	Tested By	Date Completed	Remarks

ED_004747_00027038-00397

FCR / DCN LOG

Task Order Number: _____

Task Order Name: _____

FCR# / DCN#	DESCRIPTION OF Change	Date Initiated	Status

NONCONFORMANCE REPORT LOG

Task Order Number: _____

Task Order Name: _____

NCR #	DESCRIPTION OF CONDITIONS / ITEMS AFFECTED	DATE				REMARKS
		ISSUE	DISPOSITION / APPROVAL	RE-INSPECTION	CLOSURE	

APPENDIX C

TESTAMERICA-ST. LOUIS ACCREDITATIONS

This page intentionally left blank.

CERTIFICATE OF ACCREDITATION

ANSI-ASQ National Accreditation Board/ACLASS
500 Montgomery Street, Suite 625, Alexandria, VA 22314, 877-344-3044

This is to certify that

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045

has been assessed by ACLASS
and meets the requirements of

DoD-ELAP

while demonstrating technical competence in the field(s) of

TESTING

Refer to the accompanying Scope(s) of Accreditation for information regarding the types of tests to which this accreditation applies.

ADE-1430
Certificate Number

ACLASS Approval
Certificate Valid: 01/12/2010-01/12/2012
Version No. 001

ANSI-ASQ National Accreditation Board

SCOPE OF DoD-ELAP ACCREDITATION

TestAmerica St. Louis
13715 Rider Trail North, Earth City, MO 63045
Marti Ward Phone: 314-298-8566

TESTING

Valid to: January 12, 2012 Certificate Number: ADE- 1430

I. Environmental

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Volatile Organics	3050B / 5035 / 8260C	GC/MS
Water/Soil	Semi-volatile Organics	3510C / 3550C / 8270D	GC/MS
Water/Soil	PCBs	3510C / 3550C / 3540C/8082A	GC
Water/Soil	Organochlorine Pesticides	3520C / 3550C / 8081B	GC
Water/Soil	Nitroaromatics	3535A / 3550C / 8330A	HPLC
Water/Soil	Nitroaromatics	3535A / 3550C / 8321	LC/MS/MS
Water/Soil	Herbicides	8151A	GC
Water/Soil	PAH	3510C / 3550C / 8310	HPLC
Water/Soil	DRO/~~GRO~~	3510C / 3550C / 8015	GC
Water/Soil	Perchlorates	6850	LC/MS/MS
Water/Soil	Organic Cleanups	3620C / 3660B	-
Water/Soil	Metals	3010 / 3050 / 6010C	ICP
Water/Soil	Metals	3010 / 3050 / 6020A	ICPMS

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Mercury	7470A / 7471B	CVAA
Water/Soil	Cyanide	9010C / 9012B	TRAACs
Water/Soil	Anions (Cl,NO2, NO3, F, SO4, I, Br, OPO4)	300.0 / 9056A	Ion Chromatography
Water/Soil	Perchlorates	314.1	Ion Chromatography
Water	Solids	2540B / 2540C / 2540D	Gravimetric
Water/Soil	pH	9040C / 9045D	Probe
Water/Soil	Alkalinity	SM 2320B	Titration
Water/Soil	Sulfide	9030B / 9034	Titration
Water/Soil	Ignitability	1010A	Closed Cup
Water/Soil	Gross alpha/beta	900.0 / 9310	GFPC
Water/Soil	Radium-226	903.0 / 9315	GFPC
Water/Soil	Radium-228	904.0 / 9320	GFPC
Water/Soil	Strontium-90 & Total Strontium	905.0	GFPC
Water/Soil	Tritium	906.0	Liquid Scintillation Counter
Water/Soil	TC-99	Eichrom Technologies TCW01 / TCS01	Liquid Scintillation Counter
Water/Soil	Carbon-14	EERF C-01-C14	Liquid Scintillation Counter
Water/Soil	Gamma Emmitters	901.1 / HASL300 GA-01-R	Gamma Spec

MATRIX	SPECIFIC TEST or GROUP of ANALYTES	SPECIFICATION OR STANDARD METHOD (all SW846 unless specified)	* KEY EQUIPMENT OR TECHNOLOGY USED
Water/Soil	Isotopic Uranium / Thorium / Americium / Neptunium / Plutonium / Curium	HASL300 / A-01-R	Alpha Spec
Water/Soil	Lead-210	Eichrom Technologies OTW01, OTS01	Liquid Scintillation Counter
Water/Soil	Polonium-210	Laboratory SOP	Alpha Spec
Water/Soil	Ra-226	Laboratory SOP	Alpha Spec
Water/Soil	Iron-55	Eichrom Technologies FEW01	Liquid Scintillation Counter
Water/Soil	Nickel-59/63	DOE RP-300	Liquid Scintillation Counter
Water/Soil	Additional Prep	TCLP (1311), SPLP (1312), California Wet	-

Notes:

1. ** = As Applicable*
2. *This scope is part of and must be included with the Certificate of Accreditation No. ADE-1430*

Vice President

NELAP - RECOGNIZED

CALIFORNIA STATE

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM BRANCH

CERTIFICATE OF NELAP ACCREDITATION

Is hereby granted to

TESTAMERICA ST. LOUIS

13715 RIDER TRAIL NORTH

EARTH CITY, MO 63045

Scope of the Certificate is limited to the
"NELAP Fields of Accreditation"
which accompany this Certificate.

Continued accredited status depends on successful
ongoing participation in the program.

This Certificate is granted in accordance with provisions of
Section 100825, et seq. of the Health and Safety Code.

Certificate No.: **09266CA**

Expiration Date: **3/31/2011**

Effective Date: **4/1/2010**

Richmond, California
subject to forfeiture or revocation

George C. Kulasingam, Ph.D., Chief
Environmental Laboratory Accreditation Program Branch

CALIFORNIA DEPARTMENT OF PUBLIC HEALTH

ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM - NELAP RECOGNIZED

NELAP Fields of Accreditation

TESTAMERICA ST. LOUIS
13715 RIDER TRAIL NORTH
EARTH CITY, MO 63045
Phone: (314) 298-8566

Primary AA: FL E87689

Certificate No.: 09266CA
Renew Date: 3/31/2011

104 - Volatile Organic Chemistry of Drinking Water

104.040	001	EPA 524.2	Benzene
104.040	002	EPA 524.2	Bromobenzene
104.040	003	EPA 524.2	Bromochloromethane
104.040	006	EPA 524.2	Bromomethane
104.040	007	EPA 524.2	n-Butylbenzene
104.040	008	EPA 524.2	sec-Butylbenzene
104.040	009	EPA 524.2	tert-Butylbenzene
104.040	010	EPA 524.2	Carbon Tetrachloride
104.040	011	EPA 524.2	Chlorobenzene
104.040	012	EPA 524.2	Chloroethane
104.040	014	EPA 524.2	Chloromethane
104.040	015	EPA 524.2	2-Chlorotoluene
104.040	016	EPA 524.2	4-Chlorotoluene
104.040	018	EPA 524.2	Dibromomethane
104.040	019	EPA 524.2	1,3-Dichlorobenzene
104.040	020	EPA 524.2	1,2-Dichlorobenzene
104.040	021	EPA 524.2	1,4-Dichlorobenzene
104.040	022	EPA 524.2	Dichlorodifluoromethane
104.040	023	EPA 524.2	1,1-Dichloroethane
104.040	024	EPA 524.2	1,2-Dichloroethane
104.040	025	EPA 524.2	1,1-Dichloroethene
104.040	026	EPA 524.2	cis-1,2-Dichloroethene
104.040	027	EPA 524.2	trans-1,2-Dichloroethene
104.040	028	EPA 524.2	Dichloromethane
104.040	029	EPA 524.2	1,2-Dichloropropane
104.040	030	EPA 524.2	1,3-Dichloropropane
104.040	031	EPA 524.2	2,2-Dichloropropane
104.040	032	EPA 524.2	1,1-Dichloropropene
104.040	033	EPA 524.2	cis-1,3-Dichloropropene
104.040	034	EPA 524.2	trans-1,3-Dichloropropene
104.040	035	EPA 524.2	Ethylbenzene
104.040	036	EPA 524.2	Hexachlorobutadiene
104.040	037	EPA 524.2	Isopropylbenzene

104.040	038	EPA 524.2	4-Isopropyltoluene
104.040	039	EPA 524.2	Naphthalene
104.040	041	EPA 524.2	N-propylbenzene
104.040	042	EPA 524.2	Styrene
104.040	043	EPA 524.2	1,1,1,2-Tetrachloroethane
104.040	044	EPA 524.2	1,1,2,2-Tetrachloroethane
104.040	045	EPA 524.2	Tetrachloroethene
104.040	046	EPA 524.2	Toluene
104.040	047	EPA 524.2	1,2,3-Trichlorobenzene
104.040	048	EPA 524.2	1,2,4-Trichlorobenzene
104.040	049	EPA 524.2	1,1,1-Trichloroethane
104.040	050	EPA 524.2	1,1,2-Trichloroethane
104.040	051	EPA 524.2	Trichloroethene
104.040	052	EPA 524.2	Trichlorofluoromethane
104.040	053	EPA 524.2	1,2,3-Trichloropropane
104.040	054	EPA 524.2	1,2,4-Trimethylbenzene
104.040	055	EPA 524.2	1,3,5-Trimethylbenzene
104.040	056	EPA 524.2	Vinyl Chloride
104.040	057	EPA 524.2	Xylenes, Total
104.045	001	EPA 524.2	Bromodichloromethane
104.045	002	EPA 524.2	Bromoform
104.045	003	EPA 524.2	Chloroform
104.045	004	EPA 524.2	Dibromochloromethane
104.050	002	EPA 524.2	Methyl tert-butyl Ether (MTBE)

106 - Radiochemistry of Drinking Water

106.010	001	EPA 900.0	Gross Alpha
106.010	002	EPA 900.0	Gross Beta
106.030	001	EPA 901.1	Radioactive Cesium
106.030	003	EPA 901.1	Gamma Emitters
106.050	002	EPA 903.0	Radium-226
106.060	001	EPA 904.0	Radium-228
106.070	003	EPA 905.0	Strontium-90
106.080	001	EPA 906.0	Tritium
106.092	001	EPA 200.8	Uranium
106.220	001	DOE Sr-02	Strontium-89, 90
106.480	001	ASTM D5174-97	Uranium

108 - Inorganic Chemistry of Wastewater

108.020	001	EPA 120.1	Conductivity
108.112	001	EPA 200.7	Boron
108.112	002	EPA 200.7	Calcium
108.112	004	EPA 200.7	Magnesium

108.112	005	EPA 200.7	Potassium
108.112	007	EPA 200.7	Sodium
108.113	003	EPA 200.8	Magnesium
108.120	001	EPA 300.0	Bromide
108.120	002	EPA 300.0	Chloride
108.120	003	EPA 300.0	Fluoride
108.120	004	EPA 300.0	Nitrate
108.120	005	EPA 300.0	Nitrite
108.120	006	EPA 300.0	Nitrate-nitrite
108.120	007	EPA 300.0	Phosphate, Ortho
108.120	008	EPA 300.0	Sulfate
108.229	001	EPA 353.1	Nitrate
108.323	001	EPA 410.4	Chemical Oxygen Demand
108.381	001	EPA 1664A	Oil and Grease
108.410	001	SM2320B	Alkalinity
108.421	001	SM2340C	Hardness
108.440	001	SM2540B	Residue, Total
108.441	001	SM2540C	Residue, Filterable
108.442	001	SM2540D	Residue, Non-filterable
108.490	001	SM4500-H+ B	pH
108.510	001	SM4500-NO2 B	Nitrite
108.525	001	SM4500-NO3 H	Nitrate-nitrite
108.582	001	SM4500-S= F (19th/20th)	Sulfide
108.590	001	SM5210B	Biochemical Oxygen Demand
108.610	001	SM5310B	Total Organic Carbon

109 - Toxic Chemical Elements of Wastewater

109.010	002	EPA 200.7	Antimony
109.010	003	EPA 200.7	Arsenic
109.010	004	EPA 200.7	Barium
109.010	005	EPA 200.7	Beryllium
109.010	007	EPA 200.7	Cadmium
109.010	009	EPA 200.7	Chromium
109.010	010	EPA 200.7	Cobalt
109.010	011	EPA 200.7	Copper
109.010	012	EPA 200.7	Iron
109.010	013	EPA 200.7	Lead
109.010	015	EPA 200.7	Manganese
109.010	016	EPA 200.7	Molybdenum
109.010	017	EPA 200.7	Nickel
109.010	019	EPA 200.7	Selenium
109.010	021	EPA 200.7	Silver

109.010	023	EPA 200.7	Thallium
109.010	024	EPA 200.7	Tin
109.010	026	EPA 200.7	Vanadium
109.010	027	EPA 200.7	Zinc
109.020	001	EPA 200.8	Aluminum
109.020	002	EPA 200.8	Antimony
109.020	003	EPA 200.8	Arsenic
109.020	004	EPA 200.8	Barium
109.020	005	EPA 200.8	Beryllium
109.020	006	EPA 200.8	Cadmium
109.020	007	EPA 200.8	Chromium
109.020	008	EPA 200.8	Cobalt
109.020	009	EPA 200.8	Copper
109.020	010	EPA 200.8	Lead
109.020	011	EPA 200.8	Manganese
109.020	012	EPA 200.8	Molybdenum
109.020	013	EPA 200.8	Nickel
109.020	014	EPA 200.8	Selenium
109.020	015	EPA 200.8	Silver
109.020	016	EPA 200.8	Thallium
109.020	017	EPA 200.8	Vanadium
109.020	018	EPA 200.8	Zinc
109.190	001	EPA 245.1	Mercury

110 - Volatile Organic Chemistry of Wastewater

110.040	001	EPA 624	Benzene
110.040	002	EPA 624	Bromodichloromethane
110.040	003	EPA 624	Bromoform
110.040	004	EPA 624	Bromomethane
110.040	005	EPA 624	Carbon Tetrachloride
110.040	006	EPA 624	Chlorobenzene
110.040	007	EPA 624	Chloroethane
110.040	008	EPA 624	2-Chloroethyl Vinyl Ether
110.040	009	EPA 624	Chloroform
110.040	010	EPA 624	Chloromethane
110.040	011	EPA 624	Dibromochloromethane
110.040	012	EPA 624	1,2-Dichlorobenzene
110.040	013	EPA 624	1,3-Dichlorobenzene
110.040	014	EPA 624	1,4-Dichlorobenzene
110.040	015	EPA 624	1,1-Dichloroethane
110.040	016	EPA 624	1,2-Dichloroethane
110.040	017	EPA 624	1,1-Dichloroethene

110.040	018	EPA 624	trans-1,2-Dichloroethene
110.040	019	EPA 624	1,2-Dichloropropane
110.040	020	EPA 624	cis-1,3-Dichloropropene
110.040	021	EPA 624	trans-1,3-Dichloropropene
110.040	022	EPA 624	Ethylbenzene
110.040	023	EPA 624	Methylene Chloride
110.040	024	EPA 624	1,1,2,2-Tetrachloroethane
110.040	025	EPA 624	Tetrachloroethene
110.040	026	EPA 624	Toluene
110.040	027	EPA 624	1,1,1-Trichloroethane
110.040	028	EPA 624	1,1,2-Trichloroethane
110.040	029	EPA 624	Trichloroethene
110.040	030	EPA 624	Trichlorofluoromethane
110.040	031	EPA 624	Vinyl Chloride

111 - Semi-volatile Organic Chemistry of Wastewater

111.100	001	EPA 625	Acenaphthene
111.100	002	EPA 625	Acenaphthylene
111.100	003	EPA 625	Anthracene
111.100	005	EPA 625	Benz(a)anthracene
111.100	006	EPA 625	Benzo(b)fluoranthene
111.100	007	EPA 625	Benzo(k)fluoranthene
111.100	008	EPA 625	Benzo(g,h,i)perylene
111.100	009	EPA 625	Benzo(a)pyrene
111.100	010	EPA 625	Benzyl Butyl Phthalate
111.100	011	EPA 625	bis(2-chloroethoxy)methane
111.100	012	EPA 625	bis(2-chloroethyl) Ether
111.100	013	EPA 625	Bis(2-chloroisopropyl) Ether
111.100	014	EPA 625	Di(2-ethylhexyl) Phthalate
111.100	015	EPA 625	4-Bromophenyl Phenyl Ether
111.100	016	EPA 625	4-Chloro-3-methylphenol
111.100	017	EPA 625	2-Chloronaphthalene
111.100	018	EPA 625	2-Chlorophenol
111.100	019	EPA 625	4-Chlorophenyl Phenyl Ether
111.100	020	EPA 625	Chrysene
111.100	021	EPA 625	Dibenz(a,h)anthracene
111.100	025	EPA 625	3,3'-Dichlorobenzidine
111.100	026	EPA 625	2,4-Dichlorophenol
111.100	027	EPA 625	Diethyl Phthalate
111.100	028	EPA 625	2,4-Dimethylphenol
111.100	029	EPA 625	Dimethyl Phthalate
111.100	030	EPA 625	Di-n-butyl phthalate

111.100	031	EPA 625	Di-n-octyl phthalate
111.100	032	EPA 625	2,4-Dinitrophenol
111.100	033	EPA 625	2,4-Dinitrotoluene
111.100	034	EPA 625	2,6-Dinitrotoluene
111.100	035	EPA 625	Fluoranthene
111.100	036	EPA 625	Fluorene
111.100	037	EPA 625	Hexachlorobenzene
111.100	038	EPA 625	Hexachlorobutadiene
111.100	039	EPA 625	Hexachlorocyclopentadiene
111.100	040	EPA 625	Hexachloroethane
111.100	041	EPA 625	Indeno(1,2,3-c,d)pyrene
111.100	042	EPA 625	Isophorone
111.100	043	EPA 625	2-Methyl-4,6-dinitrophenol
111.100	044	EPA 625	Naphthalene
111.100	045	EPA 625	Nitrobenzene
111.100	046	EPA 625	2-Nitrophenol
111.100	047	EPA 625	4-Nitrophenol
111.100	048	EPA 625	N-nitrosodimethylamine
111.100	049	EPA 625	N-nitroso-di-n-propylamine
111.100	050	EPA 625	N-nitrosodiphenylamine
111.100	051	EPA 625	Pentachlorophenol
111.100	052	EPA 625	Phenanthrene
111.100	053	EPA 625	Phenol
111.100	054	EPA 625	Pyrene
111.100	055	EPA 625	1,2,4-Trichlorobenzene
111.100	056	EPA 625	2,4,6-Trichlorophenol
111.170	001	EPA 608	Aldrin
111.170	002	EPA 608	a-BHC
111.170	003	EPA 608	b-BHC
111.170	004	EPA 608	d-BHC
111.170	005	EPA 608	g-BHC (Lindane)
111.170	006	EPA 608	Chlordane
111.170	007	EPA 608	4,4'-DDD
111.170	008	EPA 608	4,4'-DDE
111.170	009	EPA 608	4,4'-DDT
111.170	010	EPA 608	Dieldrin
111.170	011	EPA 608	Endosulfan I
111.170	012	EPA 608	Endosulfan II
111.170	013	EPA 608	Endosulfan Sulfate
111.170	014	EPA 608	Endrin
111.170	015	EPA 608	Endrin Aldehyde

111.170	016	EPA 608	Heptachlor
111.170	017	EPA 608	Heptachlor Epoxide
111.170	018	EPA 608	Toxaphene
111.170	019	EPA 608	PCB-1016
111.170	020	EPA 608	PCB-1221
111.170	021	EPA 608	PCB-1232
111.170	022	EPA 608	PCB-1242
111.170	023	EPA 608	PCB-1248
111.170	024	EPA 608	PCB-1254
111.170	025	EPA 608	PCB-1260
111.273	001	EPA 1664A	Oil and Grease

112 - Radiochemistry of Wastewater

112.010	001	EPA 900.0	Gross Alpha
112.010	002	EPA 900.0	Gross Beta
112.140	002	EPA 901.1	Gamma
112.160	001	EPA 904.0	Radium-228
112.170	001	EPA 905.0	Strontium
112.180	001	EPA 906.0	Tritium
112.510	001	DOE Sr-02	Strontium

114 - Inorganic Chemistry of Hazardous Waste

114.010	001	EPA 6010B	Antimony
114.010	002	EPA 6010B	Arsenic
114.010	003	EPA 6010B	Barium
114.010	004	EPA 6010B	Beryllium
114.010	005	EPA 6010B	Cadmium
114.010	006	EPA 6010B	Chromium
114.010	007	EPA 6010B	Cobalt
114.010	008	EPA 6010B	Copper
114.010	009	EPA 6010B	Lead
114.010	010	EPA 6010B	Molybdenum
114.010	011	EPA 6010B	Nickel
114.010	012	EPA 6010B	Selenium
114.010	013	EPA 6010B	Silver
114.010	014	EPA 6010B	Thallium
114.010	015	EPA 6010B	Vanadium
114.010	016	EPA 6010B	Zinc
114.020	001	EPA 6020	Antimony
114.020	002	EPA 6020	Arsenic
114.020	003	EPA 6020	Barium
114.020	004	EPA 6020	Beryllium
114.020	005	EPA 6020	Cadmium

114.020	006	EPA 6020	Chromium	
114.020	007	EPA 6020	Cobalt	
114.020	008	EPA 6020	Copper	
114.020	009	EPA 6020	Lead	
114.020	010	EPA 6020	Molybdenum	
114.020	011	EPA 6020	Nickel	
114.020	012	EPA 6020	Selenium	
114.020	013	EPA 6020	Silver	
114.020	014	EPA 6020	Thallium	
114.020	015	EPA 6020	Vanadium	
114.020	016	EPA 6020	Zinc	
114.103	001	EPA 7196A	Chromium (VI)	
114.140	001	EPA 7470A	Mercury	
114.141	001	EPA 7471A	Mercury	
114.221	001	EPA 9012A	Cyanide, Total	
114.240	001	EPA 9040B	Corrosivity - pH Determination	
114.241	001	EPA 9045C	Corrosivity - pH Determination	
114.250	001	EPA 9056	Fluoride	
115 - Extraction Test of Hazardous Waste				
115.020	001	EPA 1311	Toxicity Characteristic Leaching Procedure (TCLP)	
115.030	001	CCR Chapter11, Article 5, Appendix II	Waste Extraction Test (WET)	CA Primary
115.040	001	EPA 1312	Synthetic Precipitation Leaching Procedure (SPLP)	
116 - Volatile Organic Chemistry of Hazardous Waste				
116.030	001	EPA 8015B	Gasoline-range Organics	
116.080	001	EPA 8260B	Acetone	
116.080	002	EPA 8260B	Acetonitrile	
116.080	003	EPA 8260B	Acrolein	
116.080	004	EPA 8260B	Acrylonitrile	
116.080	006	EPA 8260B	Allyl Chloride	
116.080	007	EPA 8260B	Benzene	
116.080	010	EPA 8260B	Bromochloromethane	
116.080	011	EPA 8260B	Bromodichloromethane	
116.080	012	EPA 8260B	Bromoform	
116.080	013	EPA 8260B	Bromomethane	
116.080	014	EPA 8260B	n-Butyl Alcohol	
116.080	015	EPA 8260B	Carbon Disulfide	
116.080	016	EPA 8260B	Carbon Tetrachloride	
116.080	018	EPA 8260B	Chlorobenzene	
116.080	019	EPA 8260B	Chloroethane	
116.080	020	EPA 8260B	2-Chloroethyl Vinyl Ether	
116.080	021	EPA 8260B	Chloroform	

116.080	022	EPA 8260B	Chloromethane
116.080	023	EPA 8260B	Chloroprene
116.080	026	EPA 8260B	Dibromochloromethane
116.080	027	EPA 8260B	Dibromochloropropane
116.080	028	EPA 8260B	1,2-Dibromoethane
116.080	030	EPA 8260B	Dibromomethane
116.080	031	EPA 8260B	1,2-Dichlorobenzene
116.080	032	EPA 8260B	1,3-Dichlorobenzene
116.080	033	EPA 8260B	1,4-Dichlorobenzene
116.080	035	EPA 8260B	trans-1,4-Dichloro-2-butene
116.080	037	EPA 8260B	1,1-Dichloroethane
116.080	039	EPA 8260B	1,1-Dichloroethene
116.080	040	EPA 8260B	trans-1,2-Dichloroethene
116.080	041	EPA 8260B	cis-1,2-Dichloroethene
116.080	042	EPA 8260B	1,2-Dichloropropane
116.080	043	EPA 8260B	1,3-Dichloropropane
116.080	044	EPA 8260B	2,2-Dichloropropane
116.080	045	EPA 8260B	1,1-Dichloropropene
116.080	046	EPA 8260B	cis-1,3-Dichloropropene
116.080	047	EPA 8260B	trans-1,3-Dichloropropene
116.080	050	EPA 8260B	1,4-Dioxane
116.080	052	EPA 8260B	Ethyl Acetate
116.080	053	EPA 8260B	Ethylbenzene
116.080	055	EPA 8260B	Ethyl Methacrylate
116.080	056	EPA 8260B	Hexachlorobutadiene
116.080	058	EPA 8260B	2-Hexanone (MBK)
116.080	059	EPA 8260B	Iodomethane
116.080	060	EPA 8260B	Isobutyl Alcohol
116.080	062	EPA 8260B	Methacrylonitrile
116.080	064	EPA 8260B	Methyl tert-butyl Ether (MTBE)
116.080	065	EPA 8260B	Methylene Chloride
116.080	066	EPA 8260B	Methyl Ethyl Ketone
116.080	067	EPA 8260B	Methyl Methacrylate
116.080	068	EPA 8260B	4-Methyl-2-pentanone (MIBK)
116.080	069	EPA 8260B	Naphthalene
116.080	074	EPA 8260B	Pentachloroethane
116.080	078	EPA 8260B	Propionitrile
116.080	081	EPA 8260B	1,1,1,2-Tetrachloroethane
116.080	082	EPA 8260B	1,1,2,2-Tetrachloroethane
116.080	083	EPA 8260B	Tetrachloroethene
116.080	084	EPA 8260B	Toluene

116.080	086	EPA 8260B	1,2,3-Trichlorobenzene
116.080	087	EPA 8260B	1,2,4-Trichlorobenzene
116.080	088	EPA 8260B	1,1,1-Trichloroethane
116.080	089	EPA 8260B	1,1,2-Trichloroethane
116.080	090	EPA 8260B	Trichloroethene
116.080	091	EPA 8260B	Trichlorofluoromethane
116.080	093	EPA 8260B	Vinyl Acetate
116.080	094	EPA 8260B	Vinyl Chloride
116.080	095	EPA 8260B	Xylenes, Total
116.080	100	EPA 8260B	n-Butylbenzene
116.080	101	EPA 8260B	sec-Butylbenzene
116.080	102	EPA 8260B	tert-Butylbenzene
116.080	103	EPA 8260B	2-Chlorotoluene
116.080	104	EPA 8260B	4-Chlorotoluene
116.080	105	EPA 8260B	Isopropylbenzene
116.080	108	EPA 8260B	1,2,4-Trimethylbenzene
116.080	109	EPA 8260B	1,3,5-Trimethylbenzene

117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010	001	EPA 8015B	Diesel-range Total Petroleum Hydrocarbons
117.110	001	EPA 8270C	Acenaphthene
117.110	002	EPA 8270C	Acenaphthylene
117.110	003	EPA 8270C	Acetophenone
117.110	006	EPA 8270C	4-Aminobiphenyl
117.110	007	EPA 8270C	Aniline
117.110	008	EPA 8270C	Anthracene
117.110	009	EPA 8270C	Aramite
117.110	011	EPA 8270C	Benz(a)anthracene
117.110	012	EPA 8270C	Benzo(b)fluoranthene
117.110	013	EPA 8270C	Benzo(k)fluoranthene
117.110	014	EPA 8270C	Benzo(g,h,i)perylene
117.110	015	EPA 8270C	Benzo(a)pyrene
117.110	016	EPA 8270C	Benzoic Acid
117.110	018	EPA 8270C	Benzyl Alcohol
117.110	019	EPA 8270C	Benzyl Butyl Phthalate
117.110	020	EPA 8270C	bis(2-chloroethoxy)methane
117.110	021	EPA 8270C	bis(2-chloroethyl) Ether
117.110	022	EPA 8270C	Bis(2-chloroisopropyl) Ether
117.110	023	EPA 8270C	Di(2-ethylhexyl) Phthalate
117.110	024	EPA 8270C	4-Bromophenyl Phenyl Ether
117.110	025	EPA 8270C	Carbazole
117.110	026	EPA 8270C	4-Chloroaniline

117.110	027	EPA 8270C	4-Chloro-3-methylphenol
117.110	029	EPA 8270C	2-Chloronaphthalene
117.110	030	EPA 8270C	2-Chlorophenol
117.110	031	EPA 8270C	4-Chlorophenyl Phenyl Ether
117.110	032	EPA 8270C	Chrysene
117.110	036	EPA 8270C	Dibenz(a,h)anthracene
117.110	037	EPA 8270C	Dibenzofuran
117.110	039	EPA 8270C	1,2-Dichlorobenzene
117.110	040	EPA 8270C	1,3-Dichlorobenzene
117.110	041	EPA 8270C	1,4-Dichlorobenzene
117.110	042	EPA 8270C	3,3'-Dichlorobenzidine
117.110	043	EPA 8270C	2,4-Dichlorophenol
117.110	044	EPA 8270C	2,6-Dichlorophenol
117.110	045	EPA 8270C	Diethyl Phthalate
117.110	049	EPA 8270C	3,3'-Dimethoxybenzidine
117.110	051	EPA 8270C	7,12-Dimethylbenz(a)anthracene
117.110	052	EPA 8270C	a,a-Dimethylphenethylamine
117.110	053	EPA 8270C	2,4-Dimethylphenol
117.110	054	EPA 8270C	Dimethyl Phthalate
117.110	055	EPA 8270C	Di-n-butyl phthalate
117.110	056	EPA 8270C	Di-n-octyl phthalate
117.110	060	EPA 8270C	2,4-Dinitrophenol
117.110	061	EPA 8270C	2,4-Dinitrotoluene
117.110	062	EPA 8270C	2,6-Dinitrotoluene
117.110	067	EPA 8270C	Fluoranthene
117.110	068	EPA 8270C	Fluorene
117.110	069	EPA 8270C	Hexachlorobenzene
117.110	070	EPA 8270C	Hexachlorobutadiene
117.110	071	EPA 8270C	Hexachlorocyclopentadiene
117.110	072	EPA 8270C	Hexachloroethane
117.110	073	EPA 8270C	Hexachlorophene
117.110	074	EPA 8270C	Hexachloropropene
117.110	075	EPA 8270C	Indeno(1,2,3-c,d)pyrene
117.110	076	EPA 8270C	Isophorone
117.110	077	EPA 8270C	Isosafrole
117.110	079	EPA 8270C	3-Methylcholanthrene
117.110	080	EPA 8270C	2-Methyl-4,6-dinitrophenol
117.110	083	EPA 8270C	2-Methylnaphthalene
117.110	084	EPA 8270C	2-Methylphenol
117.110	085	EPA 8270C	3-Methylphenol
117.110	086	EPA 8270C	4-Methylphenol

117.110	087	EPA 8270C	Naphthalene
117.110	088	EPA 8270C	1,4-Naphthoquinone
117.110	089	EPA 8270C	1-Naphthylamine
117.110	090	EPA 8270C	2-Naphthylamine
117.110	092	EPA 8270C	2-Nitroaniline
117.110	093	EPA 8270C	3-Nitroaniline
117.110	094	EPA 8270C	4-Nitroaniline
117.110	095	EPA 8270C	Nitrobenzene
117.110	096	EPA 8270C	2-Nitrophenol
117.110	097	EPA 8270C	4-Nitrophenol
117.110	098	EPA 8270C	N-nitroso-di-n-butylamine
117.110	099	EPA 8270C	N-nitrosodiethylamine
117.110	100	EPA 8270C	N-nitrosodimethylamine
117.110	101	EPA 8270C	N-nitroso-di-n-propylamine
117.110	102	EPA 8270C	N-nitrosodiphenylamine
117.110	103	EPA 8270C	N-nitrosomethylethylamine
117.110	104	EPA 8270C	N-nitrosomorpholine
117.110	105	EPA 8270C	N-nitrosopiperidine
117.110	106	EPA 8270C	N-nitrosopyrrolidine
117.110	108	EPA 8270C	Pentachlorobenzene
117.110	109	EPA 8270C	Pentachloronitrobenzene
117.110	110	EPA 8270C	Pentachlorophenol
117.110	111	EPA 8270C	Phenacetin
117.110	112	EPA 8270C	Phenanthrene
117.110	113	EPA 8270C	Phenol
117.110	116	EPA 8270C	2-Picoline
117.110	117	EPA 8270C	Pronamide
117.110	119	EPA 8270C	Pyrene
117.110	120	EPA 8270C	Pyridine
117.110	122	EPA 8270C	Safrole
117.110	124	EPA 8270C	1,2,4,5-Tetrachlorobenzene
117.110	125	EPA 8270C	2,3,4,6-Tetrachlorophenol
117.110	128	EPA 8270C	o-Toluidine
117.110	129	EPA 8270C	1,2,4-Trichlorobenzene
117.110	130	EPA 8270C	2,4,5-Trichlorophenol
117.110	131	EPA 8270C	2,4,6-Trichlorophenol
117.110	132	EPA 8270C	1,3,5-Trinitrobenzene
117.140	001	EPA 8310	Acenaphthene
117.140	002	EPA 8310	Acenaphthylene
117.140	003	EPA 8310	Anthracene
117.140	004	EPA 8310	Benz(a)anthracene

117.140	005	EPA 8310	Benzo(a)pyrene
117.140	006	EPA 8310	Benzo(b)fluoranthene
117.140	007	EPA 8310	Benzo(k)fluoranthene
117.140	008	EPA 8310	Benzo(g,h,i)perylene
117.140	009	EPA 8310	Chrysene
117.140	010	EPA 8310	Dibenz(a,h)anthracene
117.140	011	EPA 8310	Fluoranthene
117.140	012	EPA 8310	Fluorene
117.140	013	EPA 8310	Indeno(1,2,3-c,d)pyrene
117.140	014	EPA 8310	Naphthalene
117.140	015	EPA 8310	Phenanthrene
117.140	016	EPA 8310	Pyrene
117.170	001	EPA 8330	4-Amino-2,6-dinitrotoluene
117.170	002	EPA 8330	2-Amino-4,6-dinitrotoluene
117.170	003	EPA 8330	1,3-Dinitrobenzene
117.170	004	EPA 8330	2,4-Dinitrotoluene
117.170	005	EPA 8330	2,6-Dinitrotoluene
117.170	006	EPA 8330	Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)
117.170	008	EPA 8330	Nitrobenzene
117.170	009	EPA 8330	2-Nitrotoluene
117.170	010	EPA 8330	3-Nitrotoluene
117.170	011	EPA 8330	4-Nitrotoluene
117.170	012	EPA 8330	Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
117.170	013	EPA 8330	1,3,5-Trinitrobenzene
117.170	014	EPA 8330	2,4,6-Trinitrotoluene
117.210	001	EPA 8081A	Aldrin
117.210	002	EPA 8081A	a-BHC
117.210	003	EPA 8081A	b-BHC
117.210	004	EPA 8081A	d-BHC
117.210	005	EPA 8081A	g-BHC (Lindane)
117.210	007	EPA 8081A	a-Chlordane
117.210	008	EPA 8081A	g-Chlordane
117.210	009	EPA 8081A	Chlordane (tech.)
117.210	013	EPA 8081A	4,4'-DDD
117.210	014	EPA 8081A	4,4'-DDE
117.210	015	EPA 8081A	4,4'-DDT
117.210	020	EPA 8081A	Dieldrin
117.210	021	EPA 8081A	Endosulfan I
117.210	022	EPA 8081A	Endosulfan II
117.210	023	EPA 8081A	Endosulfan Sulfate
117.210	024	EPA 8081A	Endrin

117.210	025	EPA 8081A	Endrin Aldehyde
117.210	026	EPA 8081A	Endrin Ketone
117.210	027	EPA 8081A	Heptachlor
117.210	028	EPA 8081A	Heptachlor Epoxide
117.210	033	EPA 8081A	Methoxychlor
117.210	039	EPA 8081A	Toxaphene
117.220	000	EPA 8082	PCBs
117.220	001	EPA 8082	PCB-1016
117.220	002	EPA 8082	PCB-1221
117.220	003	EPA 8082	PCB-1232
117.220	004	EPA 8082	PCB-1242
117.220	005	EPA 8082	PCB-1248
117.220	006	EPA 8082	PCB-1254
117.220	007	EPA 8082	PCB-1260
117.250	001	EPA 8151A	2,4-D
117.250	002	EPA 8151A	2,4-DB
117.250	003	EPA 8151A	2,4,5-T
117.250	004	EPA 8151A	2,4,5-TP
117.250	006	EPA 8151A	Dalapon
117.250	007	EPA 8151A	Dichlorprop
117.250	008	EPA 8151A	Dinoseb
117.250	009	EPA 8151A	MCPA
117.250	010	EPA 8151A	MCPP
117.250	014	EPA 8151A	Dicamba

118 - Radiochemistry of Hazardous Waste

118.010	001	EPA 9310	Gross Alpha
118.010	002	EPA 9310	Gross Beta
118.020	001	EPA 9315	Radium, Total
118.030	001	EPA 9320	Radium-228

120 - Physical Properties of Hazardous Waste

120.010	001	EPA 1010	Ignitability
120.040	001	Section 7.3 SW-846	Reactive Cyanide
120.050	001	Section 7.3 SW-846	Reactive Sulfide

ATTACHMENT 3

FINAL RADIATION PROTECTION PLAN
April 26, 2010
DCN: EMAC-8823-0003-0010

(on CD only)

This page intentionally left blank.

ATTACHMENT 4

FINAL BASEWIDE DUST CONTROL PLAN, REVISION 1
November 29, 2010
DCN: ECSD-3211-0018-0002.R1
(on CD only)

This page intentionally left blank.

ATTACHMENT 5

FINAL STORMWATER POLLUTION PREVENTION PLAN
November 19, 2010
DCN: RMAC-0809-0002-0007
(on CD only)

This page intentionally left blank.

ATTACHMENT 6

WASTE MANAGEMENT PLAN

This page intentionally left blank.

Base Realignment and Closure
Program Management Office West
1455 Frazee Road, Suite 900
San Diego, California 92108-4310

CONTRACT NO. N62473-10-D-0809
CTO NO. 0004

FINAL
WASTE MANAGEMENT PLAN
January 21, 2011

BASEWIDE RADIOLOGICAL SUPPORT
HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: RMAC-0809-0004-0003

Prepared by:

TETRA TECH EC, INC.
1230 Columbia Street, Suite 750
San Diego, California 92101-8536

Prepared by: _____
Richard Weingarz
Technical Lead

Reviewed by: _____
Bill Dougherty
Project Manager

TABLE OF CONTENTS

PAGE

ABBREVIATIONS AND ACRONYMS iii

1.0 INTRODUCTION 1-1
- 1.1 SITE HISTORY 1-1
- 1.2 REGULATORY FRAMEWORK 1-2
- 1.3 REMOVAL ACTION OBJECTIVES 1-2
- 1.4 PROJECT POINTS OF CONTACT 1-2
- 1.5 UPDATING THE WASTE MANAGEMENT PLAN 1-2
- 1.6 PLAN ORGANIZATION 1-2

2.0 WASTE STREAMS AND DESIGNATION 2-1
- 2.1 ANTICIPATED WASTE STREAMS 2-1
- 2.2 WASTE DESIGNATION AND MINIMIZATION 2-1

3.0 HAZARDOUS AND NONHAZARDOUS WASTE ACCUMULATION AND STORAGE 3-1
- 3.1 WASTE ACCUMULATION AND STORAGE 3-1
  - 3.1.1 Soil 3-1
  - 3.1.2 Debris 3-1
  - 3.1.3 Wastewater and Waste Fluids 3-1
  - 3.1.4 Container Labeling 3-2
- 3.2 WASTE ACCUMULATION AREAS 3-2
- 3.3 INSPECTIONS AND DOCUMENTATION 3-3

4.0 RADIOACTIVE WASTE ACCUMULATION AND STORAGE 4-1
- 4.1 LOW-LEVEL RADIOACTIVE WASTE 4-1
- 4.2 CONTAINER LABELING 4-1
- 4.3 WASTE ACCUMULATION AREAS 4-1
- 4.4 INSPECTIONS AND DOCUMENTATION 4-2

5.0 WASTE DISPOSAL 5-1

6.0 REFERENCES 6-1

FIGURES

Figure 1-1 Project Organization Chart

This page intentionally left blank.

ED_004747_00027038-00431

ABBREVIATIONS AND ACRONYMS

BRAC	Base Realignment and Closure
CCR	*California Code of Regulations*
CFR	*Code of Federal Regulations*
CSO	Caretaker Site Office
CTO	Contract Task Order
DON	Department of the Navy
EPA	U.S. Environmental Protection Agency
HPS	Hunters Point Shipyard
IR	Installation Restoration (Program)
LLRW	low-level radiological waste
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NRC	Nuclear Regulatory Commission
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
RSY	Radiological Screening Yard
RWP	Radiation Work Permit
SFRA	San Francisco Redevelopment Agency
Triple A	Triple A Machine Shop
TtEC	Tetra Tech EC, Inc.
WMP	Waste Management Plan

This page intentionally left blank.

ED_004747_00027038-00433

1.0 INTRODUCTION

The Department of the Navy (DON) contracted with Tetra Tech EC, Inc. (TtEC) to provide basewide radiological support under TtEC's United States Nuclear Regulatory Commission (NRC) Service Provider Radioactive Materials License. This work will be conducted under Contract No. N62473-10-D-0809, Contract Task Order (CTO) No. 0004 at Hunters Point Shipyard (HPS), San Francisco, California.

The purpose of the Waste Management Plan (WMP) is to present the waste management practices and procedures to be followed for the types of waste expected to be generated during operation of the Radiological Screening Yards (RSYs) and when providing radiological support to contractors performing work in radiologically impacted areas. The WMP identifies waste management activities conducted during the storage and preparation and/or disposal of waste (including waste characterization, packaging, storage, and management while in storage). The transportation and transfer of waste material to the appropriate basewide disposal contractor are also described.

The WMP provides information on how material, including potentially hazardous wastes and low-level radioactive waste (LLRW) associated with project activities, will be managed prior to disposal. A secondary goal of this section is to ensure that waste minimization practices are followed, to the extent practicable, to reduce the volume of waste that will be generated, stored, and removed from the site for disposal.

1.1 SITE HISTORY

HPS is located in the southeastern part of San Francisco on a long promontory that extends east into San Francisco Bay. Presently, HPS encompasses approximately 866 acres, including approximately 420 acres on land. 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 when the DON deactivated HPS. From 1976 to 1986, the DON leased HPS 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, HPS 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 HPS. Essentially, this may entail removal of buildings and structures, including subsurface systems, as well as removal of contaminated materials. HPS has since been divided into 11 parcels, A, B, C, D-1, D-2, E, E-2, F, G, UC1, and UC2. Parcel A, consisting of the most inland 75 acres, was transferred to the San

Francisco Redevelopment Agency (SFRA) in 2004. The remainder of HPS will be conveyed to the SFRA as the environmental cleanup is completed.

1.2 REGULATORY FRAMEWORK

Environmental investigation and remediation activities are being conducted at HPS under the Department of Defense Installation Restoration (IR) Program in accordance with Comprehensive Environmental Response, Compensation, and Liability Act 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 actions conducted at HPS. 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

Consistent with the NCP requirements in Title 40 *Code of Federal Regulations* (CFR), Part 300.415(b)(2), the removal action objectives for the removal actions to be performed at HPS are to implement the Action Memorandum and protect public health and welfare and the environment by physically removing and disposing of radioactive contamination that exceeds the radiological remedial objectives presented in Table 1 of the Action Memorandum (DON 2006).

1.4 PROJECT POINTS OF CONTACT

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

1.5 UPDATING THE WASTE MANAGEMENT PLAN

The WMP will be updated as changes in site activities or conditions or changes in applicable regulations occur. Revisions to the WMP will be reviewed and approved by the DON. All changes to the WMP associated with radioactive waste will require approval from the Naval Sea Systems Command Detachment Radiological Affairs Support Office.

1.6 PLAN ORGANIZATION

This WMP is organized as follows:

- **Section 1.0** provides the introduction, site history and current operations, regulatory framework, remedial action objectives, project points of contact, and plan organization.
- **Section 2.0** describes the potential waste streams, waste designation, and minimization process.

- **Section 3.0** describes procedures for waste accumulation and storage.
- **Section 4.0** describes the waste disposal option for each potential waste stream.
- **Section 5.0** presents the references used in drafting this document.

This page intentionally left blank.

ED_004747_00027038-00437

2.0 WASTE STREAMS AND DESIGNATION

2.1 ANTICIPATED WASTE STREAMS

Site activities will consist of the radionuclide of concern-screening of excavated soils and debris generated during the removal actions at HPS. The anticipated waste streams listed below for this CTO will either be classified as radiologically impacted or non-radiologically impacted:

- Radiologically impacted material
  - Soil unsuitable for use as backfill
  - Debris (including excavated piping and system components)
  - Wastewater
  - Personal protective equipment (PPE)
- Non-radiologically impacted materials
  - Soil unsuitable for use as backfill (failed IR site cleanup goals, has visible contamination, or has odors)
  - Debris (including excavated piping and system components)
  - Wastewater

2.2 WASTE DESIGNATION AND MINIMIZATION

Classification of material for reuse will be based on Project Action Limits presented in the Basewide Radiological Support Sampling and Analysis Plan (Attachment 1 to the main Execution Plan). Analytical sampling required to determine eligibility for on-site reuse as backfill material may not be adequate for characterization for disposal. Waste characterization and designation for disposal will be conducted by the DON basewide waste disposal contractors.

Excavated soil meeting the following requirements will be reused on-site as backfill material:

- Soil not originating from an area within an IR site and not radiologically impacted may be used as backfill for the excavation.
- Soil originating from within an IR site that meets the IR site cleanup goals and is not radiologically impacted may be used as backfill for the excavation.

To minimize the volume of all waste streams generated during the project, the following general guidelines will be followed:

- Waste material will not be contaminated unnecessarily.
- Work will be planned ahead.

- Material may be stored in large containers, but the smallest reasonable container will be used to transport the material to the location where it is needed.
- Cleaning and extra sampling supplies will be maintained outside any potentially contaminated area to keep the supplies clean and to minimize additional waste generation.
- Mixing of detergents or decontamination solutions will be performed outside potentially contaminated areas.
- Drop cloths or other absorbent material will be used to contain small spills or leaks.
- Contaminated material will not be placed with clean material.
- Wooden pallets inside the exclusion zone will be covered with plastic.
- Material and equipment will be decontaminated and reused when practicable.
- Volume reduction techniques will be used when practicable.
- Waste containers will be verified to ensure that they are solidly packed to minimize the number of containers.
- Only waste containers adequately sized to contain the volume of waste generated will be used.
- Less hazardous substances will be used whenever possible (only the volume of standard solutions needed for testing will be brought; minimal amounts of decontamination water and solvent rinses will be used).

3.0 HAZARDOUS AND NONHAZARDOUS WASTE ACCUMULATION AND STORAGE

The substantive requirements of the state and federal hazardous waste generation, characterization, storage, treatment, and management regulations of Title 22 *California Code of Regulations* (CCR) Sections 66261, 66262, and 66264, and 40 CFR, Parts 261, 262, and 264, are applicable to the management of wastes generated during this project's activities.

3.1 WASTE ACCUMULATION AND STORAGE

Regulations per 40 CFR Part 262 and 22 CCR Section 66262 are applicable to the generation, storage, management, and accumulation of Resource Conservation and Recovery Act (RCRA) and non-RCRA hazardous wastes, respectively. Specific requirements apply to the accumulation time for hazardous wastes on-site and to the accumulation and labeling of hazardous wastes. These wastes will be managed, accumulated, and inspected in accordance with the regulations. The Caretaker Site Office (CSO) is responsible for designating waste accumulation areas.

3.1.1 Soil

Hazardous and nonhazardous soil may be generated during excavation of sanitary sewer and storm drain lines and thus may be encountered when conducting remediation of the excavated soils at the RSYs. Soil excavated from within IR sites will be stockpiled and sampled and analyzed for final disposition or potential reuse based on the Project Action Level presented in the Sampling and Analysis Plan (TtEC 2010). Soil excavated from areas outside of IR sites will be stockpiled pending return to the excavation as backfill material, minus any radiological impacted soil or soils with visible staining or odor. The operation and maintenance of the stockpiles will conform to the requirements of RCRA staging pile regulations of 40 CFR Section 264.554 and with Division 20, Chapter 6.5, Section 25123.3 of the *California Health and Safety Code*.

3.1.2 Debris

Debris that has been determined to be nonhazardous will be stockpiled in a location designated by the CSO pending disposal. Debris that may be generated may include terra cotta and metal pipe, bricks from removed manholes, and asphalt and/or concrete.

3.1.3 Wastewater and Waste Fluids

Any wastewater generated (for example, decontamination water generated from equipment and personnel decontamination and water generated from dewatering excavated material) will be collected in containers such as Baker tanks, Rain for Rent® tanks, or 55-gallon drums and labeled as "Potentially Hazardous Water – Pending Analysis." An accumulation start date will be noted

ED_004747_00027038-00440

on the label. Tanks will be temporarily staged within a predesignated and secondarily contained (unless tanks are double-walled) on-site waste accumulation area pending characterization and appropriate disposal. Tank trucks or drums will be used to transfer water from the point of generation to the tank storage area. Wastewater generated from hazardous and nonhazardous waste and/or decontamination activities will be segregated from wastewater generated from radioactive decontamination.

3.1.4 Container Labeling

Indelible ink will be used to label containers of potentially hazardous waste with a detailed description, including accumulation start date, and the words "Analysis Pending – Potentially Hazardous." A container log will be used to track contents, accumulation start date, sample identification number, sample date, and disposal date. If containers are determined to contain nonhazardous waste, they will be labeled accordingly. If containers are determined to contain hazardous waste, they will immediately be labeled with a completed "Hazardous Waste" label that will include:

- EPA identification number of the generator
- Name and address of the generator
- EPA waste code
- Department of Transportation shipping name (prior to off-site shipment)
- Description of contents
- Date of generation

An inventory of waste containers will be maintained. In addition, weekly inspections of container storage areas will be conducted and logged while wastes remain in these areas to ensure the integrity of the containers and secondary containment, to check for leaks or spills, and to ensure that labels and markings are in good condition.

3.2 WASTE ACCUMULATION AREAS

TtEC will implement the following hazardous waste storage area requirements for hazardous waste stored on-site:

- A "Danger Hazardous Waste Area – Unauthorized Personnel Keep Out" sign will be posted at each waste accumulation area at a location that can be seen from any approach. The signs will be legible from a distance of at least 25 feet.
- Aisle space will be maintained to allow unobstructed movement of personnel, fire-protection equipment, spill-control equipment, and decontamination equipment to any area of facility operation in an emergency, unless aisle space is not needed for any of these purposes.

- The following emergency equipment will be located or available to personnel during active waste management activities at each accumulation area:
  - A hand-held two-way radio, capable of summoning emergency assistance
  - Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment
  - A spill-response kit for minor spills to include a shovel, adsorbent pads and/or "kitty litter," and a collection container

Bulk quantities of fuel, oil, or other hazardous material will not be stored on-site. These materials will be managed by an off-site contractor who will, on an as-needed basis, perform equipment fueling and maintenance activities.

3.3 INSPECTIONS AND DOCUMENTATION

While all waste accumulation areas will be informally inspected on a daily basis, formal inspections of all container accumulation and stockpile areas will be conducted and recorded at least weekly in accordance with 40 CFR, Part 264, Subpart I, and 22 CCR, Section 66264. The Project Environmental Safety Manager or designee will conduct inspections. Inspections will be recorded on a weekly inspection checklist. The container storage area(s) will be inspected to ensure the following:

- The containers will be checked for good condition. If a container is not in good condition or appears to be leaking, the waste will be transferred to another container.
- All containers used will be checked to be sure that they are made of material that will not react with, and are otherwise compatible with, the hazardous waste to be stored.
- The containers will be checked to ensure that they remain closed at all times, except when adding or removing waste.
- The container label will be checked to ensure that it is filled out properly and to check the waste accumulation date.

Containers used for storage of collected runoff and decontamination water will be inspected on a weekly basis and the inspections will be logged. The inspections will ensure that tanks have adequate secondary containment, are properly labeled, are in good condition (no apparent structural defects or deterioration), and have no visible leaks.

Documentation requirements apply to all waste managed during project activities. Field records will be kept of all waste-generation activities. In addition, the following information will be recorded in the log:

- Description of waste-generating activities
- Location of waste generation

- Type and volume of waste
- Date and time of generation
- Description of any waste sampling
- Name of person recording information
- Name of field manager at time of generation

4.0 RADIOACTIVE WASTE ACCUMULATION AND STORAGE

4.1 LOW-LEVEL RADIOACTIVE WASTE

Radiologically impacted soil and debris will be placed in covered and lined roll-off containers (or other suitable container) provided by the DON basewide LLRW disposal contractor. Each container will be assigned a unique identification number by the DON basewide LLRW disposal contractor, and each will be properly inventoried and labeled. Inventories will include material description and isotopic identification, if available. The contents of each container will be recorded on the inventory sheet (Intermodal Tracking Sheet). From the information provided on the Intermodal Tracking Sheet, a Bin Field Content Sheet and LLRW Field Bin Daily Report documenting the contents of the container will be completed. The Bin Field Content Sheet will be kept with the container. The LLRW Field Bin Daily Report will be forwarded to the Database Group where the information is entered into the database.

Containers will be stored in a designated and posted radioactive material storage area under the authority of TtEC's NRC license. Storage areas will be at the site where the waste originated until removed by the DON basewide LLRW disposal contractor. Containers will be secured to prevent unauthorized access to their contents. Once containers are filled and prior to their transport from the radioactive materials storage area, the DON basewide LLRW disposal contractor will survey the containers and collect surface radiation measurements. This information will be reported on the Hunters Point: Field Content Sheet & Transfer Document.

Wastewater from the radioactive material decontamination area will be maintained separately from hazardous decontamination and dewatering wastewater. The wastewater will be managed as LLRW wastewater until the chemical and radiological characteristics are known.

4.2 CONTAINER LABELING

Each container of LLRW will be labeled and placed in a designated radioactive material storage area. The waste containers will be posted with a "Caution Radioactive Material" sign. The sign will also note the maximum surface radiation level (measured in microroentgens per hour). For bin type containers, the posting will be placed on all four sides. An inventory of contents (Bin Field Content Sheet) will be posted on the outside of the container. The inventory contents and radionuclide and specific activity (if available) will be entered into the database.

4.3 WASTE ACCUMULATION AREAS

TtEC will implement the following for radioactive waste stored within a designated radioactive material storage area:

- A "Caution, Radiologically Controlled Area, Radioactive Materials Area, RWP Required For Entry, Authorized Personnel Only" (in English and Spanish) placard will be posted at each radioactive waste storage area at a location that can be seen from any approach. The signs will be legible from a distance of at least 25 feet.
- Aisle space will be maintained to allow for the unobstructed movement of personnel, fire-protection equipment, spill-control equipment, and decontamination equipment to any area of facility operation in an emergency, unless aisle space is not needed for any of these purposes.
- The following emergency equipment will be located or available to personnel during active waste management activities at each accumulation area:
  - A hand-held two-way radio, capable of summoning emergency assistance
  - Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment

4.4 INSPECTIONS AND DOCUMENTATION

While all waste accumulation areas will be informally inspected on a daily basis. The Certified Health Physicist/Radiation Safety Officer (or designee) will conduct inspections. The container storage area(s) will be inspected to ensure the following:

- The containers will be checked for good condition. If a container is not in good condition, the DON basewide LLRW disposal contractor will be notified.
- The containers will be checked to ensure that they remain closed and secured at all times, except when adding or removing waste.
- The container label will be checked to ensure that it is filled out properly and is visible.

Documentation requirements apply to all waste managed during project activities. Field records of all waste-generation activities will be kept. All pages of the field data record log (Intermodal Tracking Sheet) will be initialed and dated by the technician who is entering the data. In addition, the following information will be recorded on the Bin Field Content Sheet:

- Description of waste-generating activities
- Location of waste generation
- Type and volume of waste
- Date of generation
- Description of any waste sampling (if necessary)
- Initials of technician entering data

Prior to transfer of the bin to the DON basewide LLRW disposal contractor, the activity in each waste container will be measured in picocuries per gram, and maximum contact radiation levels

will be measured in milliroentgens per hour. This information will be reported on the Hunters Point: Field Content Sheet & Transfer Document for transfer to the DON basewide LLRW disposal contractor.

This page intentionally left blank.

ED_004747_00027038-00447

5.0 WASTE DISPOSAL

Wastes generated under this project, which will require off-site disposal by the DON's basewide disposal contractors, include the following:

- Excavated soil classified as unsuitable for reuse as backfill, based on chemical analysis, will be transferred to the DON's non-radioactive waste disposal contractor for waste characterization and disposal.
- Nonradiological debris will be either transferred to the DON's non-radioactive waste disposal contractor for waste characterization and disposal or sent off-site for recycling.
- Debris, PPE, and soil classified as unsuitable for reuse as backfill, based on radiological analysis, will be directly loaded into bins and transferred to the DON's (Army Joint Munitions Command) radioactive waste disposal contactor for characterization and disposal. Bins will be provided by the DON radioactive waste disposal contactor.
- Wastewater will be characterized and profiled for appropriate off-site treatment and/or disposal.

This page intentionally left blank.

6.0 REFERENCES

DON (Department of the Navy). 2006. Final Base-wide Radiological Removal Action, Action Memorandum – Revision 2006, Hunters Point Shipyard, San Francisco, California.

ED_004747_00027038-00450

This page intentionally left blank.

ED_004747_00027038-00451

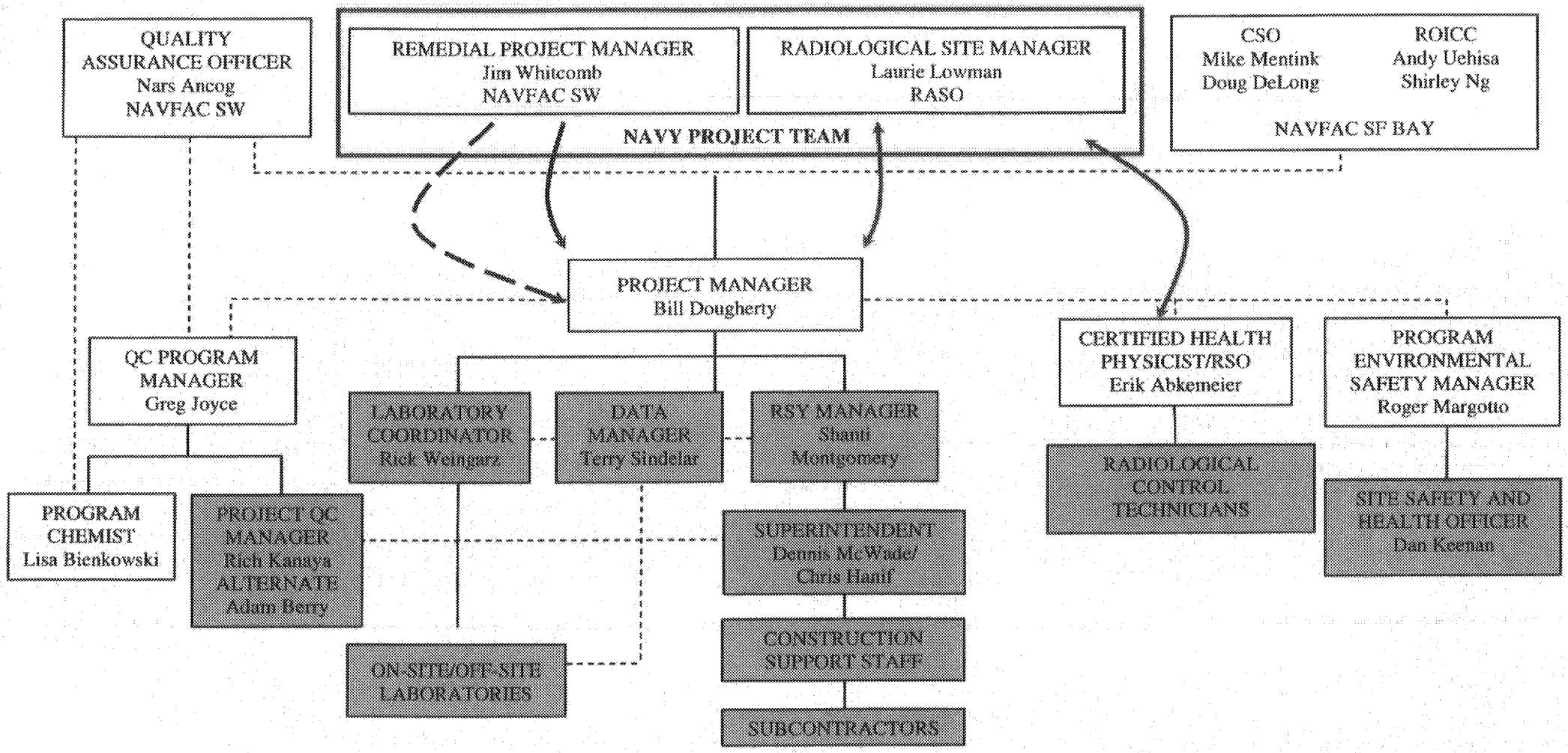
FIGURES

ED_004747_00027038-00452

This page intentionally left blank.

FIGURE 1-1

PROJECT ORGANIZATION CHART



Legend

Formal reporting relationship

Supporting relationship

Primary lines of technical communication

Line of technical direction (alternate where dashed)

Abbreviations and Acronyms:
CSO – Contractor Site Office
HPS – Hunters Point Shipyard
NAVFAC SW – Naval Facilities Engineering Command Southwest
RASO – Radiological Affairs Support Office
ROICC – Resident Officer in Charge of Construction
RSO – Radiation Safety Office
RSY – Radiological Screening Yard
QC – Quality Control
SF – San Francisco

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

The Construction Manager (Jeff Bray) has overall responsibility for coordinating the activities of on-site technical staff.

Final Waste Management Plan
Basewide Radiological Support
Hunters Point Shipyard, San Francisco, California
DCN: RMAC-0809-0004-0003
CTO No. 0004