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FINAL RADIOLOGICAL WORK PLAN, BUILDINGS 343 AND 344 AND BUILDING 233 DRAIN LINES

08/01/2007

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

FINAL
RADIOLOGICAL WORK PLAN
August 2007

BUILDINGS 343 AND 344 AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

Base Realignment and Closure
Program Management Office West
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FINAL
RADIOLOGICAL WORK PLAN
August 2007

BUILDINGS 343 AND 344 AND BUILDING 233 DRAIN LINES NAVAL STATION TREASURE ISLAND SAN FRANCISCO, CALIFORNIA

DCN: ECSD-2201-0021-0001

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Appendix B	Project Contractor Quality Control Plan
Appendix C	Site Health and Safety Plan
Appendix D	Response to Comments on Draft Work Plan

ABBREVIATIONS AND ACRONYMS

α	Type I error
β	Type II error
γ	gamma
ϵ_i	instrument efficiency
ALARA	as low as reasonably achievable
BRAC	Base Realignment and Closure
^{137}Cs	cesium-137
CERCLA	Comprehensive Environmental Response, Compensation, Recovery, Cleanup and Liability Act
CHP	Certified Health Physicist
CIH	Certified Industrial Hygienist
cm	centimeter
cm^2	square centimeter
cm/s	centimeter per second
COC	chain of custody
cpm	count per minute
CQC	Contractor Quality Control
CSO	Caretaker Support Office
DCGL	derived concentration guideline level
$DCGL_{EMC}$	derived concentration guideline level (evaluated measurement comparison)
$DCGL_w$	derived concentration guideline level W
DFW	definable feature of work
DOD	Department of Defense
DON	Department of the Navy
dpm	disintegration per minute
DQO	data quality objective
EM	Engineer Manual
FCR	Field Change Request
FSS	Final Status Survey
GPS	Global Positioning System

ABBREVIATIONS AND ACRONYMS
(Continued)

H_a	alternative hypothesis
H_o	null hypothesis
HP Ge	high-purity Germanium
HPS	Hunters Point Shipyard
HRA	Historical Radiological Assessment
inch/sec	inch per second
ISO	International Organization for Standardization
LBGR	lower boundary of the gray region
LLD	lower limit of detection
m^2	square meter
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	minimum detectable activity
MDC	minimum detectable concentration
MDCR	minimum detectable count rate
MeV	megaelectron volt
min	minute
mrem/y	millirem per year
NaI	sodium iodide
MSDS	Material Safety Data Sheet
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSEA	Naval Sea Systems Command
NAVSTA TI	Naval Station Treasure Island
NCR	Nonconformance Report
NIST	National Institute of Standards and Technology
NRC	Nuclear Regulatory Commission
NRMP	Navy Radioactive Material Permit
NTTC	Naval Technical Training Center
NUREG	U.S. Nuclear Regulatory Commission Regulation
pCi/g	picocurie per gram

ABBREVIATIONS AND ACRONYMS
(Continued)

PjM	Project Manager
PMO	Program Management Office
PPE	personal protective equipment
PQCM	Project Quality Control Manager
QAO	Quality Assurance Officer
QC	Quality Control
QCM	Quality Control Program Manager
^{226}Ra	radium-226
RASO	Radiological Affairs Support Office
RCT	Radiological Control Technician
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RPP	Radiological Protection Program
RSO	Radiation Safety Officer
RSSI	Radiation Survey and Site Investigation
RTM	Radiological Task Manager
RWP	Radiation Work Permit
SAP	Sampling and Analysis Plan
SHSP	Site Health and Safety Plan
SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
TBD	to be determined
TI	Treasure Island
TtEC	Tetra Tech EC, Inc.
VSP	Visual Sampling Plan
WRS	Wilcoxson Rank-Sum
YBI	Yerba Buena Island

1.0 INTRODUCTION

This Radiological Work Plan (Work Plan) describes survey and decontamination approaches that will be implemented in support of radiological release of buildings and drainage systems at Naval Station Treasure Island (NAVSTA TI), San Francisco, California (Figure 1-1). Tetra Tech EC, Inc. (TtEC) has been contracted by the Department of the Navy (DON) to perform these activities at NAVSTA TI for the Base Realignment and Closure (BRAC) Program Management Office West (PMO) under Naval Facilities Engineering Command, Southwest (NAVFAC SW) Remedial Action Contract N62473-06-D-2201.

A basic concept in radiation protection specifies that exposures to ionizing radiation and releases of radioactive material should be managed to reduce collective doses to workers and the public and ensure that exposure is as low as reasonably achievable (ALARA). The ALARA principle will be considered during the course of the work carried out under this Work Plan for survey activities.

The Work Plan will be used to conduct the following activities in support of radiological surveys. The objectives of these activities are to evaluate impacted sites that may contain residual radioactive contamination as a result of past activities at NAVSTA TI and confirm that Buildings 343 and 344 at NAVSTA TI meet the release criteria. The radiological survey and sediment sampling at Building 233 will be conducted as a scoping survey. These activities include:

- Reference (Background) Surveys
- Scoping Surveys
- Final Status Surveys (FSSs)
- Sediment Sampling

Where applicable, survey activities will be conducted consistent with the guidelines in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) (Department of Defense [DoD], et al., 2000), as incorporated into this Work Plan. Survey activities, as well as activities not addressed by MARSSIM, will be performed in accordance with this Work Plan and Standard Operating Procedures (SOPs) from the selected radiological subcontractor.

The Work Plan is organized as follows:

- **Section 1.0, Introduction** – Provides an overview of the project scope, work objectives, and organization of the Work Plan
- **Section 2.0, Background** – Presents a description of NAVSTA TI, a historical summary of the base, and an overview of the radiological history of NAVSTA TI, including Buildings 343 and 344 and Building 233 drain lines
- **Section 3.0, Project Management** – Discusses the project organization, roles and responsibilities of key project personnel, personnel qualifications, and work control activities, including Radiation Work Permits (RWPs)
- **Section 4.0, Radiological Surveys** – Identifies the types of surveys that will be conducted, and discusses survey area classification and survey type selection
- **Section 5.0, Survey Overview** – Presents the survey strategies and data quality objectives
- **Section 6.0, Release Criteria and Investigation Levels** – Identifies the criteria for radiological release from structures
- **Section 7.0, Instrumentation** – Identifies instrumentation that will be used to perform surveys
- **Section 8.0, Survey Implementation** – Presents the approach to implementing surveys that will be conducted, as well as associated sampling activities
- **Section 9.0, Radioactive Materials Management** – Describes how radioactive materials will be managed, including control of samples, work areas, and wastes
- **Section 10.0, Documentation and Records Management** – Presents procedures that will be used to manage records/documentation, as well as assess, interpret, and report data
- **Section 11.0, Environmental Protection Plan** – Identifies potential environmental impacts that will be considered during project implementation and how they will be managed
- **Section 12.0, References** – Presents references cited in the body of the Work Plan
- **Appendix A, Sampling and Analysis Plan** – Summarizes the protocols for collecting, tracking, and analyzing samples collected under this plan
- **Appendix B, Project Contractor Quality Control (CQC) Plan** – Establishes the procedures and methods to be implemented for the field activities, including criteria for the implementation of QC measures
- **Appendix C, Project Health and Safety Plan (SHSP)** – Identifies potential hazards, activity hazard analyses, personal protective equipment (PPE), required health and safety monitoring, and reporting

2.0 BACKGROUND

NAVSTA TI location and history are described in the following sections.

2.1 SITE LOCATION AND DESCRIPTION

NAVSTA TI is located on two islands in San Francisco Bay approximately midway between the City of San Francisco and the City of Oakland (Figure 1-1). NAVSTA TI is a man-made island of approximately 403 acres. Yerba Buena Island (YBI) is a natural island of approximately 170 acres connected to NAVSTA TI via a man-made causeway (Figure 2-1).

NAVSTA TI consists of approximately 945 acres, of which approximately 454 acres surrounding both NAVSTA TI and the northern side of YBI are submerged below the Bay. The dry land property includes all of NAVSTA TI (approximately 403 acres) and a portion of YBI north of the San Francisco-Oakland Bay Bridge (approximately 88 acres). Access to NAVSTA TI and YBI is via the east-bound (lower deck) of the bridge from San Francisco, and via the west-bound (upper deck) of the bridge from Oakland.

The Army Corps of Engineers constructed NAVSTA TI in 1936 to be the site of the 1939 Golden Gate International Exposition. The construction project, which required approximately 19 months, included the creation of a perimeter seawall using 287,000 tons of rock. The seawall was then filled with almost 30 million cubic yards of sand and gravel dredged from San Francisco Bay. The seawall was originally 13 feet above sea level. After filling the cavity, the fill material was desalinized by pumping in millions of gallons of fresh water and extracting the diluted saltwater. A six-foot layer of topsoil was used to surface the entire island. After completion of construction of NAVSTA TI in August 1937, the next 18 months were devoted to constructing the exposition buildings and preparing the site for the exposition to open in February 1939.

2.2 GENERAL SITE HISTORY

TI was used for the International Exposition from February 1939 to September 1940. Early plans had been to convert TI into an international airport following the closure of the exposition. A master plan for construction of the Treasure Island Airport prepared by the U.S. Public Roads Administration and approved by the 12th Naval District Acting Public Works Officer on July 2, 1941, shows two crossing runways and three future runways taking up almost all available space on the island.

During the same time frame, the Navy was actively attempting to obtain Treasure Island for a naval base. In mid-1940 Admiral Greenslade attempted to get the Navy Department to agree to lease TI from the City of San Francisco. His efforts were denied at that time. However, it was

becoming clear to the City of San Francisco that the proposed airport at TI would soon be too small. The city agreed to lease TI to the Navy in exchange for assistance in obtaining land south of San Francisco for use as an international airport. Treasure Island was leased to the Navy in February 1941. After the attack on Pearl Harbor in December 1941, the Navy accelerated use of TI. In April 1942, the Navy took title to TI and YBI. Many of the structures built for the International Exposition were converted to Navy uses. By mid-1942 the runways previously built in anticipation of conversion to an airport were partially overtaken by new buildings in support of the ever-increasing mission of the Naval Training and Distribution Center.

The Naval Training and Distribution Center conducted various types of training, including radiological training, from 1941 through 1993. Training courses included the Radiological Safety School and Decontamination Training.

As early as 1968, the Navy had leased some NAVSTA TI buildings to private tenants and Navy-related entities for various uses. For example, the Bureau of Alcohol, Tobacco, and Firearms operated a laboratory in Building 233 beginning in about 1976; the California Conservation Corps leased Building 109 for their operations; and the San Francisco Unified School District operated a school on NAVSTA TI. Many non-Navy and even non-military tenants occupied space on NAVSTA TI including the American Red Cross, the Environmental Protection Agency, the National Maritime Union Job Corps, and the Treasure Island Yacht Club.

There is no indication that any of the buildings on YBI were utilized in support of the radiological activities of the various training schools on NAVSTA TI. Many of the buildings had multiple uses over the life of the Naval station.

Several alternative scenarios are under review for development of NAVSTA TI. All scenarios include some combination of residential, open space, publicly oriented, and institutional and community uses. There are no known current uses of licensed or unlicensed radioactive materials on NAVSTA TI.

2.3 RADIOLOGICAL HISTORY

The first documented use of radioactive materials on NAVSTA TI began in 1947. Two separate, but closely related, operational areas accounted for the major uses of radioactive materials on NAVSTA TI. These two areas are:

- Use of radioactive sources to train Naval personnel on the calibration and operation of radiation monitoring instruments
- Use of radioactive sources to train Naval personnel on monitoring and decontamination of ships and airplanes

A third possible source of radioactive materials is the berthing of OPERATION CROSSROADS ships at NAVSTA TI. Although no ship decontamination operations were known to have occurred at NAVSTA TI, some OPERATION CROSSROADS ships that were decontaminated at HPS were temporarily berthed at NAVSTA TI prior to those ships receiving final radiological clearance.

2.3.1 Building 233 Radium Spill

The first known radiological investigation of radioactive material on NAVSTA TI took place in January 1950 following the spill of approximately 40 milligrams of radium in Building 233 (Figure 2-2). The investigation of the magnitude and extent of this spill involved monitoring for alpha airborne activity and radon activity inside Building 233. In addition, alpha swipe surveys and beta-gamma direct radiation survey measurements were performed. Since many of the occupants of Building 233 left the building before the extent of the spill was fully identified, radioactive contamination was spread by personnel (on shoes, clothing, etc) to personal automobiles and personal residences. Direct measurements and swipe surveys of alpha radioactivity revealed various levels of contamination in automobiles, on furniture, and on clothing.

Numerous innovative decontamination techniques were utilized to control, contain, and eventually remove the radium contamination. Some of the techniques were as simple as using damp wipes and hot trisodium phosphate cleaning solutions. Other methods included the use of high-efficiency filtered vacuum cleaners, paint removal, wire brushing, flame decontamination (burning off the surface layer of concrete and wood), and material disposal. Some items such as small portable furniture, rubber floor mats, linoleum flooring, etc. were simply packaged as low-level radioactive waste and disposed of. More than 200 barrels of radioactive waste were generated and stored aboard the USS Independence at Hunters Point Shipyard (HPS). The drums were weighted with concrete and sunk at sea at a depth of more than 100 fathoms.

2.3.2 Building 344 Investigation

In March 1988, a scheduled routine beta-gamma swipe survey of the waste containers inside the storage vault revealed low levels of contamination on the inside of the waste containers. Only swipe surveys were feasible in this location because the numerous sources maintained in the vault made direct radiation surveys difficult to perform. After the swipes were removed from the vault and counted, revealing low levels of contamination, an investigation quickly identified the source to be a mini-generator kit located on a shelf near the waste containers. No spread of radioactive contamination was found outside of the mini-generator kit and the waste containers.

Cleanup of the low levels of contamination simply involved packaging and off-site disposal of the mini-generator kit and the waste containers. Arrangements for off-site disposal were made by Naval Supply Center Oakland.

2.3.3 Closeout Survey of Building 344

A closeout survey of Building 344 was conducted in 1991 (Figure 2-3). Alpha, beta, and gamma swipes were collected and analyzed by the Naval Technical Training Center (NTTC). Following review of the initial survey data, the NTTC submitted a summary of the Building 344 survey data to the Radiological Affairs Support Office (RASO), along with a request for amendment of the Navy Radioactive Material Permit (NRMP) to remove Building 344 from the authorized storage locations. Further review by RASO resulted in an additional report from the NTTC to RASO to clarify calculations of minimum detectable activity (MDA) for alpha activity. RASO reviewed the Building 344 survey data and recommended approval of termination of the NRMP by letter in 1994. The actual change to the NRMP, Amendment No. 3, was issued in November 1990. This amendment removed Building 344 from the NRMP, leaving only Building 343 as an authorized location for possession of radioactive materials.

2.3.4 Closeout Survey of Building 343

Closeout surveys of Building 343 (Figure 2-4), the last authorized location for possession of licensed radioactive material, were conducted in June 1993. The NTTC submitted a request to RASO for termination of the NRMP No. 04-62639-C1NP. The request, an 86-page document, contained documentation of the disposal of all sources, swipe surveys of all sources and source containers, and swipe surveys of the rooms in Building 343. This document included the leak tests of the sealed and plated calibration sources and AN/UDM-7 alpha calibrators that were stored in Building 343. All leak tests were less than the MDA of the counting system used by NTTC. RASO analyses of 172 swipe samples taken in a portion of Building 343 were reported in July 1993. RASO reported that all beta swipes were equal to or less than the lower limit of detection (LLD) for beta of 88 disintegrations per minute (dpm). All but six alpha swipes were equal to or less than the LLD for alpha of 2.5 dpm. Two of the six alpha swipes above the LLD were also above release limits. They were located on a counter top in the storeroom (Figure 2-4). Of the remaining four swipes above the LLD (but well below release limits), two were in shelves in the storeroom, one was on the floor in the restroom, and one was in a drawer in the Chemical, Biological, Radiological Defense Laboratory. Follow-up swipes were taken by the NTTC to resolve the six alpha swipes. The NTTC reported that the areas were decontaminated using commercial decontamination spray foam. RASO analyses of the six areas resurveyed by NTTC determined that all six were less than the LLD for both alpha and beta. No direct surveys were taken and the swipe samples were not analyzed for gamma-emitting isotopes. An additional 95 swipe samples were forwarded to RASO for alpha, beta, and gamma analyses of the remainder of Building 343 in July 1993. RASO reported that all beta swipes were equal to or less than the LLD for beta of 92 dpm, and all but two of the alpha swipes were less than or equal to the LLD for alpha of 2.1 dpm. The two alpha swipes above the LLD were well below the release limits. All swipes were counted as a group for gamma radiation in a high-purity Germanium (HP Ge)

detector for 50,000 seconds. No gamma radiation other than natural background activity was detected.

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3.0 PROJECT MANAGEMENT

This section describes management of the project including organizational, structural, and functional responsibilities; the use of RWPs; prerequisite requirements of survey activities; and client notifications. A schedule of project activities is included as Figure 3-1.

3.1 ORGANIZATION

The project personnel will be organized to facilitate effective communications and to ensure that organizational lines of communication, roles and responsibilities, and reporting requirements are well defined. The organization will be defined to a level sufficient to ensure that each participant whose actions could affect the quality of radiological task planning, field or laboratory operations, or reporting, has an understanding of his/her responsibilities and how these responsibilities fit into the overall team. The project organization chart is provided in Figure 3-2. Table 3-1 provides contact information of DON and key project personnel.

TABLE 3-1

LIST OF CONTACTS

Agency	Contact	Project Title
NAVFAC SW Attn: Code 06CH.RP 1455 Frazee Road, Suite 900 San Diego, CA 92101-4310	Mr. Jim Whitcomb (619) 532-0936 james.h.whitcomb@navy.mil	Remedial Project Manager (RPM)
Naval Sea Systems Command (NAVSEA) Detachment (DET) RASO Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260	Mr. Patrick Owens (757) 887-4483 patrick.a.owens@navy.mil	Radiological Site Manager
NAVFAC SW 1220 Pacific Highway San Diego, CA 92132-5190	Mr. Nars Ancog (619) 532-2544 narciso.ancog@navy.mil	Quality Assurance Officer (QAO)
NAVFAC SW 2450 Saratoga Street, Building 110, Suite 200 Alameda Point, Alameda, CA 94501-7545	Ms. Shirley Ng (510) 749-5939 shirley.ng@navy.mil	Resident Officer in Charge of Construction (ROICC)

Agency	Contact	Project Title
NAVFAC SW 410 Palm Ave., Bldg. 1, Rm 161 Treasure Island San Francisco, CA 94130	Mr. Mike Mentink (415) 743-4729 (415) 559-9851 (cell) mike.mentink@navy.mil	BRAC Caretaker Support Office (CSO)
TtEC 1230 Columbia St., Suite 750 San Diego, CA 92101-8536	Brian Maidrand, PG (619) 471-3570 (619) 606-2544 (cell) brian.maidrand@tteci.com	Project Manager (PjM)
TtEC 1940 E. Deere Ave, Suite 200 Santa Ana, CA 92705-5718	Mr. Greg Joyce (619) 471-3530 greg.joyce@tteci.com	Quality Control Program Manager (QCM)
TtEC 1940 East Deere Ave., Suite 200 Santa Ana, CA 92705-5718	Ms. Jennifer Dessort (949) 756-7541 (949)466-7573 (cell) jennifer.dessort@tteci.com	Project Quality Control Manager (PQCM)
TtEC 1230 Columbia St., Suite 750 San Diego, CA 92101-8536	Roger Margotto, CIH (619) 471-3503 (714) 810-3742 (pager) roger.margotto@tteci.com	Program Health and Safety Manager
TtEC 1940 East Deere Ave., Suite 200 Santa Ana, CA 92705-5718	Ms. Jennifer Dessort (949) 756-7541 (949)466-7573 (cell) jennifer.dessort@tteci.com	Site Health and Safety Specialist (SHSS)
TtEC 3200 George Washington Way, Suite G Richland, WA 99352-3429	Mr. Cliff Stephan (509) 371-0140 (509) 430-4655 (cell) cliff.stephan@tteci.com	Certified Health Physicist (CHP)
TtEC Hunters Point Shipyard 270 Nimitz Ave. (Bldg. 270) San Francisco, CA 94124	TBD	Radiation Safety Officer (RSO)
Undetermined Subcontractor	TBD	Radiation Control Technicians (RCTs)
TtEC 1940 E. Deere Ave., Suite 200 Santa Ana, CA 92705-5718	Ms. Lisa Bienkowski (949) 756-7592 lisa.bienkowski@tteci.com	Program Chemist

DON oversight of the activities performed by the project team will be provided by NAVFAC SW, RASO, and BRAC PMO personnel. The project personnel with the primary responsibilities for the achievement and verification of the project's radiological goals and objectives are the

PjM, QCM, PQCM, CIH, SHSS, CHP, RSO, RCTs, and Progam Chemist. Their roles and responsibilities are described in the following sections.

3.1.1 Remedial Project Manager

The RPM has primary responsibility within the DON for day-to-day management of the project activities performed under this Work Plan and for their successful completion. The RPM's duties and authority include:

- Performing project management for the DON
- Ensuring that the project scope of work requirements is fulfilled
- Overseeing the project cost and schedule
- Providing formal technical direction to the TtEC project team, as needed
- Integrating Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) issues at NAVSTA TI with ongoing radiological activities
- Coordinating with RASO and RPMs of other projects being performed in radiologically impacted areas to ensure that proper controls are in place
- Acting as lead interface with agencies on non-radiological issues
- Together with the Radiological Site Manager, negotiating radiological release criteria with regulatory agencies

3.1.2 Radiological Site Manager

As a representative of RASO, the Radiological Site Manager has primary responsibility within the DON for the technical accuracy and the regulatory conformance of work performed under this Work Plan. The Radiological Site Manager's duties and authority include:

- Reviewing and approving project work plans and procedures
- Acting as lead interface with regulatory agencies on radiological survey plans and reports
- Together with the RPM, negotiating radiological release criteria with regulatory agencies
- Reviewing and approving on-site laboratory analytical data
- Reviewing and approving project reports
- Ensuring compliance with applicable MARSSIM (DoD et al., 2000) requirements
- Recommending changes in TtEC scope to the RPM, as appropriate
- Supporting public meetings

3.1.3 Quality Assurance Officer

The QAO is the DON representative with primary responsibility for ensuring that contract-required quality assurance measures are in place and effective for the work performed under this Work Plan. The QAO's duties and authority include:

- Reviewing and approving Sampling and Analysis plans
- Providing DON oversight of the TtEC Quality Assurance Program
- Providing quality-related directives through Contracting Officer Representative
- Providing technical and administrative oversight of TtEC surveillance audit activities
- Acting as point of contact for matters concerning quality assurance and the DON'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

3.1.4 Resident Officer in Charge of Construction

The ROICC staff has the primary responsibility for providing on-site quality assurance and safety oversight of contractors performing work at NAVSTA TI. The ROICC staff member's duties and authority include:

- Verifying that all work has been completed per contract and technical specifications prior to final government acceptance
- Performing ongoing field inspections to verify that all work is in compliance with both contract and technical specifications
- Notifying the contractor of any work not in compliance
- Interacting with the contractor's QCM on quality-related issues
- Reviewing and signing waste manifests for non-radiological wastes as the generator's representative
- Reviewing contractor daily reports for completeness and accuracy
- Attending Preparatory Phase, Initial Phase, Pre-final, and Final Acceptance Inspections
- Attending weekly QC meetings

3.1.5 BRAC Caretaker Support Office

The CSO is responsible for coordination of field activities with different NAVSEA TI departments, tenants, and personnel.

3.1.6 Project Manager

The PjM is responsible for the direction, execution, and successful completion of project tasks to achieve overall project goals. The PjM has the primary responsibility for coordinating activities and concerns with the Navy RPMs and RASO. The PjM also has the responsibility and authority to perform the following:

- 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 project deliverables are completed on time and within budget
- Ensuring adherence to the requirements of the contract, project scope of work, and the project plans
- Ensuring that all work activities are conducted in a safe manner in accordance with the SHSP (Appendix C)
- Attending required meetings, including the pre-construction conference, weekly quality control (QC) meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Serving as the senior contact between the DON and TtEC for actions and information related to the work
- Ensuring effective implementation of the radiological record management program
- Ensuring that all personnel assigned to perform field work are appropriately monitored for exposure to ionization radiation
- Coordinating regulatory site visits

3.1.7 Quality Control Program Manager

The QCM will report directly to the Corporate QC Manager and has the responsibility and authority to perform the following:

- Establishing and maintaining the QC program for the project
- Overseeing the QC program including data acquisition
- Working directly with the PjM and NAVFAC SW QAO to ensure implementation of the Program QC Plan

- Acting as a focal point for coordination of all QC project-related matters and resolving all QC issues
- Providing QC direction and training to the PQCM and others performing QC functions
- Suspending project activities if quality standards are not maintained
- Interfacing with the DON, including the NAVFAC SW QAO, on quality-related items
- Conducting field QC audits to ensure that site QC plans are being followed
- Performing reviews of audit and surveillance reports conducted by others
- Implementing DON technical direction letters related to QC topics

3.1.8 Project Quality Control Manager

The PQCM is responsible for overall management of project QC and will report to the QCM. The PQCM or an alternate PQCM will be on site at all times during field activities. The PQCM has the responsibility and authority to perform the following:

- Monitoring activities to ensure conformance with this Work Plan and that policies, procedures, contract specifications, and sound practices are followed
- Preparing the Daily QC Reports
- Ensuring that the three phases of inspection (preparatory, initial, and follow-up) are implemented for all definable features of work (DFWs)
- Ensuring that required tests and inspections are performed and the results reported
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Issuing and maintaining Field Change Requests (FCRs) and Nonconformance Reports (NCRs) for project activities (construction- and radiological-related)
- Maintaining FCR and NCR logs
- 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

3.1.9 Certified Industrial Hygienist

The CIH has authority to implement and oversee the TtEC Health and Safety Program. The CIH has the responsibility and authority to perform the following:

- Ensuring that all staff, including subcontractors, comply with the SHSP (Appendix C), state and federal regulations, and corporate policies
- Interacting with the PjM on all aspects of health and safety from the initial planning phase through fieldwork and closeout
- Providing advice and assistance on any safety, industrial hygiene, or accident prevention issue to the SHSS, PjM, and Site Superintendent
- Reviewing all site health and safety documents and cost estimates, and working to properly staff projects
- Pre-qualifying field subcontractors

3.1.10 Site Health and Safety Specialist

The SHSS ensures that all elements of the approved SHSP are implemented and enforced on site. The SHSS will report directly to the CIH and will assist in implementing and enforcing the SHSP (Appendix C) in the field. The SHSS has full authority to issue stop work orders or evacuation orders where work operations or noncompliance(s) may threaten the health and safety of site workers or the public. The SHSS has the responsibility and authority to perform the following:

- Ensuring that all personnel understand the requirements of TtEC's Environmental Health and Safety program and procedures through training and communication
- Ensuring enforcement of SHSP (Appendix C) by means of daily site inspections
- Investigating all accidents, injuries, illnesses, near-misses, and other incidents
- Ensuring that project personnel are trained on the hazards of hazardous substances on the project, maintaining a Material Safety Data Sheet (MSDS) file to provide easy access to project personnel, and performing inspections to ensure that all waste containers are correctly labeled
- Ensuring that the SHSP (Appendix C) is read, understood, and signed by all personnel including subcontractors
- Ensuring that tailgate safety meetings are conducted on days that work is performed and that documentation of all meetings and any other additional training is completed
- Verifying that project safety equipment is inspected, as required by the Environmental Health Safety program
- Coordinating site health and safety requirements with the PjM
- Ensuring maintenance of all health and safety monitoring and personal protective equipment and directing site-monitoring activities
- Coordinating daily field activities

- Coordinating site safety and emergency response duties; verifying site communications system with site personnel
- Performing inspection of safety equipment
- Reporting to the ROICC within 2 hours all incidents required to be reported by Engineer Manual (EM) 385-1-1; and immediately reporting to the ROICC any fatal injury, any persons admitted to a hospital, or property damage to government property greater than two thousand dollars
- Verifying that all personnel have the necessary training and medical clearance prior to entering the exclusion zone or contamination reduction zone at the site
- Determining and posting routes to medical facilities and emergency telephone numbers arranging for emergency transportation to medical facilities
- Serving as the Project Hazard Communication Coordinator
- Maintaining training records and medical certifications for all on-site personnel including subcontractors
- Initiating necessary revisions or changes to the SHSP (Appendix C)
- Maintaining site-control procedures
- Maintaining current records of certification for first aid and cardiopulmonary resuscitation for project field personnel
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings

3.1.11 Certified Health Physicist

The CHP is responsible for implementing, directing, and supervising all radiological project-related activities. The CHP has the responsibility and authority to perform the following:

- Assisting in the development and approval of the SHSP (Appendix C)
- Assisting in identifying radiological analysis needs
- Providing technical support in subcontractor selection
- Providing health physics guidance on an as-needed basis
- Providing radiological control protection services, if required
- Directing and assisting project personnel in proper completion of radiological records
- Assisting the RSO to determine if an external dose is to be assigned to an individual who reported lost or damaged dosimetry devices
- Ensuring that the required radiological safety training is provided to project personnel

- Reviewing and approving project field procedures that involve the handling of radioactive materials or access to radiological areas
- Ensuring timely and thorough review of records, in accordance with the Radiological Records SOP (from the selected radiological subcontractor), prior to approval
- Approving records with verifiable signature and date once records meet the quality standards as described in the Radiological Records SOP (from the selected radiological subcontractor)
- Conducting radiation incident investigations
- Conducting radiological project inspections
- Conducting data assessment

3.1.12 Radiation Safety Officer

The RSO will be responsible for oversight of the inspection and certification activities for radiological safety-related activities. The duties specified for the RSO may be shared with the CHP as appropriate. In accordance with DON requirements, the RSO or a qualified designee will be on site during radiological work conducted under this Work Plan. The RSO has the responsibility and authority to perform the following:

- Providing radiological material-related safety briefings
- Assuring that specified radiological safety procedures are followed and that the radiological safety tests and inspections are complete and acceptable
- Conducting daily oversight and field safety inspections and tests required by the project technical specifications and applicable professional standards
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Serving as a contact person for lost or damaged dosimeters for TtEC staff
- Conducting search, investigating, and then documenting dosimeters reported lost or damaged for TtEC staff
- Ensuring that an individual who reported a lost or damaged dosimeter is excluded from a radiologically controlled area until the investigation is completed, documented, and the dosimetry device re-issued for TtEC staff
- Reviewing the exposure condition of an individual who reported lost or damaged dosimetry in order to assign an external dose with concurrence of the CHP
- Ensuring that each individual working at an impacted area wears a dosimetry device specified in the RWP

- Verifying compliance with on-site RWPs and SOPs (including laboratory SOPs and radiological SOPs from the selected radiological subcontractor)
- Assuring that all radiological safety documentation is provided to the PQCM for inclusion in the project files
- Providing surveillance of radiological-related activities
- Serving as a contact person for Nuclear Regulatory Commission (NRC) site inspections
- Stopping work not in compliance with RWPs, good radiological practices, and the subcontractor's approved SOPs

3.1.13 Radiological Control Technicians

The RCTs will support projects in the field. The RCT has the responsibility and authority to perform the following:

- Conducting and documenting field surveys, sampling, and laboratory support in accordance with this Work Plan and the radiological subcontractors approved SOPs
- Interpreting and verifying field data accumulated from surveys and monitoring activities
- As assigned, assisting in training support personnel in health physics and safety
- Supporting dose assessments and assuring compliance with QC programs, emergency plans, and procedures
- Performing effluent monitoring and radioactive material inventories
- Performing survey equipment efficiencies, response checks, and daily checks of the survey instruments
- Conducting safety evaluations of health physics field and laboratory equipment
- Preparing and implementing use of RWPs, including being present at active work areas to ensure compliance with the RWPs

3.1.14 Program Chemist

The Program Chemist oversees sample collection, handling, analysis, and analytical data reporting. The Program Chemist has responsibility and authority for the following:

- Developing Sampling and Analysis Plan
- Evaluating and selecting qualified subcontract laboratories
- Implementing data QC procedures and performing audit of field performance
- Reviewing off-site laboratory data prior to use

- Ensuring that proper review of on-site laboratory data is performed
- Coordinating data validation of off-site laboratory data
- Reviewing data validation reports
- Preparing analytical reports and supporting project report preparation

3.2 TRAINING

The minimum training requirements for all personnel working in the field include the following:

- Occupational Safety and Health Administration 40-Hour and Annual 8-Hour Refresher
- Radiation awareness training
- RWP training for the specific site or task
- Activity Hazard Analysis (Appendix C, Attachment 2)training for the specific site or task
- SHSP (Appendix C) training, as required by the plans

3.3 WORK CONTROL PROCEDURES

Prerequisites for the initiation of survey activities include completion of the SHSP (Appendix C) and required notifications as well as the procurement of services, equipment, and materials necessary to perform the work. Additional activities will include a pre-work radiological evaluation of the designated work areas.

3.3.1 Radiological Health and Safety

The Radiological Protection Program (TtEC, 2001) will be used to address controls necessary for radiologically safe operations. Critical requirements resulting from the aforementioned document include the presence of an SHSS at active work locations to ensure implementation of the SHSP (Appendix C). Additionally, an RCT will be present at active work areas to ensure compliance with the RWP. Dose rate, contamination, and air monitoring, including initial baseline sampling to determine radiological background conditions, will be performed as necessary. PPE levels, dictated by radiological considerations and physical and chemical safety issues identified at each work location, will be assigned or modified, according to the approved RWP.

3.3.2 Radiation Work Permits

An RWP will be prepared that will specify the activities to be performed and include radiological safety requirements for the work. All personnel assigned to site work will be required to understand the requirements and sign the RWP prior to beginning work. RWPs will be used to

identify the requirements for entering, exiting, and conducting work in radiologically impacted areas at NAVSTA TI.

3.3.2.1 Purpose of the Radiation Work Permit

RWPs provide guidelines specifying the appropriate personnel protective measures within the scope of the work based upon the radiological conditions in the area. The RWP will also provide a complete document addressing existing radiological conditions, work scope and limitations, radiological limitations, PPE requirements, dosimetry requirements, ALARA considerations, and specific instructions to personnel. An RWP should not be used unless a radiological survey has been performed in the work area within the last 24 hours or there is reasonable assurance that radiological conditions have not changed as determined by the RSO or his/her designee. Changes to an RWP will be noted during the daily safety briefing. The absence of any changes will also be communicated during the briefing.

3.3.2.2 Development of the Radiation Work Permit

The Radiological Task Manager (RTM), or qualified designee, will perform or assign an RCT to perform an assessment of the work area. Prior to performing a work area survey, the RCT will be as knowledgeable as possible about the nature of the work to be performed (surface or sub-surface surveying, drilling, sample collection, equipment repair, decontamination, and jack hammering, and so forth). In addition, consideration will be given to the specific component or equipment to be worked on, the positions the workers may take to perform the work (i.e., kneeling on the ground, leaning against one component to work on another), and the possibility of the presence of radioactive debris.

All assessments will clearly identify the radiological hazards present in the work area. The following guidelines will be considered when performing a work area assessment:

- What are the contamination, radiation, and airborne radioactivity levels at the position(s) where the individual is to work?
- Where are the designated radiation and/or contaminated area boundaries?
- Are there special radiological hazards or hot spots?
- If work on a specific component is required, what are the contact and 30 centimeter (cm) dose rates for the component?
- Is there or could there be material and equipment present?
- What additional safety hazards may be encountered at the job site?

Upon completion of the assessment, the RCT will complete a draft of the RWP, entering all existing radiological conditions, source of survey information, and the RWP number.

3.3.2.3 Review and Approval of the Radiation Work Permit

The RTM or a designee will review the RWP for accuracy and correctness. A copy of the draft RWP will also be provided to the SHSS for review. Upon completion of their respective reviews, the RTM, or designee, and SHSS will discuss the draft RWP. After ensuring that the RWP is complete and addresses relevant non-radiological safety considerations identified by the SHSS, the RTM, or qualified designee, will approve the RWP. The RTM will then submit the RWP to the RSO for review and approval.

3.3.2.4 Implementation of the Radiation Work Permit

Before beginning work governed by the RWP, the RTM or a designee will conduct a pre-job briefing with the work crew. Pre-job briefings will be documented. The RTM or a designee will answer questions resulting from RWP reviews. Prior to working under an RWP, the user will sign the RWP indicating that he/she understands the requirements of the RWP. A copy of the RWP will be kept at the work location.

3.3.2.5 Changes to the Radiation Work Permit

In the event of changes to conditions or scope of work that do not justify the generation of a new RWP, two modifications of the RWP may be made by the RTM with the concurrence of the RSO. Revisions to the RWP will be performed in accordance with the subcontractor's approved SOP. Upon completion of the modification or extension of the RWP, the RTM will communicate all changes made to the RWP to the affected work crew and work crew supervisors prior to the commencement of work covered under the revised RWP. Upon termination of an RWP, the original RWP will be retained in the project file.

3.3.3 Notifications

During survey activities, radioactive anomalies could be identified and significant events could occur. An anomaly, for purposes of this plan, is described as a reading or result that appears to be an outlier in the professional judgment of the RTM. When an anomaly is identified, the RTM will notify the PjM, RPM, and the Radiological Site Manager. If none of these people are available, the RTM will leave a voice mail and confirmatory e-mail describing the anomaly and follow up with a call to the appointed designee, if any.

Significant events include regulatory visits (such as by the NRC), radiological issues, injuries, and breaches in security. As described above, the RPM and RASO will be notified of all significant events.

Non-regulatory third-party individuals, including members of the media, requesting access to the site or asking questions will be referred to the RPM. TtEC personnel or their subcontractor will not grant site access or answer questions for unauthorized personnel. The PjM will notify the RPM and RASO of any attempts to gain site access.

4.0 RADIOLOGICAL SURVEY TYPES, AREA CLASSIFICATION, AND SELECTION

Two types of radiological surveys will be conducted at NAVSTA TI. Surveys will be used to support the release of materials, equipment, utilities, and buildings; identify radionuclides and levels of contamination present; and support unforeseen work that may be necessary.

4.1 SURVEY TYPES

Listed below are the types of surveys that will be performed.

4.1.1 Reference (Background) Area Survey

The reference area is where the background radioactivity is measured and defined for comparison to field survey/sample data collected during surveys.

The reference area is a geographical area or structure from which representative radioactivity measurements are performed for comparison with measurements performed in an impacted area. The reference area is an area that should have similar physical, chemical, radiological, and biological characteristics as the impacted area(s) being investigated, but that has not been identified as impacted by the NAVSTA TI Historical Radiological Assessment (HRA) (NAVSEA, 2004). The same survey methods and equipment that will be used for conducting a survey in an impacted area will be used for the background area survey.

4.1.2 Scoping Survey

Scoping surveys provide site-specific information based on limited measurements. Scoping surveys are to be conducted as indicated by the NAVSTA TI HRA (NAVSEA, 2004) (with guidance from MARSSIM, [DoD et al., 2000]) and will consist of judgment measurements based on the NAVSTA TI HRA (NAVSEA, 2004) data and professional experience. Sufficient information will be collected to identify situations that require immediate radiological attention or to support development of other project activities.

The primary objectives of scoping surveys are to:

- Perform a preliminary contamination assessment
- Identify radionuclide contaminants
- Assess radionuclide ratios
- Assess general levels and extent of radionuclide contamination
- Support classification of impacted areas

- Evaluate whether the survey strategy can be optimized for use in the characterization of FSSs

4.1.3 Final Status Survey

The FSS provides data to demonstrate that radiological parameters satisfy the established guideline values and conditions for radiological release. Data from other surveys conducted during the course of site investigations at NAVSTA TI—such as scoping, characterization, and remedial action support surveys—can provide valuable information for planning an FSS. The primary objectives of FSSs are to:

- Verify classification
- Demonstrate that the potential dose or risk from residual contamination is below the release criteria
- Demonstrate that the potential dose or risk from small areas of elevated activity is below the release criteria

4.1.4 Equipment and Materials Surveys

Before being put into service or leaving a radiological work area, equipment and/or materials will be surveyed in an area of low background concentrations to ensure that the equipment and materials release criteria are not exceeded.

- Equipment and/or materials being put into service in a radiological work area at NAVSTA TI that exceed the release criteria will be returned to the supplier for replacement or decontamination.
- Equipment and/or materials that do not meet the release criteria will be decontaminated before leaving the radiological work area or stored for disposal.

4.2 SURVEY AREA CLASSIFICATION

The NAVSTA TI HRA (NAVSEA, 2004) has identified areas at NAVSTA TI that have been classified as impacted. Based on available information from previous surveys and the NAVSTA TI HRA (NAVSEA, 2004), each area will be given a classification. Impacted areas are divided into one of three classifications as described below.

4.2.1 Class 1 Areas

Class 1 areas have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiation surveys) above the derived concentration guideline level W ($DCGL_W$). The W refers to the Wilcoxon Rank Sum Test (See Section 5.0). Examples of Class 1 areas include:

- Site areas previously subjected to remedial actions
- Locations where leaks or spills are known to have occurred
- Former burial or disposal sites
- Waste storage sites
- Areas designated as such in the NAVSTA TI HRA (NAVSEA, 2004)

4.2.2 Class 2 Areas

Class 2 areas have, or had, prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the $DCGL_W$. Examples of areas that might be classified as Class 2 for the FSS include:

- Locations where radioactive materials were present in an unsealed form
- Potentially contaminated transport routes
- Areas downwind from stack release points
- Upper walls and ceilings of buildings or rooms subjected to airborne radioactivity
- Areas handling low concentrations of radioactive materials
- Areas designated as such in the NAVSTA TI HRA (NAVSEA, 2004)
- Buffer areas on the perimeter of Class 1 areas

4.2.3 Class 3 Areas

Class 3 areas are not expected to contain residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the $DCGL_W$, based on site operating history and previous radiation surveys. Examples of areas that might be classified as Class 3 include:

- Buffer zones around Class 1 or Class 2 areas
- Areas with very low potential for residual contamination but insufficient information to justify a non-impacted classification
- Areas designated as such in the NAVSTA TI HRA (NAVSEA, 2004)

4.3 CLASSIFICATION AND SURVEY UNIT SIZE

A survey unit is a physical area consisting of structures or land areas of specified size and shape for which a separate decision will be made as to whether or not that area exceeds the release criteria. This decision is made as a result of the FSS. As a result, the survey unit is the primary entity for demonstrating compliance with the release criteria.

Survey units will be limited in size based on classification, exposure pathway modeling assumptions, and site-specific conditions. The limitation on survey unit size for Class 1 and Class 2 areas ensures that each area is assigned an adequate number of data points. Table 4-1 lists the survey unit sizes.

TABLE 4-1

SURVEY UNIT SIZE

Area Classification	Survey Unit Size
Class 1 Structure	up to 100 m^2 floor area
Class 1 Land area	up to 2,000 m^2
Class 2 Structure	100 to 1,000 m^2
Class 2 Land area	2,000 to 10,000 m^2
Class 3 Structure	>1,000 m^2
Class 3 Land area	>10,000 m^2

Notes:

m^2 – square meter

4.4 REFERENCE COORDINATE SYSTEMS

A reference coordinate system will be laid out for each survey unit to identify survey/sample locations. A square grid system will be used for Class 1 and Class 2 survey units. The length, L, of a side of the square grid is determined by the total number of samples or measurements to be taken. The length of the square will determine the distance between survey data points. The length or spacing of the grids will be calculated for each of the survey units using the following equation:

Equation 4-1

$$L = \sqrt{\frac{A}{N}}$$

Where:

L = length of squares grids (meters [m])
A = surface area of the survey unit (square meters [m^2])
N = statistically calculated number of data points (see Equation 5-1)

5.0 SURVEY OVERVIEW

This section provides an overview of survey planning, implementation, and data assessment. Survey details are given in later sections of this plan.

5.1 DATA LIFE CYCLE

Compliance demonstration is simply a decision as to whether or not a survey unit meets the release criterion. This decision is based on the results of one or more surveys. Positive actions must be taken to manage the uncertainty in the survey results so that sound, defensible decisions may be made. These actions include proper survey planning to control known causes of uncertainty, proper application of QC procedures during implementation of the survey plan to detect and control significant sources of error, and careful analysis of uncertainty before the data are used to support decision making. These actions describe the flow of data throughout each type of survey, referred to as the Data Life Cycle.

There are four phases of the Data Life Cycle:

- *Planning Phase.* The survey design is developed and documented using the data quality objective (DQO) process, which is presented in detail in Section 5.2.3.
- *Implementation Phase.* The survey design is carried out resulting in the generation of raw data. Additionally, quality assurance and QC measurements will generate data and other important information that will be used during the Assessment Phase.
- *Assessment Phase.* The data generated during the Implementation Phase are first verified to ensure that the Work Plan was actually followed and that the measurement systems were performed in accordance with the criteria specified in this plan. Then the data are validated to ensure that the results of data collection activities support the objectives of the survey or permit a determination that these objectives should be modified.
- *Decision-making Phase.* A decision is made, in coordination with the responsible regulatory agency, based on the conclusions drawn from the assessment process. The ultimate objective is to make technically defensible decisions with a specified level of confidence.

5.2 SURVEY PLANNING

The Radiation Survey and Site Investigation (RSSI) process includes a series of surveys that will be used at NAVSTA TI to demonstrate compliance with the release criterion. This process will be used as a framework for collecting the information required for scoping and FSS activities. The DQO methodology discussed below will be used at NAVSTA TI to implement the RSSI process. This process consists of the following six principal steps:

- Site identification
- Historical site assessment
- Scoping survey
- Characterization survey
- Remedial action support survey
- FSS

Table 5-1 provides a simplified overview of the principal steps in the RSSI process and how the Data Life Cycle can be used in an iterative fashion within the process.

TABLE 5-1

THE DATA LIFE CYCLE USED TO SUPPORT THE RADIATION SURVEY AND SITE INVESTIGATION PROCESS

RSSI Process	Data Life Cycle	Phases	MARSSIM Guidance*
Site Identification			Provides information on identifying potential radiation sites (Section 3.3)
Historical Site Assessment	Historical Site Assessment Data Life Cycle	Plan Implement Assess Decide	Provides information on collecting and assessing existing site data (Sections 3.4 through 3.9)
Scoping Survey	Scoping Data Life Cycle	Plan Implement Assess Decide	Discusses the purpose and general approach for performing scoping surveys, especially as sources of information when planning FSSs (Section 5.2)
Characterization Survey	Characterization Data Life Cycle	Plan Implement Assess Decide	Discusses the purpose and general approach for performing characterization surveys, especially as sources of information when planning FSSs (Section 5.3)
Remedial Action Support Survey	Remedial Action Data Life Cycle	Plan Implement Assess Decide	Discusses the purpose and general approach for performing remedial action support surveys, especially as sources of information when planning FSSs (Section 5.4)
FSS	Final Status Data Life Cycle	Plan Implement Assess Decide	Provides detailed guidance for planning final status surveys (Chapter 4 and Section 5.5), selecting measurement techniques (Chapter 6, Chapter 7, and Appendix H), and assessing the data collected during FSSs (Chapter 8 and Chapter 9)

Notes:

FSS – Final Status Survey

* Chapter numbers refer to chapters in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), (DoD et al., 2000)

Figure 2.4 of MARSSIM (DoD et al., 2000) illustrates the RSSI process in terms of area classification and lists the major decision to be made for each type of survey. The flow chart, illustrated in Figures 2.5 through 2.8 of MARSSIM (DoD et al., 2000), presents the principal steps and decisions in the site investigation process and shows the relationship of the survey types to the overall assessment process.

5.2.1 Survey Design Elements

Survey and sampling process design includes, but is not limited to, the following elements:

- The *types of samples and sampling matrices* for the survey; solid samples and scan surveys for outdoor surveys, and scan surveys and/or fixed measurements for indoor surveys
- The *measurement frequency* for direct measurement locations for each survey unit and scan percentage of each survey unit
- The *sampling frequency* for solid sample collection locations in the survey unit(s)
- The *methods* for performing remedial action support surveys and other ancillary surveys

However, before these can be established, a general strategy must be determined.

5.2.2 Survey Strategy

The selection of specific survey types for each area investigated under this Work Plan will be based on information given in the NAVSTA TI HRA (NAVSEA, 2004). For an FSS, the standard survey strategy will be based on using a MARSSIM (DoD et al., 2000) Scenario A approach, as described in Sections 5.2.3.5 and 5.5.3.

5.2.3 Data Quality Objectives

MARSSIM (DoD et al., 2000) recommends using the seven-step DQO process in the design of radiological surveys. This process tailors the survey to the particular conditions around each survey situation. This section summarizes DQO elements applicable to the surveys to be performed under this plan.

5.2.3.1 State the Problem

The first step in the DQO process is to simply state the problem. The problem is, "Existing data are not sufficient to support release of the impacted areas at NAVSTA TI."

- A scoping survey is needed to provide data to plan the release or remediation of a building or area.
- An FSS is needed to provide data for free release of a building or area.

5.2.3.2 Identify the Decision

- For a scoping survey, the decision is, "Does the survey identify the radionuclides of concern and assess general levels and extent of contamination?"
- For an FSS, the decision is, "Do the FSS results demonstrate compliance with the release criteria?"

5.2.3.3 Identify Inputs to the Decision

Inputs will vary, depending on the specific survey. However, in general, some or all of the following data will be used:

- Gamma scan survey
- Alpha/beta scan surveys
- Systematic and biased static alpha, beta, and gamma static readings
- Systematic and biased solid and swipe sampling
- Systematic and biased exposure rate measurements

5.2.3.4 Define Study Boundaries

Study boundaries will depend on the particular survey performed. For a building or room, it will be the physical boundaries of those spaces.

5.2.3.5 Develop a Decision Rule

For each applicable survey, developing a decision rule is as follows:

- For a scoping survey, the decision rule is, "If the survey results meet the criteria defined in this Work Plan, then design and perform an optimized FSS. If the survey results do not meet the criteria defined in this Work Plan, then design and perform an optimized characterization survey."
- For an FSS, the decision rule is, "If the survey results demonstrate compliance with the release criteria, then document the results in the FSS report. If the survey results do not demonstrate compliance with the release criteria, then additional assessment and/or remediation are necessary."

The release criteria for this survey are listed in Section 6.0.

In evaluating this decision, MARSSIM (DoD et al., 2000) Scenario A will be applied. In Scenario A, the null hypothesis (H_o) is tested to verify if the residual contamination exceeds the release criterion; also, the alternative hypothesis (H_a) is tested to determine if the residual contamination meets the release criterion. Details on the null hypothesis are given in Sections 5.2.3.6 and 5.5.3.

5.2.3.6 Set Limits on Decision Errors

For those surveys where decision errors would be used, there are two types of decision errors that can be made. The first type of decision error, called a Type I error, occurs when the null hypothesis is rejected when it is actually true. A Type I error is sometimes called a "false positive." The probability of a Type I error is usually denoted by α. The Type I error rate is often referred to as the significance level or size of the test.

The second type of decision error, called a Type II error, occurs when the null hypothesis is not rejected when it is actually false. A Type II error is sometimes called a "false negative." The probability of a Type II error is usually denoted by β . The *power* of a statistical test is defined as the probability of rejecting the null hypothesis when it is false. It is numerically equal to $1-\beta$, where β is the Type II error rate.

This survey is designed to limit Type I and Type II errors to 5 percent. It is important to minimize the chances of concluding that a survey unit meets the release limits (reject the null hypothesis) when it actually exceeds the limits (Type I Error), and concluding that a survey unit exceeds the release limit (accept the null hypothesis) when it actually meets the limit (Type II Error).

5.2.3.7 Optimize Data Collection

Guidelines for optimizing the data collection process are presented below:

- Review Outputs and Existing Data for Consistency

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

  The RTM, or qualified designee, 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 survey data collected.

- Develop Data Collection Design Alternatives

  The MARSSIM (DoD et al., 2000) guidelines will be used, and a 95 percent confidence level for detecting radioactivity above the release criteria will be assumed with Type I and Type II errors limited to 5 percent.

- Document Operational Details and Theoretical Assumptions

  Operational details for the radiological survey process have been developed for and are included as part of this Work Plan. The theoretical assumptions are based on guidelines contained in MARSSIM (DoD et al., 2000). Generic information regarding

types of radiation measurements, instrument detection capabilities, selecting the quantities and locations of data to be collected, investigation levels, and release criteria are contained in this Work Plan and associated Sampling and Analysis Plan (SAP), Appendix A.

5.3 SURVEY IMPLEMENTATION

Survey implementation for each of the types of surveys to be conducted at NAVSTA TI is discussed below. While implementation requires instrumentation and survey techniques, this section will concentrate on the general approach. The instrumentation to be used is discussed in Section 7.0 and survey techniques are presented in Section 8.0.

5.3.1 Scoping Surveys

In practice, scoping survey data that indicate that the residual activity is below the derived concentration guideline level (DCGL) for the building/area will be used in the FSSs where possible.

5.3.2 Final Status Surveys

For the FSS, the data analysis framework is critical to survey development because it drives the sampling requirements. For contaminants present in background, the analysis uses the Wilcoxon Rank Sum (WRS) test. The minimum number (N) of samples (or fixed measurements) is calculated as follows.

Since radionuclide-specific measurements will not be performed, N is calculated in the manner specified for the WRS test using Equation 5-1:

Equation 5-1

$$N = \frac{\left(Z_{1-\alpha} + Z_{1-\beta}\right)^2}{3\left(P_r - 0.5\right)^2}(1.2)$$

Where:

$Z_{1-\alpha}$ = Type I decision error level
$Z_{1-\beta}$ = Type II decision error level
Pr = random measurement probability (based on screening values from MARSSIM Tabel 5.1 (DoD et al., 2000)
(1.2) = 20% increase in number of samples over the minimum

5.3.3 Error Control

Actions to minimize errors will be instituted during the data collection phase of the surveys. Qualified radiation survey personnel will perform the survey and record the data. Automated recording of survey data will be used where possible to minimize errors. Data transcribing is an

activity where errors may arise. To minimize data errors for manual surveys, experienced personnel will record and transcribe data.

The evaluation of survey results provides a verification check for errors, which, if detected, will be corrected.

A knowledgeable individual (RSO or CHP) 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 survey data collected.

5.4 ASSESSMENT OF SURVEY RESULTS

A preliminary evaluation of the data set will be conducted to better understand the structure of the data and thereby identify appropriate approaches and limitation for their use. For non-FSSs, this may be merely identifying areas of elevated contamination or reviewing the mean, median, and standard deviation of the data set. FSS activities to accomplish the evaluation include, but are not limited to, reviewing quality assurance reports, calculating statistical quantities, and graphing the data.

5.4.1 Scoping Surveys

Basic statistical measures of control tendency and dispersion (mean, maximum, standard deviation) will be calculated from the data collected. When a reference area is surveyed, the same statistical measures will be calculated. The focus of the data assessments will normally be the comparison of the survey data to the DCGL for the building/area. If all measurements are less than the DCGL, then the data will be used in the FSSs where possible. Measurements above the DCGL will be assessed for further action.

5.4.2 Final Status Surveys

When determining compliance with FSS goals, the survey data are examined. Compliance tests are summarized as follows:

- Compare the largest measurement to the DCGL (net of background, if present in background).
- Compare the average measurement to the DCGL (net of background, if present in background).
- Use the appropriate statistical test to determine if the survey data exceed the release limits. (If no readings exceed the DCGL, then no statistical tests are necessary.)
- If scan measurements are above the DCGL, then a fixed measurement will be taken to confirm the elevated reading. If the elevated reading is confirmed, then the unit would fail.

This plan will use an analysis structure incorporating two possible common statistical procedures, as well as conventional qualitative and semi-quantitative comparisons for FSS data. The statistical tests are only applied to measurements made at fixed locations. The tests are:

- **Wilcoxon Rank Sum test** – The WRS test is a two-sample sets or populations, non-parametric procedure that can be used to evaluate compliance when the contaminant is present in background. The WRS test can be used as a two-sample sets or population test to compare means between sample sets or populations (contamination concentration measured in reference background materials vs. the same parameter measured in site investigative materials) when either or both sampling distributions deviate significantly from normal.
- **Normal means test** – This is the traditional two-sample set t-test based on the central limit theorem (i.e., normality). It can be used to assess compliance, derive confidence intervals, and compare between sample sets (mean removable surface contamination concentration in one survey unit vs. the mean removable surface contamination concentration measured in another survey unit) when both sample distributions are normal or do not deviate appreciably from normality.

Both scan and fixed measurements are subject to the elevated measurement comparison. The result of this comparison is not conclusive as to whether the survey unit meets or exceeds the release criterion, but is a flag or trigger for further investigation. This comparison is described in Section 6.1.

5.5 DECISION MAKING

This section will cover the decision making process for scoping surveys and final status surveys.

5.5.1 Scoping Surveys

For a scoping survey, the decision rule is, "If the survey results meet the criteria, then design and perform an optimized FSS. If the survey results do not meet the criteria then design and perform an optimized characterization survey." In practice, most scoping surveys will be tested against DCGLs. If no contamination above the DCGL is found, then the survey data will be used in an FSS. If contamination is found, then a characterization survey would be performed.

5.5.2 Final Status Surveys

The results of the statistical testing of the data set for each survey unit will be used to evaluate whether to accept or reject the null hypothesis. Using the MARSSIM (DoD et al., 2000) Scenario A methodology, the null hypothesis is stated as "the residual activity in the survey unit exceeds the release criteria." Thus, in order to pass the survey unit (that is, release the area), the null hypothesis must be rejected. The objective of FSSs will be to demonstrate that residual radioactivity levels meet the release criterion. In demonstrating that the objective is met, H_o is tested that residual contamination exceeds the release criterion; H_a is then tested that residual contamination meets the release criterion.

To validate the use of a test, an evaluation will be made to determine that the data are consistent with the underlying assumptions made for the statistical procedure. Assumptions that can be made in the survey design are 1) the sample sizes determined for the tests are sufficient to achieve the DQO set for the Type I and Type II error; 2) the data from the reference area or survey unit consist of independent samples from each distribution; 3) the reference area and survey unit data distribution are similar, except for a possible shift in the median; and 4) whether the data are normally or asymmetric distributed. Certain departures from these assumptions may be acceptable when given the actual data and other information about the study. One of the primary advantages of the non-parametric test is that it involves fewer assumptions about the data than the parametric test.

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6.0 RELEASE CRITERIA AND INVESTIGATION LEVELS

The release criteria for the surveys are listed in Table 6-1. Release criteria for equipment and material are taken from Atomic Energy Commission *Regulatory Guide 1.86* (1974). Criteria for structures (surfaces) are taken from either *Regulatory Guide 1.86* or a dose-based calculation. The dose-based calculation will be performed with a dose limit of 25 millirem per year (mrem/y), using RESRAD-Build Version 3.3 (Argonne National Laboratory, 2003).

An FSS will use all the release criteria in Table 6-1, and criteria for scanning surveys known as $DCGL_{EMC}$, discussed below.

TABLE 6-1

RELEASE CRITERIA

Radionuclide	Primary Radiation Properties		Release Criteria			
			Buildings and Structures (dpm/100cm^2)			Sediment (pCi/g)
	Half-life	Type	Total Surface Activity	Removable Activity	Maximum	
^{226}radium	1600 y	Alpha Gamma	100	20	300	1.0[a]
^{137}cesium	30.17 y	Beta Gamma	5,000	1,000	15,000	NE[b]

Notes:

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

[b] ^{137}Cesium is not a radionuclide of concern for the sediment samples. Therefore, the release criteria is listed as not established for ^{137}cesium.

Abbreviations and Acronyms:

cm^2 – square centimeter
dpm – disintegration per minute
EPA – U.S. Environmental Protection Agency
NE – not established
pCi/g – picocurie per gram
PRG – primary remediation goal
y – year

6.1 ASSESSING SMALL AREAS OF ELEVATED ACTIVITY

According to MARSSIM (DoD et al., 2000), systematic measurements and sampling, in conjunction with surface scanning, are used to obtain adequate assurance that small areas of elevated radioactivity will still satisfy the release criterion for small areas. Under RASO direction, this procedure may be implemented for survey units classified as Class 1.

The $DCGL_W$ is the average concentration across the site equivalent to the release criteria, based on dose or risk. The general assumption is that the concentrations of the radionuclides in the source are fairly homogenous. The degree to which any single localized area can be elevated above the average, assuming the average is at the $DCGL_W$, and not invalidate the homogenous assumption, is characterized by the small area criteria ($DCGL_{EMC}$).

Values for the $DCGL_{EMC}$ are obtained by modifying the $DCGL_W$ using an area factor that accounts for the difference in area, and the resulting change in dose or risk. The area factor is the magnitude by which the concentration within the small area of elevated activity can exceed the $DCGL_W$ while maintaining compliance with the release criterion. The area factor takes into consideration how a smaller area would affect the dose or risk.

The guidance provided in NUREG-1757, Vol. 2, Appendix I (NRC, 2002), will be used to determine area factors. Specific area factor determinations will be performed on a case-by-case basis, and presented in the Final Report using RESRAD, or RESRAD-BUILD.

The $DCGL_{EMC}$ for scan surveys in Class 1 areas will be calculated as follows:

Equation 6-1

$$DCGL_{EMC} = (DCGL_W) \times (Area\ Factor)$$

6.2 INVESTIGATION LEVELS

Investigation levels are specific levels of radioactivity used to indicate when additional investigation may be necessary. Investigation levels also serve as a quality control check. For example, in addition to indicating potential contamination, a measurement that exceeds the investigation level may indicate that the survey unit has been improperly classified or may indicate a failing instrument.

When determining an investigation level using a statistical-based parameter (e.g., standard deviation) the following may be considered: survey objectives, underlying radionuclide distributions (e.g., normal, log-normal, non-parametric), data population descriptors (e.g., standard deviation, mean, median), and prior survey and historical information.

When an investigation level is exceeded, the measurement will be confirmed to ensure that the initial measurement/sample actually exceeds the particular investigation level. This will involve

taking further measurements to confirm the initial result, and as appropriate, to quantify the area of elevated residual radioactivity.

6.2.1 Investigation Levels for Gamma Radiation Surveys

For gamma surveys the investigation level will normally be established at the reference area mean + 3σ, where σ is the standard deviation of the gamma readings in the reference area.

6.2.2 Investigation Levels for Alpha and Beta Radiation Surveys

For alpha and beta surveys, the investigation level will be the $DCGL_W$, or a statistically based parameter (e.g. reference area mean + 3σ), if used.

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7.0 INSTRUMENTATION

Instruments will be selected that are suitable for the physical and environmental conditions at the site. The instruments and measurement methods selected will be able to detect the radionuclide of concern or radiation types of interest, and are, in relation to the survey or analytical technique, capable of measuring levels sufficient to support the DQOs. Table 7-1 identifies the instrumentation resources available to support the survey objectives.

7.1 FIELD SURVEY INSTRUMENTS

Portable survey instruments will be utilized to perform measurements in the field. Table 7-1 lists the types of portable survey equipment expected to be used during survey activities at NAVSTA TI.

7.1.1 Calibration

Portable survey instrument calibration will be completed on an annual frequency. Instrument calibration will also be performed after repairs or modifications have been performed on the instrument. The instrument will be calibrated in accordance with the manufacturer's recommended method.

7.1.2 Daily Performance

Prior to use of the portable survey instruments, calibration verification, physical inspection, battery check, and a source response check will be performed.

All portable survey instruments will have a current calibration label, which will be verified daily prior to use of the instrument.

Physical inspection of the portable survey instrument will include:

- General physical condition of the instrument and detector prior to each use
- Knobs, buttons, cables, connectors
- Meter movements/displays
- Instrument cases
- Probe/probe window(s)
- Other physical properties that may affect the proper operation of the instrument or detector

Any portable survey instrument or detector having a questionable physical condition will not be used until the problems have been corrected.

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TABLE 7-1

PORTABLE SURVEY INSTRUMENTS

Measurement/ Technique	Primary Use	Type of Instrumentation		Typical Background	Typical Total Efficiency (%)	Detection Sensitivity	Typical Minimum Detectable Concentration
		Detector Type and Ludlum Model Number(s)	Meter Description and Ludlum Model Number(s)				
Surface alpha/beta scans	Structures (floor surveys)	Large-area gas - proportional 43-37 (582 cm^2)	Data logger 2360	600-800 cpm β 5-10 cpm α	~12 β total efficiency ~12 α total efficiency	972 dpm/100 cm^2 β 90% detection probability α	900 dpm/ 100 cm^2 β 80 dpm/ 100 cm^2 α
	Equipment, materials, and structures (wall and shelving surveys)	Large-area gas - proportional 43-68 (126 cm^2)		150-250 cpm β 0-2 cpm α	~6 β total efficiency ~6 α total efficiency	900 dpm/100 cm^2 β 100 dpm/100 cm^2 α	553 dpm/ 100 cm^2 β 53 dpm/ 100 cm^2 α
Direct measurement static alpha/beta Scan measurements		Scintillation, Ludlum Model 43-89 (100 cm^2)		100-200 cpm β 0-5 cpm α			
Surface gamma scans	Equipment, materials	NaI 2-inch x 2-inch scintillation Ludlum Model 44-10	Data logger 2350-1	5,000 cpm γ	N/A	1,500 cpm γ 1.6 pCi/g ^{137}Cs 0.58 pCi/g ^{226}Ra	353 cpm γ
Direct measurement static gamma							
Exposure rates	All Inclusive	MicroR Meter with integral 1-inch x 1-inch NaI scintillation	Ratemeter 19	7-8 µR/hr	N/A	2 µR/hr	N/A

Abbreviations and Acronyms:

α – alpha
β – beta
γ – gamma
µR/hr – microroentgen per hour
^{137}Cs – cesium 137
^{226}RA – radium 226
cm^2 – square centimeters
cpm – count per minute
dpm – disintegration per minute
N/A – not applicable
NaI – sodium iodide
pCi/g – picocurie per gram

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A battery check will be performed to ensure that there is sufficient voltage being supplied to the detector and instrument circuitry for proper operation. This check will be performed in accordance with the instrument's operations manual.

The instrument will be exposed to the appropriate (alpha, beta, gamma) check source to verify that the instrument response is within the +/- 20 percent range determined during the initial response check.

The results of the daily operation checks discussed above will be documented. Instruments that do not pass the daily operation checks will be removed from service until all deficiencies have been corrected.

7.1.3 Instruments for Surface Scan Surveys for Alpha Activity

Scan surveys for alpha radiation will be performed using Ludlum Model 2360 data logger (or equivalent) equipped with either a Ludlum Model 43-68 or Model 43-37 alpha-beta gas proportional probes (or equivalent) or a Ludlum Model 43-89 zinc sulfide (ZnS[Ag]) plastic scintillation detector (or equivalent).

7.1.4 Instruments for Surface Scan Surveys for Beta Activity

Scan surveys for beta radiation will be performed using a Ludlum Model 2360 data logger (or equivalent) equipped with either a Ludlum Model 43-68 or Model 43-37 alpha-beta gas proportional probes (or equivalent) or a Ludlum 43-89 ZnS(Ag) plastic scintillation detector (or equivalent).

7.1.5 Instruments for Direct Measurement Static Surveys for Alpha Activity

Static surveys for alpha radiation will be performed using a Ludlum Model 2360 data logger (or equivalent) equipped with either a Ludlum Model 43-68 or Model 43-37 alpha-beta gas proportional probes (or equivalent) or a Ludlum Model 43-89 ZnS(Ag) plastic scintillation detector (or equivalent).

7.1.6 Instruments for Direct Measurement Static Surveys for Beta Activity

Static surveys for beta radiation will be performed either a Ludlum Model 2360 data logger (or equivalent) equipped with either a Ludlum Model 43-68 or Model 43-37 alpha-beta gas proportional probes (or equivalent) or a Ludlum Model 43-89 ZnS(Ag) plastic scintillation detector (or equivalent).

7.1.7 Instruments for Scan Surveys for Gamma Activity

Scan surveys for gamma radiation will be performed using a Ludlum Model 2350-1 data logger (or equivalent) equipped with a Ludlum Model 44-10 2-inch by 2-inch sodium iodide (NaI) scintillation detector (or equivalent).

7.1.8 Instruments for Direct Measurement Static Surveys for Gamma Activity

Direct measurement static surveys for gamma radiation will be performed using a Ludlum Model 2350-1 data logger (or equivalent) equipped with a Ludlum Model 44-10 2-inch by 2-inch NaI scintillation detector (or equivalent).

7.1.9 Instruments for Direct Measurement Surveys for Beta Gamma Activity

Direct measurement surveys for beta and gamma radiation will be performed using Ludlum Model 3 (or equivalent) with a model 44-9 Geiger Mueller pancake probe (or equivalent). This instrument combination is normally used for routine surveys associated with operational aspects of decommissioning activities such as monitoring personnel and equipment exiting a radiologically controlled area.

7.1.10 Instrument for Exposure Rate Surveys

Exposure rate surveys are conducted with use of a Ludlum Model 19 MicroR meter (or equivalent). Compatible with anticipated exposure rates, the instrument is equipped with an internally mounted 1-inch by 1-inch NaI scintillation detector integral to the meter housing.

7.2 INSTRUMENTATION EQUATIONS

The following equations are used to calculate efficiencies, minimum detectable concentrations (MDCs) and minimum detectable count rates (MDCRs).

7.2.1 Instrument Efficiency

The instrument efficiency (ε_i) is defined as the ratio between the net count rate, in counts per minute (cpm), of the instrument and the surface emission rate of the calibration source for a specified geometry. The surface emission rate is the 2π particle fluence that is affected by both the attenuation and backscatter of the radiation emitted from the calibration source.

Equation 7-1 will be used to calculate the instrument efficiency in counts per particle, although efficiency is typically reported as having no units or unitless.

Equation 7-1

$$\varepsilon_i = \frac{R_{S+B} - R_B}{q_{2\pi}\left(\frac{W_A}{S_A}\right)}$$

Where:

R_{S+B} = the gross count rate of the calibration measurement (cpm)
R_B = the background count rate (cpm)
$q_{2\pi}$ = surface emission rate of the calibration source [National Institute of Standards and Technology (NIST)-traceable] (particles per minute)
W_A = active area of the detector window (square centimeters [cm^2])
S_A = area of the source (cm^2)

The instrument efficiency is determined by obtaining static counts with the detector over a calibration source that has a NIST-traceable surface emission rate. The 2π particle fluence rate is corrected for decay, attenuation, and scatter. Then the surface emission rate of the source must be corrected for the area subtended by the probe. Factors that can also affect the instrument's efficiency are discussed below:

- Efficiency Check Sources. Efficiency check sources that emit alpha or beta radiation with energies similar to those expected from the contaminant in the field (similar to the expected radionuclide(s) of concern) will be selected.
- Source Geometry Factors. Instrument efficiency will usually be determined with an efficiency check source equal to or greater than the area of the probe. If a source that is smaller than the probe is used, a conversion factor is applied to the MDC to account for the active region of the probe.
- Source-to-Detector Distance. The detector efficiency will be calculated at a source-to-detector distance the same as the detector-to-surface distance used in the field.

7.2.2 Count Detection Probability for Alpha Scans ($\leq$126-cm^2 Probe)

Scanning for alpha emitters differs significantly from scanning for beta and gamma emitters in that the expected background response of most alpha detectors is very close to zero. The following sections cover scanning for alpha emitters.

Since the time varies that a contaminated area is under the probe, and the background count rate of some alpha instruments is less than 1 cpm, it is not reasonable to determine a fixed MDC for scanning. Instead, it is more practical to determine the probability of detecting an area of contamination at a predetermined DCGL for given scan rates.

For alpha survey instrumentation with backgrounds ranging from less than 1 to 3 cpm, a single count provides a surveyor sufficient cause to stop and investigate further. Assuming this to be true, the probability of detecting given levels of alpha surface contamination can be calculated by use of Poisson summation statistics.

Given a known scan rate and a surface contamination release limit, the probability of detecting a single count while passing over the contaminated area is given by Equation 7-2:

Equation 7-2

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

Where:

$P(n \geq 1)$	=	probability of observing a single count
G	=	contamination activity (disintegrations per minute [dpm])
E	=	detector efficiency (4π)
d	=	width of detector in direction of scan (cm)
v	=	scan speed (centimeters per second [cm/s])

Once a count is recorded and the guideline level of contamination is present, the surveyor should stop and wait until the probability of getting another count is at least 90 percent. This time the interval can be calculated by Equation 7-3:

Equation 7-3

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

Where:

t	=	time period for static count(s)
C	=	contamination guideline (dpm/100 cm^2)
A	=	physical probe area (cm^2)
E	=	detector efficiency (4π)

7.2.3 Count Detection Probability for Alpha Scans (582-cm^2 Probe)

The larger (582 cm^2) gas proportional detectors have background count rates on the order of 5 to 10 cpm, and a single count will not cause a surveyor to investigate further. A counting period long enough to establish that a single count indicates an elevated contamination level would be prohibitively inefficient. For these types of instruments, the surveyor usually will need to get at least two counts while passing over the source area before stopping for further investigation.

Assuming this to be a valid assumption, the probability of getting two or more counts can be calculated by Equation 7-4:

Equation 7-4

$$P(n \geq 2) = 1 - \left[1 + \frac{(GE + B)t}{60}\right]\left[e^{\frac{-(GE+B)t}{60}}\right]$$

Where:

$P(n \geq 2)$	=	probability of getting two or more counts during the time interval t
t	=	time interval (s)
G	=	contamination activity (dpm)
E	=	detector efficiency (4π)
B	=	background count rate (cpm)

7.2.4 Minimal Detectable Count Rate and Minimum Detectable Concentration for Beta Scans

The minimum detectable number of net source counts in the scan interval can be arrived at by multiplying the square root of the number of background counts (in the scan interval) by the detectability value associated with the desired performance (as reflected in index of sensitivity [α and β errors (performance criteria)]) as shown in Equation 7-5.

Equation 7-5

$$MDCR = \mathrm{d}' \sqrt{\mathrm{b_i}} \left(\frac{60}{i} \right)$$

Where:

d'	=	index of sensitivity (α and β errors [performance criteria])
b_i	=	number of background counts in scan time interval (count)
i	=	scan or observation interval (s)

The required rate of true positives will be 95 percent, and the false positives will be 5 percent. From Table 6.5 of MARSSIM (DoD et al., 2000), the value of d', representing this performance goal, is 3.28.

The scan MDC is determined from the MDCR by applying conversion factors that account for detector and surface characteristics and surveyor efficiency. As discussed below, the MDCR accounts for the background level, performance criteria (d'), and observation interval. The observation interval during scanning is the actual time that the detector can respond to the contamination source. This interval depends on the scan speed, detector size in the direction of the scan, and area of elevated activity.

The scan MDC for structure surfaces is calculated using Equation 7-6.

Equation 7-6

$$Scan\ MDC = \frac{MDCR}{\sqrt{p}\ \varepsilon_i \varepsilon_s \frac{W_A}{100\ cm^2}}$$

Where:

MDCR is discussed above
p = surveyor efficiency factor
ε_i = instrument efficiency (count per particle)
ε_s = contaminated surface efficiency (particle per disintegration)
W_A = area of the detector window (cm^2)

7.2.5 MDC for Static Alpha and Beta Counts

The static MDC is the level of radioactivity practically achievable by the overall measurement process. Equation 7-7 is used to calculate instrument MDC in dpm per 100 cm^2 when the background and sample are counted for the same time intervals.

Equation 7-7

$$MDC = \frac{3 + 4.65\sqrt{R_B T_B}}{\varepsilon_s \varepsilon_i \frac{W_A}{100} T_B}$$

Where:

R_B = background count rate (cpm)
T_B = background counting time (min)
ε_i = instrument efficiency (count per particle)
ε_s = contaminated surface efficiency (particle per disintegration)
W_A = active area of the detector window (cm^2)

In Equation 7-7, W_A is the size of the "active" area of the detector window. If the area of the detector window (cm^2) does not equal 100 cm^2, it is necessary to convert the detector response to units of dpm per 100 cm^2.

If the background and sample are counted for different time intervals, Equation 7-8 is used to calculate the MDC in dpm per 100 cm^2.

Equation 7-8

$$MDC = \frac{3 + 3.29\sqrt{R_B T_{S+B}\left(1 + \frac{T_{S+B}}{T_B}\right)}}{\varepsilon_i \varepsilon_s \frac{W_A}{100\ cm^2} T_{S+B}}$$

Where:

R_B	=	background count rate (cpm)
T_B	=	background counting time (min)
T_{S+B}	=	sample counting time (min)
ε_i	=	instrument efficiency (count per particle)
ε_s	=	contaminated surface efficiency (particle per disintegration)
W_A	=	active area of the detector window (cm^2)

7.2.6 Surface Efficiency (ε_s) for Surface Activity Measurements

The surface efficiency term in the preceding equations is used to determine the 4π total efficiency for a particular surface and condition. Suitable values are based on the radiation and radiation energy, and are primarily impacted by the backscatter and self-absorption characteristics of the surface on which the contamination exists in the field. Backscatter is most affected by the energy of the radiation and the density of the surface material. Self-absorption characteristics or attenuation are also a function of the radiation's energy and surface condition. Surfaces typically encountered in the field include concrete, asphalt, wood, drywall, plaster, carpet, and metal. Surface conditions include both physical effects, such as scabbled concrete, and the effect of surface coatings: dust, paint, rust, water, and oil.

In the absence of experimentally determined surface efficiencies, ISO-7503-1 (International Organization for Standardization [ISO], 1988) and NUREG-1507 (NRC, 1997a), provide conservative recommendations for surface efficiencies. ISO-7503-1 recommends a surface efficiency of 0.5 for maximum beta energies exceeding 0.4 megaelectron volt (MeV) and to use a surface efficiency of 0.25 for beta energies between 0.15 and 0.4 MeV and for alpha emitters (ISO, 1988; NRC, 1997a). NUREG-1507 (NRC, 1997a) provides surface efficiencies based on studies performed for the NRC. In general, NUREG-1507 (NRC, 1997a) indicates that the ISO rule-of-thumb for surface efficiencies is conservative, particularly for beta-emitting radionuclides with end-point energies between 0.25 MeV and 0.4 MeV. Therefore, a surface efficiency of 0.25 will be used for alpha and beta emitters.

7.2.7 Minimum Detectable Count Rate for Static Gamma Counts

For gamma surveys, MDCR, rather than MDC, is calculated in cpm. If the background and sample are counted for the time intervals, Equation 7-9 is used to calculate the MDCR.

Equation 7-9

$$MDCR = \frac{3 + 4.65\sqrt{R_B T_B}}{T_B}$$

Where:

$3 + 4.65$	=	constant factor provided by MARSSIM (DoD et al., 2000)
R_B	=	background count rate (cpm)
T_B	=	background counting time (min)

7.3 LABORATORY INSTRUMENTS

Laboratory equipment will be used to analyze swipe samples collected in the field. Table 7-2 lists the types of laboratory equipment expected to be used during survey activities at NAVSTA TI.

TABLE 7-2

LABORATORY INSTRUMENTATION

Laboratory Instruments				
Measurement/ Technique	**Type of Instrumentation***	**Typical Background**	**Typical Efficiency (%)**	**Detection Sensitivity**
Gamma spectroscopy	EG&G Ortec Beryllium Window	N/A	N/A	0.05 pCi/g (for ^{137}Cs) 0.5 pCi/g (for ^{226}Ra)
Gross beta-gamma-alpha on swipes	Protean Instrument Corp. 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
	Ludlum Model 2929 ZnS(Ag) detector	>80 cpm β >3 cpm α	16 β 26 α	100 dpm/100 cm^2 β 10 dpm/100 cm^2 α

Notes:

* or equivalent

Types of radiation: α - alpha, γ - gamma, β^- - beta
cm^2 – square centimeters
cpm – count per minute
^{137}Cs – cesium-137
dpm – disintegration per minute
N/A – not applicable
pCi/g – picocurie per gram
^{226}Ra – radium-226

7.3.1 Quality Assurance Checks

Quality assurance checks shall be performed on laboratory instrumentation to ensure proper operation and to maintain calibration. The quality checks shall be documented, reviewed, and

maintained. Data trends outside the tolerance limits shall be investigated to determine the cause and potential effect on measurement results.

7.3.2 Gross Beta-Gamma-Alpha Loose Surface Contamination Surveys

Swipe samples will be processed using a Protean IPC 9025 gas-flow proportional alpha/beta 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 analysis at levels required for environmental release surveillance. Data are reported in units of dpm per 100 cm^2.

As a backup to the gas-flow proportional counters, a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent) may be used. Data are reported in units of dpm.

7.3.3 Gamma Spectroscopy

Gamma spectroscopy analysis incorporates an EG&G Ortec and/or a Canberra Genie 2000 (or equivalent) detector system. Hardware features include a HP Ge gamma photon detector supported by a multi-channel analyzer and analysis software. Instrument hardware is calibrated using a multi-energy NIST-traceable source ranging from 50 kiloelectron volts to 1.8 MeV. Data results will be reviewed for quality assurance and reported in units of picocuries per gram (pCi/g). Analysis and review processes will address count integration, efficiency and background corrections, as well as the processing of overlapping peaks.

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8.0 SURVEY IMPLEMENTATION

This section discusses the types of surveys and their implementation in the field, focusing on the methods for conducting each type of survey. The survey procedures described in this section will be performed in accordance with the subcontractor's approved SOPs.

8.1 REFERENCE (BACKGROUND) AREAS

An average background level will be determined by performing measurements at systematic or random locations within the designated background area. The detector probe will be held approximately 10 cm (4 inches) from the surface area for gamma and 0.25 inch from the surface area for alpha/beta radiation. Instrumentation will be allowed to stabilize before background readings are taken. The average of all of the readings taken will determine the background. Background scan ranges, smears, and exposure rates will also be collected for reference data. The same survey methodology and instruments used to collect the background data will be used to perform measurements within survey units.

Data collected in reference areas will be statistically evaluated using a graphical format, such as a frequency distribution chart. The purpose of the evaluation is to ensure that the data collected in the reference area are normally distributed and that the variability of the background is not too high. Background variability may be considered high when differences in estimated mean concentration measured in potential reference areas are comparable to screening level DCGLs. NUREG-1505 (NRC, 1997b), Chapter 13, Demonstrating Indistinguishability from Background, provides detailed guidance for evaluating reference areas exhibiting high variability.

8.2 SURVEY UNITS

Buildings 343 and 344 will each consist of one Class 1 and one Class 2 survey unit. Each building has been subdivided such that floors and areas less than or equal to 2 meters above the respective floor are considered Class 1 survey units and areas greater than 2 meters above the respective floor are considered Class 2 survey units. Class 1 survey units consist of floor areas less than 100 square meters. Upper walls and ceilings have been combined to form Class 2 survey units with a maximum total area of 1,000 square meters. Using a random start point, systematic data collection locations (N) will be laid out in a square grid pattern for the survey units. In some cases, the number of data collection locations may exceed N primarily because of the fact that the value of N may not always be divisible by the exact number of columns and rows associated with the square grid pattern for a given survey unit. This is particularly true when N is a prime number or is not divisible by three and four.

Building 233 will consist of various surveys to include the sanitary drains from sinks, drain traps, low points in the sanitary drainage system, and the first sanitary sewer manhole downstream to the building.

8.2.1 LBGR Determination

The lower boundary of the gray region (LBGR) is the net median concentration of the contaminant in the survey unit. Since this value is unknown, MARSSIM (NUREG-1575; DoD et al., 2000) suggests using a value for the LBGR of half the DCGL during planning purposes. However, once the median concentration activity in the survey unit is established (as expressed in a gross alpha and gross beta measurement) this value will be used to determine the LBGR.

8.2.2 Determining the Number of Data Points

Since radionuclide-specific measurements will not be performed, N is calculated in the manner specified for the Wilcoxon Rank Sum test using Equation 5-1.

Variables used to calculate N are Δ and σ. The relative shift is equal to Δ/σ, where Δ is equal to DCGL-LBGR and σ is an estimate of the standard deviation of the measured values in a survey unit. The value used for Δ is half of the release criteria for the isotopes of concern, while the values for σ are based on estimated background data. Values for Δ (2,500 dpm/100 cm^2) and σ (237 dpm/100 cm^2) associated with cesium-137 (^{137}Cs) and Δ (50 dpm/100 cm^2) and σ (6 dpm/100 cm^2) associated with ^{226}Ra were used to calculate the value for N for the isotopes of concern in Building 343 and 344. Using Equation 5-1, N for both alpha and beta surface activity is calculated as 18 total data collection locations, 9 from each survey unit, and 9 from the reference area. In order to account for invalid or unusable data, a minimum of 13 measurements will be collected from each survey unit and reference area for a total of 26 total data collection locations.

In addition to the 13 systematic data collection points on the floor of each Class 1 survey unit, additional biased measurements will be collected at least one per wall section or one measurement location for every 6 linear meters of wall, whichever is the most restrictive. The biased measurement locations will be identified based on the scan survey data. This will produce a minimum of 17 measurement locations for each Class 1 survey unit. There will be a minimum of 13 measurement locations in the Class 2 survey units. Figure 8-1 shows the typical sample placement for the Class 1 survey units. Actual diagrams will be provided in the closeout report.

8.2.3 Decision Errors

There are two types of decision errors that can be made when performing any statistical test. The first type of decision error, called a Type I error, occurs when the null hypothesis is rejected when it is actually true. This type of error is sometimes called a "false positive." The probability

of a Type I error is denoted by an α. The Type I error is often referred to as the significance level or size of the test.

The second type of decision error, called a Type II error, occurs when the null hypothesis is not rejected when it is actually false. This type of error is sometimes called a "false negative." The probability of a Type II error is denoted by a β. The power of a statistical test is defined as the probability of rejecting the null hypothesis when it is actually false. It is numerically equal to $1-\beta$, where β is the Type II error rate.

This survey is designed to limit Type I and Type II errors to a maximum probability of 5 percent. It is important to minimize the chances of concluding that a survey units meets the release criteria (reject the null hypothesis) when it actually exceeds the limits (Type I error), and concluding that a survey unit exceeds the release criteria (accept the null hypothesis) when it actually meets the limits (Type II error).

8.3 SCAN SURVEYS

Scan surveys are an integral part of survey programs conducted to determine contamination levels. The surveys are an evaluation technique performed by moving a detection device over a surface at a specified speed and distance above the surface to detect radiation. Such a device will be used to identify areas that may require additional survey measurements.

8.3.1 Scan Surveys for Alpha/Beta Surface Activity

Surface scan surveys for alpha and beta surface activity will be performed by moving the detector over the surface being surveyed at a rate of approximately 1.2 cm/s (0.47 inch per second [inch/sec]). The detector will be held approximately 0.63 cm (0.25 inch) off the surface being surveyed.

Scan measurements are performed to identify elevated areas of radioactivity within the survey unit. Alpha and beta scans will be effective for identifying elevated concentrations of ^{137}Cs and ^{226}Ra. One hundred percent of the accessible surface areas in the Class 1 survey units will be scanned with Ludlum Model 43-37 or 43-68 gas-flow proportional detectors coupled to Ludlum Model 2360 data loggers.

To conduct the survey, the surveyor will move the detector at a scan speed of 1.2 cm/s (0.47 inch/sec) while maintaining audio and visual observation of the instrument response. If the surveyor observes two or more counts during a scan interval (approximately 12 seconds), the surveyor will pause the detector movement and take a 5-second observation. If during the 5-second observation no additional counts are observed, the surveyor can continue the scan survey. Conversely, if additional counts are observed during the 5-second observation, the

surveyor should mark the area for further investigation and subsequent biased measurements using a 126 cm^2 (20 square inches) or smaller detector to locate and properly quantify any areas of elevated activity.

8.3.2 Scan Surveys for Gamma Radiation

Scan measurements are obtained by traversing a path at a maximum speed (scan rate) of approximately 0.5 meter per second (3.3 feet per second) and slowly moving the detector assembly in a serpentine (S-shaped) pattern, while maintaining the detector approximately 10 cm (4 inches) above the area being surveyed.

8.4 STATIC SURVEYS

Static contamination surveys are used to determine contamination levels on surface areas for scoping, characterization, and/or release surveys. The surveys are an evaluation technique performed by holding a detection device over a surface for a specified time at a set distance to detect radiation.

8.4.1 Static Surveys for Alpha and Beta Surface Activity

Direct measurements will be conducted with the detector approximately 0.63 cm (0.25 inch) above the surface. Count time for conducting the measurement will be adequate to meet the release criteria for the isotope of concern. Additional measurements may be collected if elevated radiation readings are identified while performing the scan surveys.

8.4.2 Static Surveys for Gamma Radiation

Static gamma measurements require positioning the detector assembly approximately 10 cm (4 inches) above the surface, and completing a stationary 60-second survey.

8.5 EXPOSURE RATE MEASUREMENTS

These surveys are performed to measure ambient gamma radiation levels. Exposure rate measurements are obtained by holding the detection device approximately 1 m (3.3 feet) from the surface being surveyed. Instrumentation will be allowed to stabilize before taking the measurement. Instrument stabilization time will vary depending on the instruments used and site conditions.

8.6 SWIPE SAMPLE MEASUREMENTS

Swipe sampling will be performed to assess the presence of radioactive contamination that is readily removed from a surface. Swipe samples will be taken to evaluate the presence of alpha and beta surface activity. The procedures for collecting swipe samples are discussed in the SAP (Appendix A).

8.7 SURVEY AND SAMPLE LOCATIONS

Static measurements, swipe samples, exposure rate measurements, and sediment samples will be taken from the same predetermined locations within each survey unit to obtain data for use in FSSs.

Sample locations will be determined using sample location grids in Building 343, Room 101, and Building 344. The sample location grid will be derived using the MARSSIM Application Version of the Visual Sampling Plan (VSP) software (Hassig, et al., 2005). This software tool was developed to aid in locating environmental samples so that the results of statistical tests performed on data collected via the sampling plan have the required confidence for decision making. The sample points will be selected to meet or exceed the required number of points per survey unit. A minimum of 17 samples will be collected from Class 1 areas (floors and lower walls) and 13 samples from Class 2 areas (upper walls and ceilings). Input parameters in VSP are selected to ensure that these minimums will be met or exceeded.

Measurements of the buildings will be confirmed during mobilization and then VSP will be used to determine final sample locations. The rooms will then be cleared of debris and sample locations will be marked with paint or permanent marker. Sample locations will be measured from building features and will be correlated to a Global Positioning System (GPS) location outside the building using a tape measure. All measurements and GPS coordinates will be recorded in the field notebook. Representative sampling locations are shown on Figures 8-1 and 8-2. Grid spacing between samples is shown for clarity however the actual sampling locations will be determined in the field. The sampling locations will be selected so as to avoid doors, windows, and any other immovable obstructions to sampling.

8.8 PRE-SURVEY FIELD ACTIVITIES

Some miscellaneous shelving and debris remain inside Buildings 343 and 344. These materials will be surveyed and removed prior to beginning the FSS.

One hundred percent scan surveys for alpha and beta radiation will be conducted on the accessible surfaces of equipment and materials. Biased static alpha and beta measurements will be collected from the surfaces. A minimum of 1 static measurement per shelf or miscellaneous piece of debris will be collected at the location exhibiting the highest alpha/beta radiation measurement. Additional measurements will be collected at locations where the investigation level is exceeded. Materials identified as having contamination present above the levels specified in Table 6-1 will be packaged for subsequent decontamination or storage and disposal.

8.9 FLOOR SURFACES

Since the original flooring material is not known, floor surfaces (e.g., tile, plywood, carpet) will be surveyed and removed to expose the original flooring material. One hundred percent scan surveys for alpha and beta radiation will be conducted on the accessible surfaces of these materials. Systematic static alpha and beta measurements will be collected from the surfaces. Additional measurements and solid samples will be collected at locations where the investigation level is exceeded. Materials identified as having contamination present above the release criteria specified in Table 6-1 will be packaged for subsequent storage and disposal.

8.10 SEDIMENT SAMPLING

Sediment samples may be collected from the drainage systems in Building 233 for radiological analysis. The SAP (Appendix A) describes the methods for collecting samples, sample numbering, sample labeling, sample shipment, and completion of the associated chain of custody and other required documentation. Sediment samples for gamma spectrometry will be analyzed at an off-site laboratory, as described in the SAP (Appendix A).

9.0 RADIOACTIVE MATERIALS MANAGEMENT

9.1 INTRODUCTION

Planned site activities could encounter the presence of radioactive materials. These activities will be conducted by trained and qualified personnel designated to apply management and control measures, as regulated by the cognizant regulatory agencies.

A qualified license representative will delegate the daily operating responsibility for related activities with the use of defined directives that comply with the corresponding NRC materials license and other applicable regulatory requirements. Actions necessary to carry out related decisions and policy include:

- Specific oversight of radioactive materials that result from site activities
- Acting as a primary point of contact for site-specific activities involving radioactive materials
- Establishment of administrative controls to manage radioactive materials according to regulatory requirements
- Acting as a primary point of contact with the NRC or Agreement States on radioactive materials present such as point sources, soil contaminants, naturally occurring radioactive material, etc.
- Establishing, in the event of multiple material license use, an agreement between each license owner as to what tasks will be designated under each specific license, (including development of a document of "mutual agreement"—defining individual license responsibilities for which a copy of the final agreement will be made available for each licensee represented).

9.2 MANAGING RADIOACTIVE MATERIALS

The day-to-day management of radioactive material is governed by program criteria detailed in the RPP (TtEC, 2001). This manual reflects applications and techniques unique to exposure reduction goals and control. Specific subcontractor SOPs are designed to govern the acquisition, receipt, storage, distribution, and use of radioactive material.

Materials at NAVSTA TI that require the implementation of radioactive materials management include:

- Sealed radioactive sources used for radiation detection instrument checks
- Potential contaminants from past operations at NAVSTA TI

- Radioactive material managed by the RSO or designated appointee. Off-site organizations and contractors, who plan to use radioactive materials in support of TtEC activities, must obtain approval. Approval can be obtained by directing a request, in writing, through the RSO or designated appointee.

9.3 RADIOACTIVE MATERIAL HANDLING

There should be no contact with radioactive material or exposure to ionizing radiation where an expected benefit is not realized. Exposures should be the lowest possible and consistent with technology, cost, and operational requirements.

9.3.1 Limitations

Designees responsible for the control of radioactive materials are required to limit its accessibility and use. Material management policies (i.e., that performed by TtEC and its contractors and affiliates) require an inventory accountability process. Clearly defined radiological safety requirements have been established for operating, changing, and repairing systems containing or designed to operate with radioactive material.

9.3.2 Authorizations

Work involving the handling and storage of radioactive materials at NAVSTA TI will be performed under the specifications of the subcontractor's approved SOPs and with authorization for such work from the RSO and license representative.

9.4 RADIOACTIVE MATERIAL CONTROL

In order to minimize unauthorized access to, and/or removal from the site of radioactive material(s), application of appropriate security protective measures will be exercised (i.e., combination and/or key lock safes for source storage). Licensed radioactive sources and devices, as well as non-exempt quantities of radioactive materials in non-permitted sources, must be routinely inventoried and documented as such. Identification of locations where radioactive materials are present will be accomplished with the use of conspicuous posting compliant with Title 10 Code of Federal Regulations Part 20.

Only pre-authorized areas will be used to store radioactive materials at NAVSTA TI. These areas will be selected with concurrence of the RASO and the RPM. Security measures for these areas will be coordinated with the CSO.

Radioactive material handling activities must be performed in a manner to ensure that:

- Access to areas and/or rooms is restricted where radioactive materials are known to be present
- Surveys of radioactive materials storage areas are completed at least weekly

10.0 DOCUMENTATION AND RECORDS MANAGEMENT

The purpose of this section is to define standards for the maintenance and retention of radiological records. Radiological records provide historical data, document radiological conditions, and record personnel exposure.

Sample collection, field measurement, and laboratory data will, to the extent practicable, be recorded both electronically and on paper. Data and information recorded on paper will be recorded using indelible ink. Records of field-generated data will be reviewed by the QCM or a designee knowledgeable in the measurement method for completeness, consistency, and accuracy. Data manually transposed to paper from electronic data collection devices will be compared to the original data sets to ensure consistency and to resolve noted discrepancies. Electronic copies of original electronic data sets will be preserved on a retrievable data storage device. No data reduction, filtering, or manipulation will be performed on the original electronic versions of data sets.

Changes or corrections on project documentation will be made by crossing out the erroneous item with a single line, initialing (by the person performing the correction), and dating the correction. The original item, although erroneous, must remain legible beneath the cross-out line. The new information will be written above the crossed-out item. Corrections must be written clearly and legibly with indelible black or blue ink.

10.1 REQUIREMENTS

Records resulting from implementation of this Work Plan shall meet the quality standards as outlined herein. All records must be retrievable and maintained for their prescribed retention time. Completed records awaiting transfer to long-term storage shall be stored in an appropriate manner to minimize loss and damage that could result from exposure to weather, fire, or other conditions. The signature and initials of all personnel who sign records shall be on file. This file shall be updated when a change in personnel is warranted. Principle personnel who create, review, and approve radiological records must sign and date the record and follow quality standards specified in the SAP (Appendix A). If working copies of records are used for reference, they will be stored separately from the original.

10.2 DOCUMENT QUALITY STANDARDS

Records shall be legible and completed with an indelible ink that provides reproducible and legible copies. Records shall be dated and contain a verifiable signature of the originator. Errors shall be corrected by marking a single line through the error and by initialing and dating the correction. Radiological records shall not be corrected using an opaque substance. Shorthand or nonstandardized terms may not be used.

To ensure traceability, each record shall clearly indicate:

- Identification of the facility
- Specific location
- Function and process
- Date
- Document number (if applicable)

The quantities used in records shall be clearly indicated in standard units (curie, rad, rem, dpm), including multiples and subdivisions of these units.

10.3 DOCUMENTATION

Four types of documentation that will be maintained and assessed are field operation records, laboratory records, data handling records, and work support documents.

10.3.1 Field Operation Records

The information contained in field operation records will document overall field operations and may consist of the following:

- Field measurement records – At a minimum, this documentation will identify the names of the persons conducting the activity, measurement identification, measurement locations, measurement results, maps and diagrams, equipment, and unusual observations. Data record forms and/or bound field notebooks will be used to record raw data and make references to prescribed procedures and changes in planned activities.
- Sample tracking records – At a minimum, these records will identify the samples, samplers, date of sampling, date of transfers, and receivers. Chain-of-custody (COC) forms will be used to document the handling of samples.
- QC records – QC records document the performance of QC practices in the field and include calibration and standards' traceability documentation that can be used to provide a reproducible reference point to which similar measurements can be correlated. These records will contain information on the frequency, condition, level of standards, and instrument calibration history. QC measurement records are more completely defined in the SAP (Appendix A).
- Personnel files – Personnel files record the names and training certificates of the staff collecting the data and will be maintained in accordance with approved procedures.
- SOPs – SOPs will be prepared by the selected subcontractor and will describe the procedures used in the field to collect data and outline potential areas of difficulty in performing measurements.
- Deficiency and problem identification reports – These reports document problems and deficiencies encountered as well as suggestions for process improvement.

- Corrective action reports – Corrective action reports document what methods were used in cases where general field practices or other standard procedures were violated and include the methods used to resolve non-compliance.

10.3.2 Laboratory Records

Laboratory-specific records include, but are not limited to:

- Laboratory measurement results and sample data – Information contained in these records includes the number of samples, sample identification, requested analysis, sample measurement results, any deviations from the laboratories' SOPs, time of day, and date.
- Sample management records – Sample management records, including COC records, document sample receipt, handling and storage, and scheduling of analysis will verify that sample tracking requirements were maintained, reflect discrepancies in the samples (e.g., receipt of damaged samples), and note proper login of samples into the laboratory.
- Analytical methods – This documentation includes sample preparation and analysis, instrument standardization, detection and reporting limits, and method-specific QC requirements. Documentation demonstrating laboratory proficiency with each method used may also be a part of the data reporting package.
- QC records – This information includes the general QC records, such as initial demonstration of capability, instrument calibration, routine monitoring of analytical performance, and calibration verification considered in the selection of analytical laboratories.
- Deficiency and problem identification reports – These reports document problems and deficiencies encountered as well as suggestions for process improvement.
- Corrective action reports – These reports document the methods used to resolve noncompliance in cases where general laboratory practice or other standard procedures were violated.

10.3.3 Data Handling Records

Data handling records document protocols used in data reduction, verification, and validation. Data reduction involves data transformation processes such as converting raw data into reportable quantities and units, using significant figures, and calculating measurement uncertainties. Data verification involves reviewing reports of data entered into electronic data management systems by the appropriate supervisory personnel knowledgeable of and with access to the original data to verify data transcription accuracy in accordance with the approved SOP. Data validation will be done on samples sent for off-site analysis, as discussed in the SAP (Appendix A). Record copies of surveys, sampling, and analytical data (and their supporting data) will be protected and maintained in project record files.

10.3.4 Work Support Documents

Work support documents will include, but not be limited to the following:

- RWPs – Will provide a complete document addressing existing radiological conditions, work scope and limitations, radiological limitations, PPE requirements, dosimetry requirements, ALARA considerations, and specific instructions to personnel.
- Reports – Documents the pertinent field activities performed under this Work Plan. These documents may include release criteria, objectives, survey results, instrumentation used, detection sensitivities, survey procedures, sample analyses and results, and conclusions. These reports may contain risk factors and dose assessments. Documentation will also include applicable survey data.

10.3.5 Preparation of Documents

Documents will be prepared using a standard form that has been verified as current and in good quality. Documents will be prepared in accordance with the applicable guidance and in accordance with the quality standards established in this Work Plan.

Once a document has been created, reviewed, and signed, it is a completed radiological record. For inclusion in a final report, a supplemental record may be prepared. A supplemental record is a copy of the original record that does not contain strikeout/initials; technical errors or omissions that were corrected using strikeout/initials will not be included in the supplemental record. This supplemental record must maintain traceability to the original document.

10.3.6 Review of Documents

Completed documents will be reviewed for accuracy of calculations, legibility, proper units, proper forms, etc. Documentation addressing conclusions must be reviewed to ensure that the conclusions drawn are supported by the data provided with the document. The document should meet all quality standards before it is submitted for final review and approval.

Supervisory reviews will be performed focusing on identification of trends, validity of recorded data and information, and identification of originators. Subsequent quality reviews will be performed to verify that documents are complete, legible, and in compliance with the quality standards outlined herein.

10.3.7 Approval of Documents

In accordance with the QC procedures specified in SAP (Appendix A), all documents will be reviewed to verify that they are correct and in compliance with the requirements of this Work Plan prior to transmittal.

10.4 RECORD RETENTION

Radiological records including, but not limited to, logbooks, data sheets, electronic files, and reports will be retained by TtEC for a minimum of 30 years from the date of the generation of the record.

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11.0 ENVIRONMENTAL PROTECTION PLAN

Radiological activities carried out at NAVSTA TI under this Work Plan are not expected to use and/or affect natural resources, impact traffic flow or access, generate noise that will require the use of hearing protection in the immediate area, generate dust, or result in liquid and/or airborne discharges outside the work areas that would require sampling actions. Therefore, an Environmental Protection Plan will not be prepared for this project.

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FIGURES

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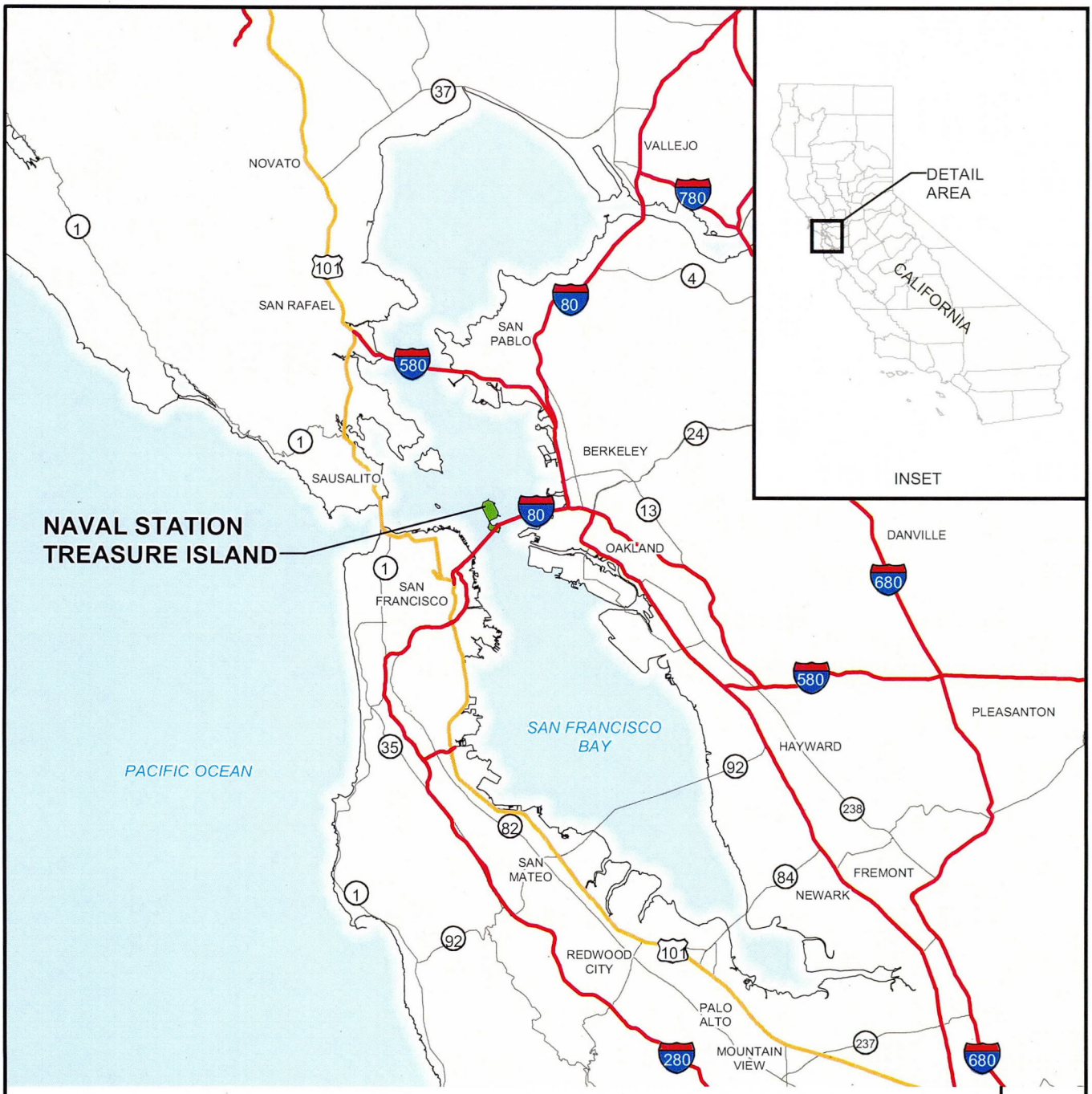


LEGEND

- STATE HIGHWAY
- US HIGHWAY
- INTERSTATE HIGHWAY
- TREASURE ISLAND
- WATER

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

FINAL RADIOLOGICAL WORK PLAN

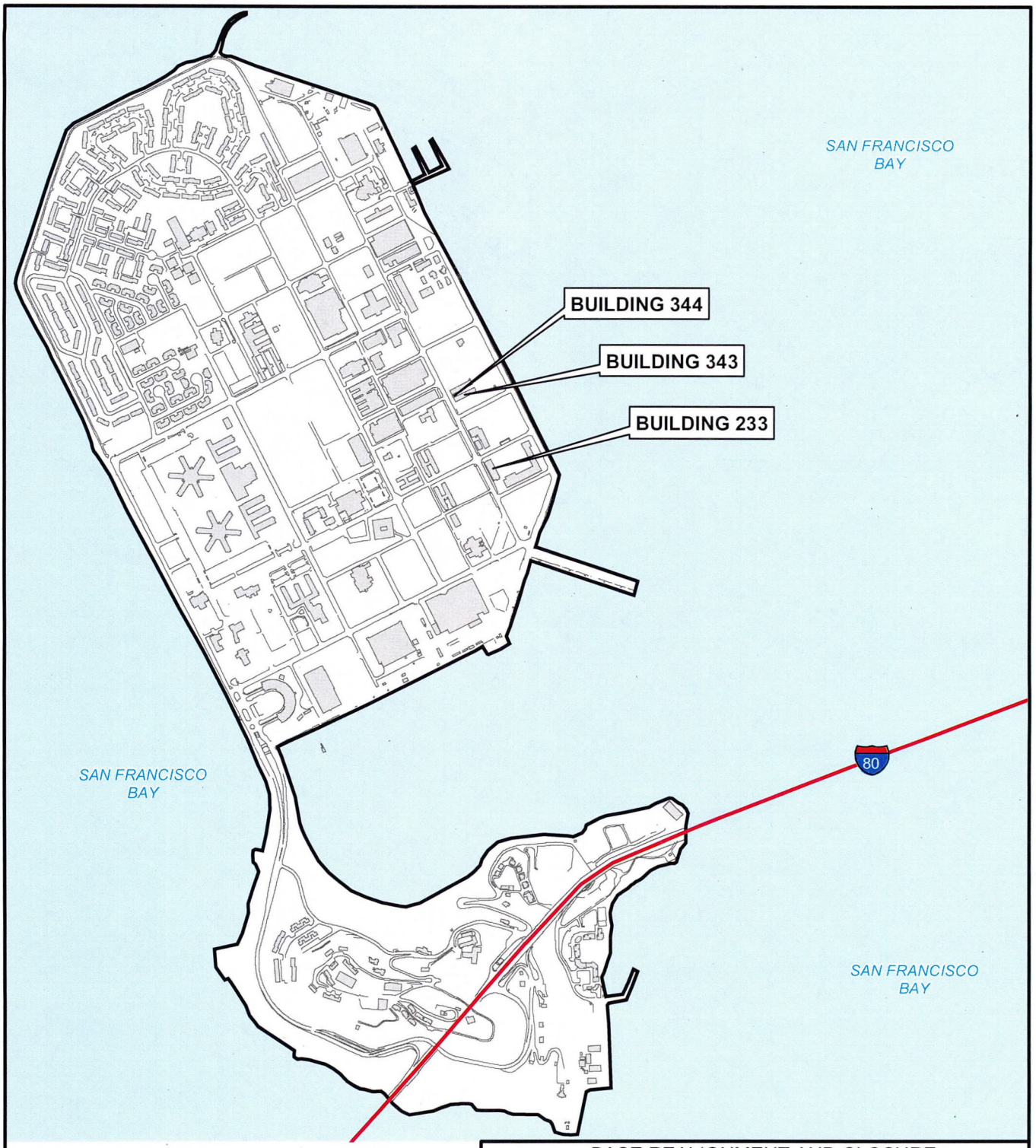
FIGURE 1-1

REGIONAL LOCATION MAP

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183R1903.mxd

TETRA TECH EC, INC.



LEGEND

80 INTERSTATE HIGHWAY

NAVAL STATION TREASURE ISLAND BASE BOUNDARY

600 0 600 1,200 Feet

Scale: 1" = 1200'

N

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

FINAL RADIOLOGICAL WORK PLAN

FIGURE 2-1

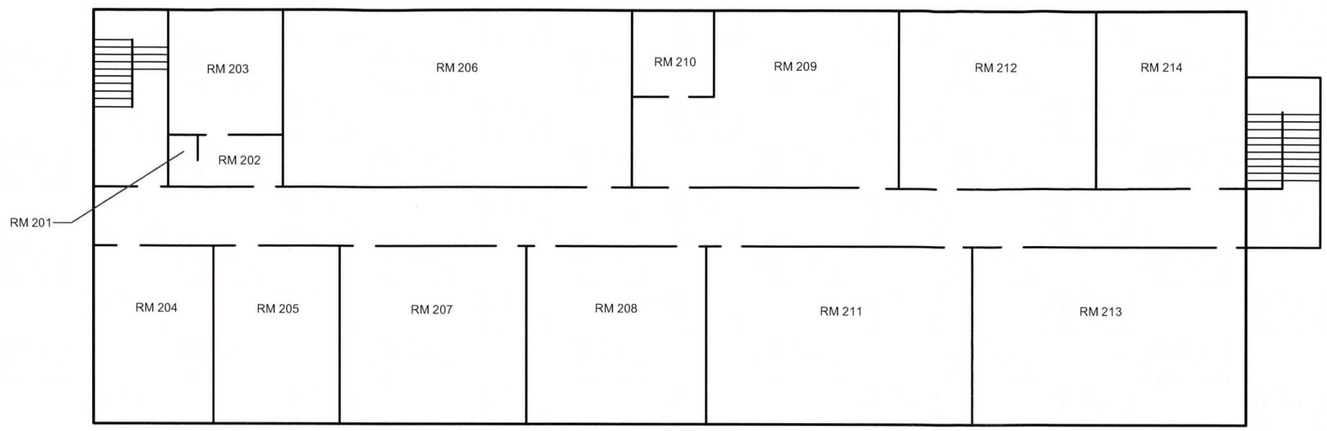
SITE LOCATION MAP

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

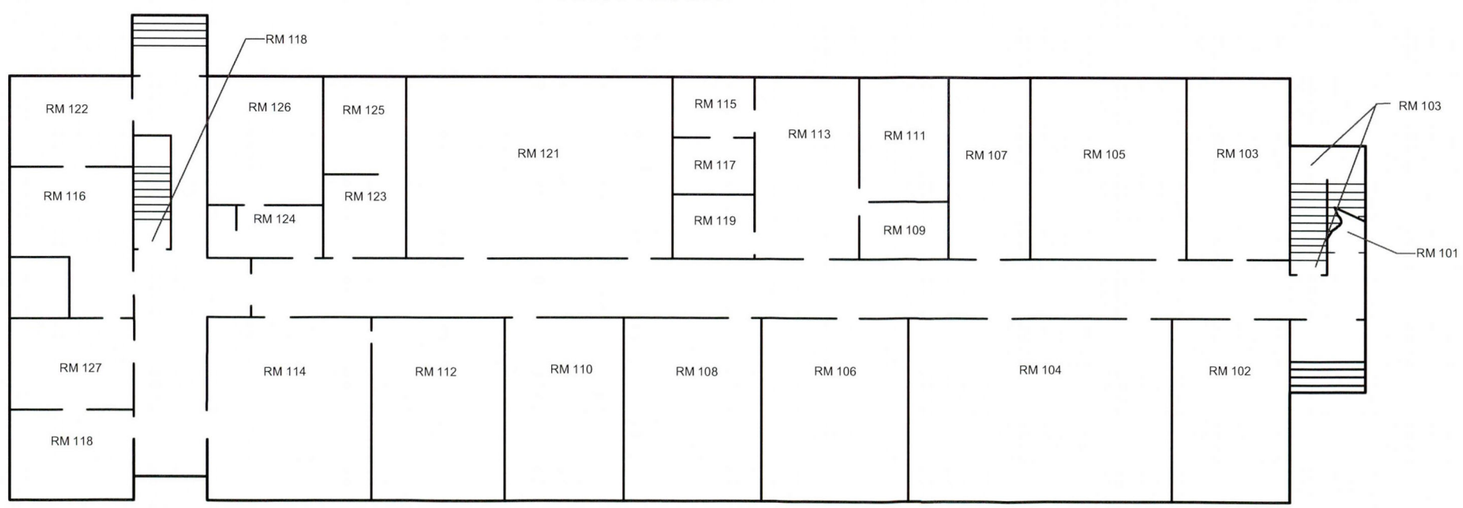
REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183S1904.mxd

TETRA TECH EC, INC.

SECOND FLOOR



FIRST FLOOR



10 0 10 20 Feet

Scale: 1" = 20'

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

FINAL RADIOLOGICAL WORK PLAN

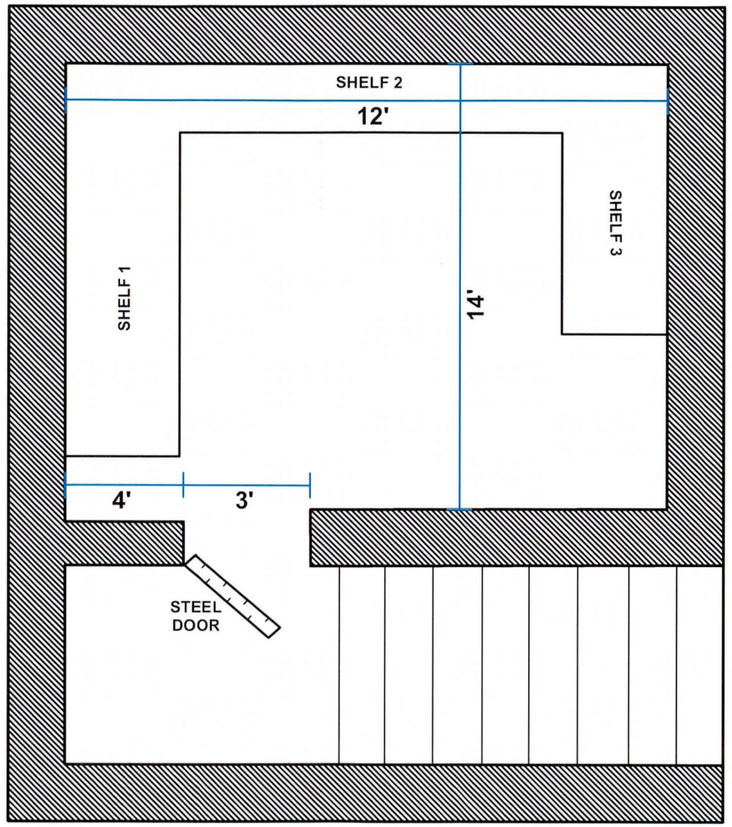
FIGURE 2-2

BUILDING 233 FLOOR PLAN

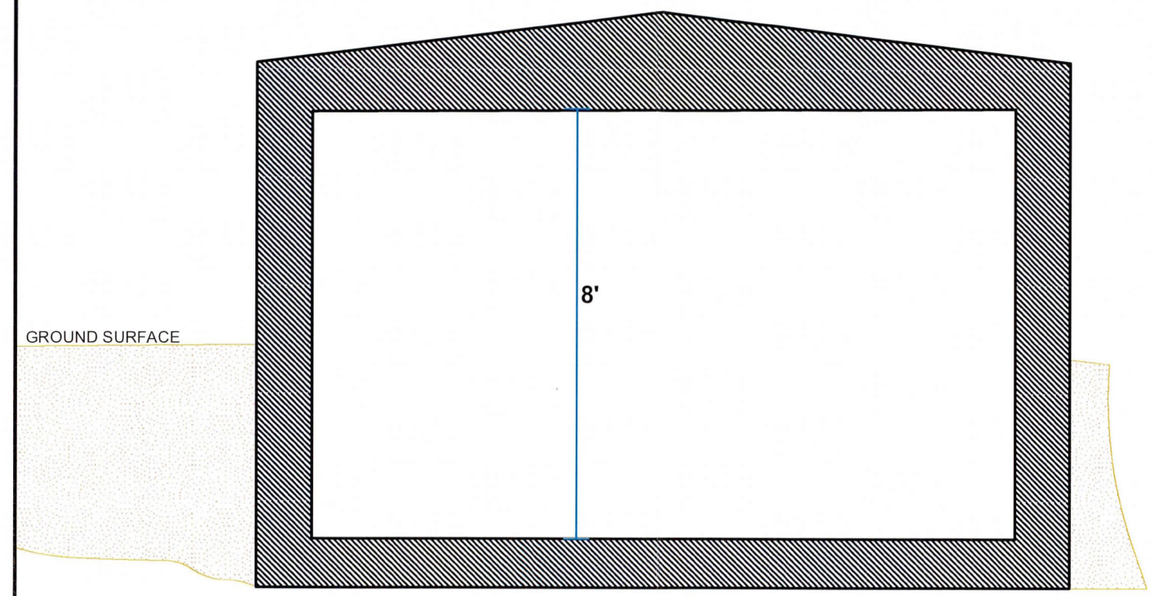
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: RKH
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1907.mxd

TETRA TECH EC, INC.



BUILDING 344 FLOOR PLAN



BUILDING 344 FRONT PROFILE

LEGEND

- CONCRETE
- STEEL
- SOIL

1.5 0 1.5 3 Feet

Scale: 1" = 3'

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

FINAL RADIOLOGICAL WORK PLAN

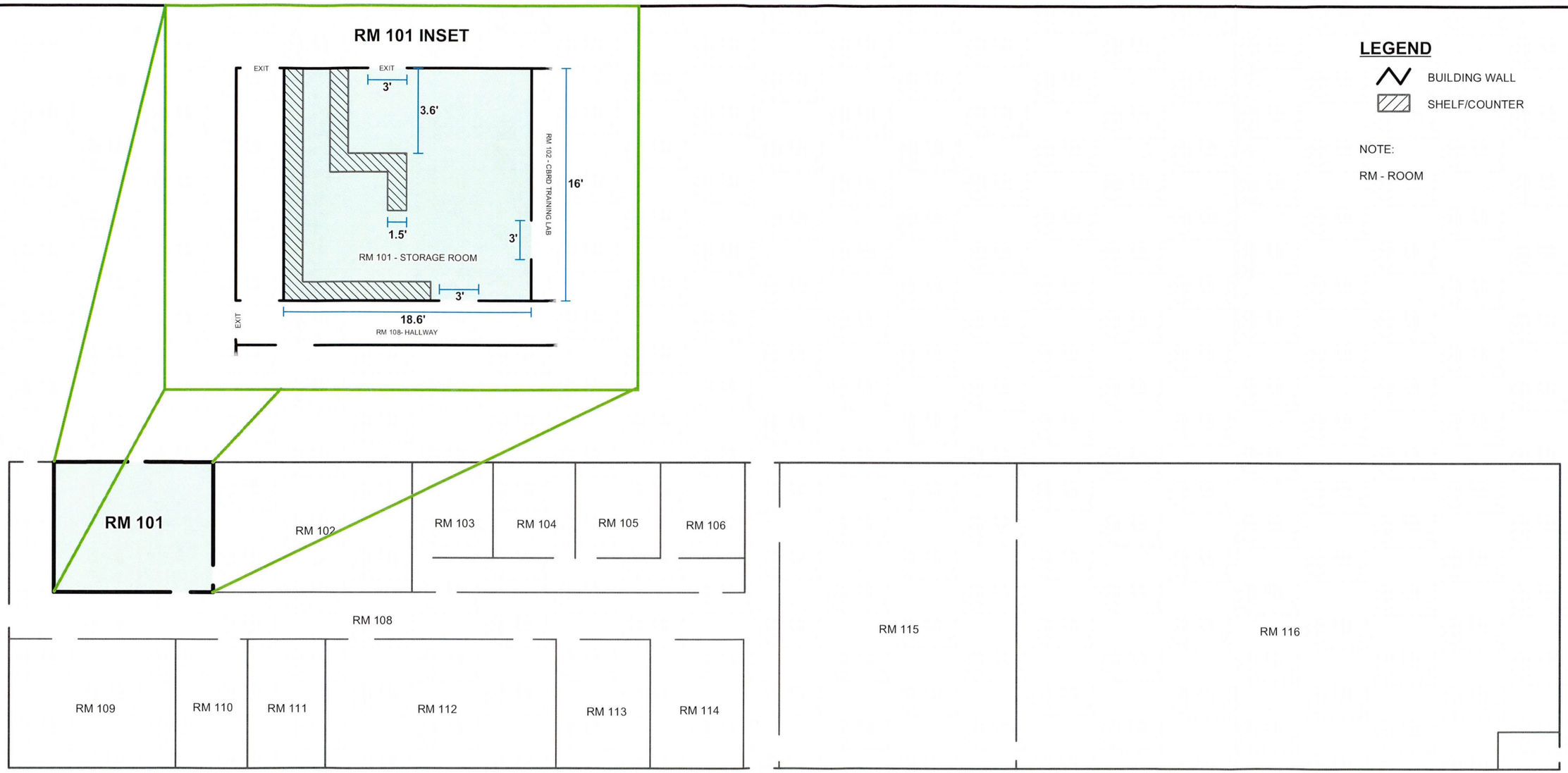
FIGURE 2-3

BUILDING 344 FLOOR PLAN AND FRONT PROFILE

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1905.mxd

TETRA TECH EC, INC.



LEGEND

BUILDING WALL

SHELF/COUNTER

NOTE:

RM - ROOM

NOT TO SCALE

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

FINAL RADIOLOGICAL WORK PLAN

FIGURE 2-4

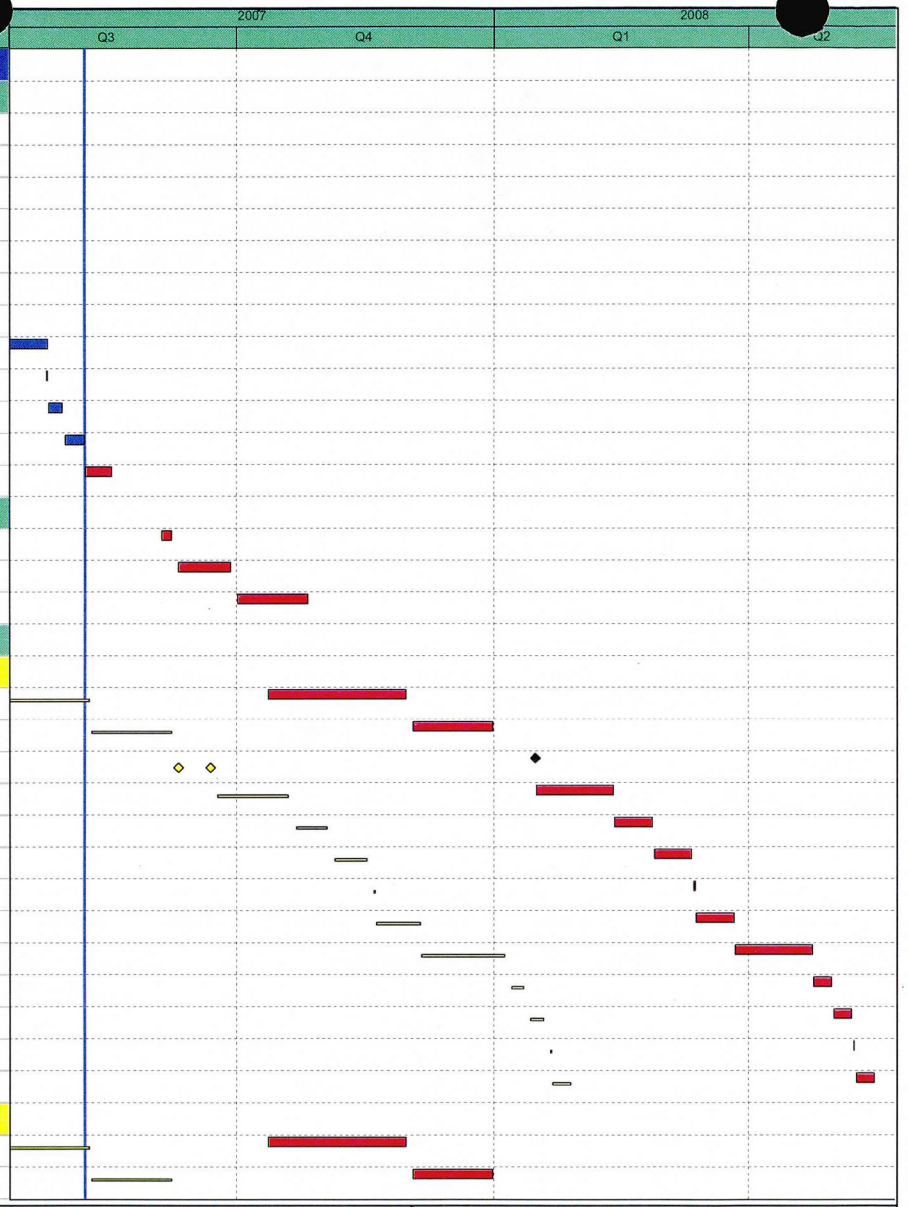
BUILDING 343 FLOOR PLAN AND RM 101 SCHEMATIC

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1906.mxd

TETRA TECH EC, INC.

Activity ID	Activity Name	Current Duration	Start	Finish
Treasure Island - Base-wide Radiological Support		426	28-Sep-06 A	15-May-08
Pre-Construction		232	28-Sep-06 A	17-Aug-07
TO-21-0001	Contract Award	1	28-Sep-06 A	28-Sep-06 A
TO-21-0010	Prepare and Submit - Pre-Draft Work Plan to Navy	42	28-Sep-06 A	29-Nov-06 A
TO-21-0015	Navy Review - Pre-Draft Work Plan	25	29-Nov-06 A	04-Jan-07 A
TO-21-0018	Prepare Draft Work Plan	34	04-Jan-07 A	20-Feb-07 A
TO-21-0020	Submit - Draft Work Plan to Agencies	0	21-Feb-07 A	21-Feb-07 A
TO-21-0025	Regulatory Review - Draft Work Plan	31	21-Feb-07 A	04-Apr-07 A
TO-21-0030	Prepare RTCs - Draft Work Plan	11	05-Apr-07 A	20-Apr-07 A
TO-21-0035	Resolve RTCs - Draft Work Plan	66	23-Apr-07 A	25-Jul-07 A
TO-21-0040	Regulatory Concurrence on RTCs	1	25-Jul-07 A	25-Jul-07 A
TO-21-0045	Finalize and Submit - Draft Final Work Plan to Navy	3	26-Jul-07 A	31-Jul-07 A
TO-21-0050	Navy Review - Draft Final Work Plan	5	01-Aug-07 A	07-Aug-07 A
TO-21-0070	Finalize and Submit - Final Work Plan	8	08-Aug-07	17-Aug-07
Construction		39	04-Sep-07	26-Oct-07
TO-21-0075	Site Mobilization	4	04-Sep-07	07-Sep-07
TO-21-0080	Site Work	15	10-Sep-07	28-Sep-07
TO-21-0085	Samples Analyzed	20	01-Oct-07	26-Oct-07
Post Construction Submittals		155	12-Oct-07	15-May-08
FSS Report - Building 343 Storeroom / Building 344		155	12-Oct-07	15-May-08
TO-21-0090	Prepare and Submit - Pre-Draft FSS Report	35	12-Oct-07	30-Nov-07
TO-21-0095	Navy Review - Pre-Draft FSS Report	20	03-Dec-07	31-Dec-07
TO-21-0100	Submit - Draft FSS Report	0		15-Jan-08
TO-21-0105	Regulatory Review - Draft FSS Report	20	16-Jan-08	12-Feb-08
TO-21-0110	Prepare RTCs - Draft FSS Report	10	13-Feb-08	26-Feb-08
TO-21-0115	Resolve RTCs - Draft FSS Report	10	27-Feb-08	11-Mar-08
TO-21-0120	Regulatory Concurrence on RTCs	1	12-Mar-08	12-Mar-08
TO-21-0125	Finalize and Submit - Draft Final FSS Report	10	13-Mar-08	26-Mar-08
TO-21-0130	Regulatory Review - Draft Final FSS Report	20	27-Mar-08	23-Apr-08
TO-21-0135	Prepare RTCs - Draft Final FSS Report	5	24-Apr-08	30-Apr-08
TO-21-0140	Resolve RTCs - Draft Final FSS Report	5	01-May-08	07-May-08
TO-21-0145	Regulatory Concurrence on RTCs - Draft Final FSS Report	1	08-May-08	08-May-08
TO-21-0150	Finalize and Submit - Final FSS Report	5	09-May-08	15-May-08
FSS Report - Building 233 (Internal Drain, etc.)		155	12-Oct-07	15-May-08
TO-21-0155	Prepare and Submit - Pre-Draft FSS Report	35	12-Oct-07	30-Nov-07
TO-21-0160	Navy Review - Pre-Draft FSS Report	20	03-Dec-07	31-Dec-07



Primary Baseline
Actual Work
Remaining Work
Critical Remaining Work
Baseline Milestone
Milestone

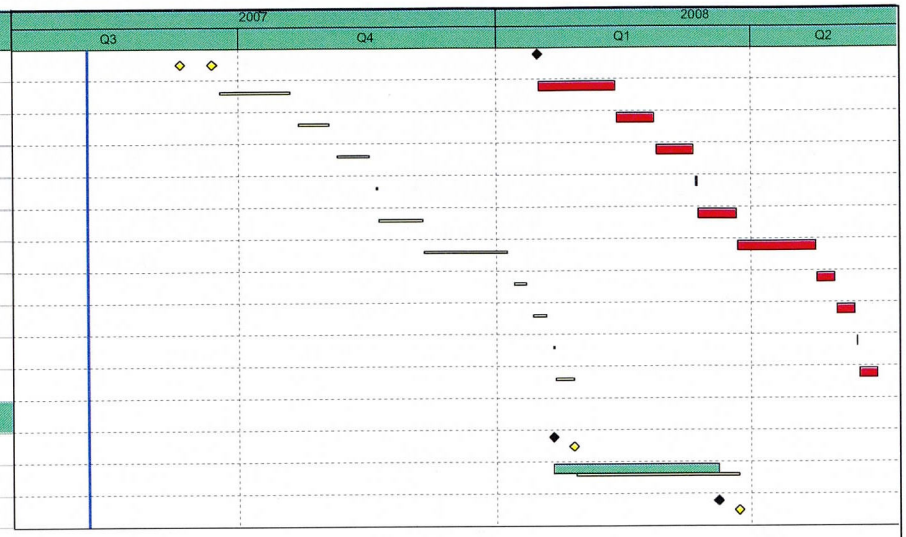
Figure 3-1 **Project Schedule**

Naval Station Treasure Island

San Francisco, CA

TETRA TECH EC, INC.

Activity ID	Activity Name	Current Duration	Start	Finish
TO-21-0165	Submit - Draft FSS Report	0		15-Jan-08
TO-21-0170	Regulatory Review - Draft FSS Report	20	16-Jan-08	12-Feb-08
TO-21-0175	Prepare RTCs - Draft FSS Report	10	13-Feb-08	26-Feb-08
TO-21-0180	Resolve RTCs - Draft FSS Report	10	27-Feb-08	11-Mar-08
TO-21-0185	Regulatory Concurrence on RTCs	1	12-Mar-08	12-Mar-08
TO-21-0190	Finalize and Submit - Draft Final FSS Report	10	13-Mar-08	26-Mar-08
TO-21-0195	Regulatory Review - Draft Final FSS Report	20	27-Mar-08	23-Apr-08
TO-21-0200	Prepare RTCs - Draft Final FSS Report	5	24-Apr-08	30-Apr-08
TO-21-0205	Resolve RTCs - Draft Final FSS Report	5	01-May-08	07-May-08
TO-21-0210	Regulatory Concurrence on RTCs - Draft Final FSS Report	1	08-May-08	08-May-08
TO-21-0215	Finalize and Submit - Final FSS Report	5	09-May-08	15-May-08
Job Closeout		43	21-Jan-08	20-Mar-08
TO-21-0220	Technical Completion	0		21-Jan-08
TO-21-0225	Project Closeout	43	21-Jan-08	20-Mar-08
TO-21-0230	Project Completion	0		20-Mar-08



Primary Baseline
Actual Work
Remaining Work
Critical Remaining Work
Baseline Milestone
Milestone

Figure 3-1 **Project Schedule**

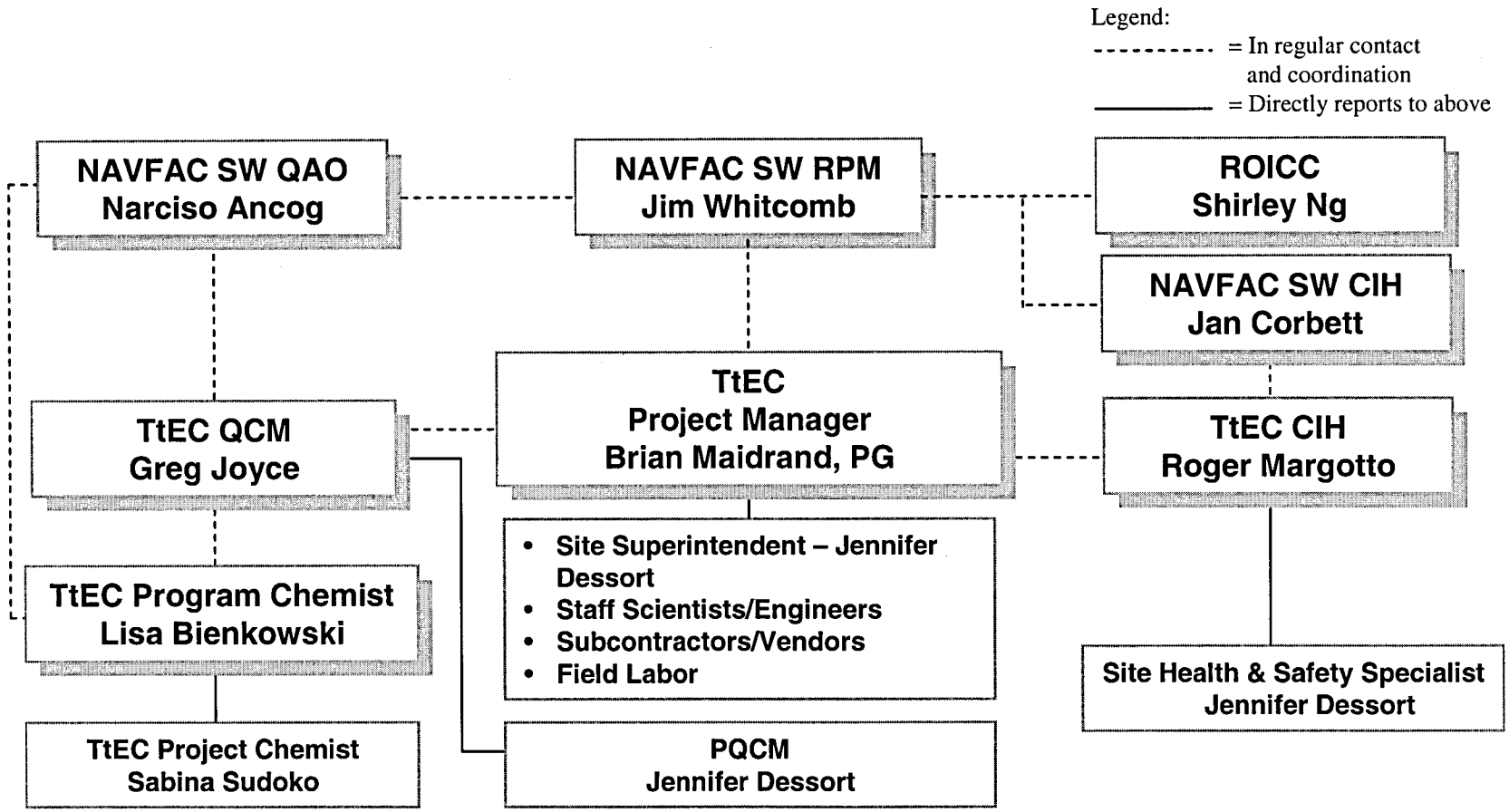
Naval Station Treasure Island

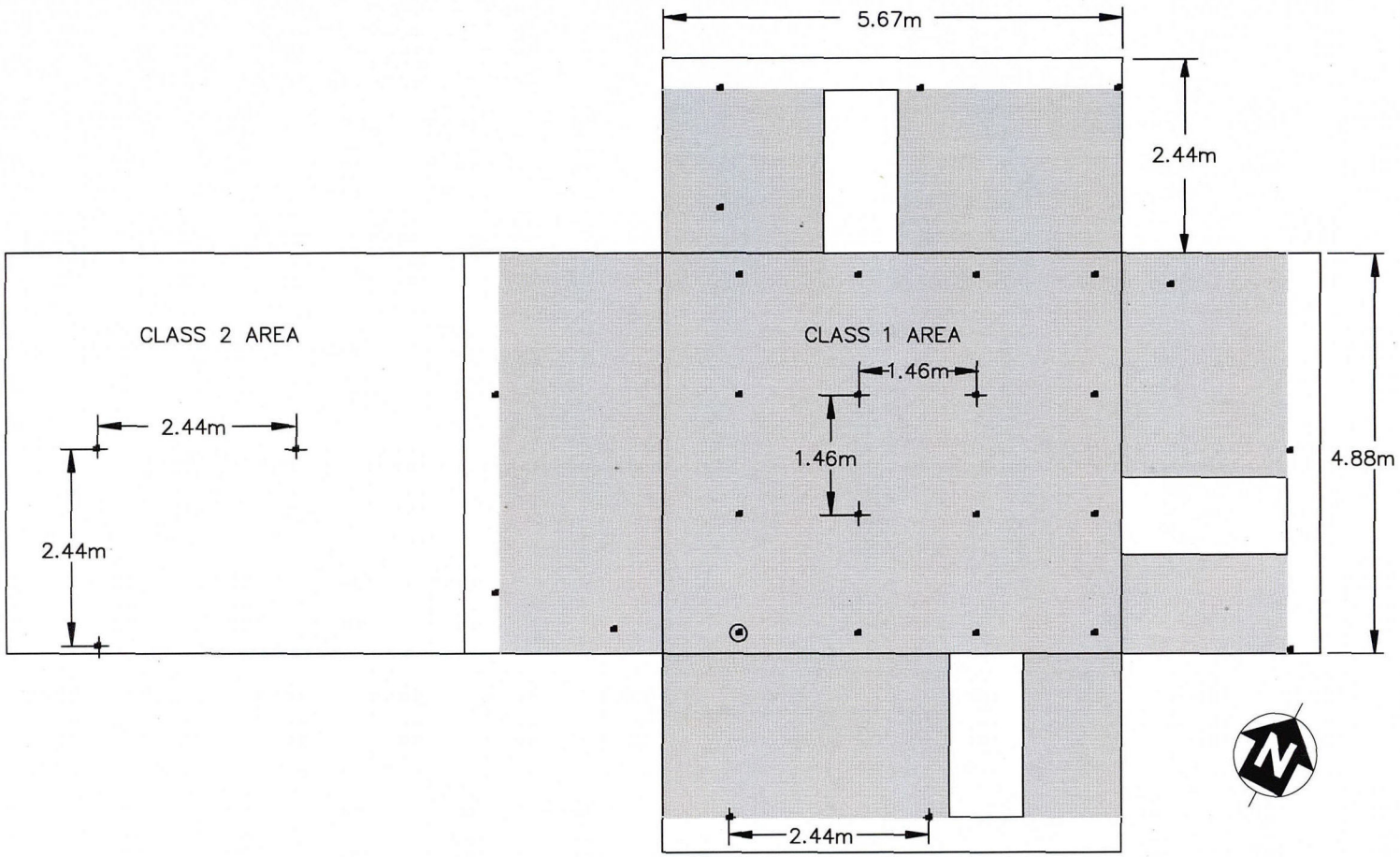
San Francisco, CA

TETRA TECH EC, INC.

Figure 3-2

Project Organization Chart





NOTE: DOOR LOCATIONS APPROXIMATED, CEILING HEIGHT ASSUMED AT 2.44m (8 ft)

LEGEND:

- CLASS 1 AREA (FLOOR AND WALLS BELOW 2m)
- CLASS 2 AREA (CEILING AND WALLS ABOVE 2 m)
- SAMPLE POINT
- RANDOM START POINT
- M METER

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

FINAL RADIOLOGICAL WORK PLAN

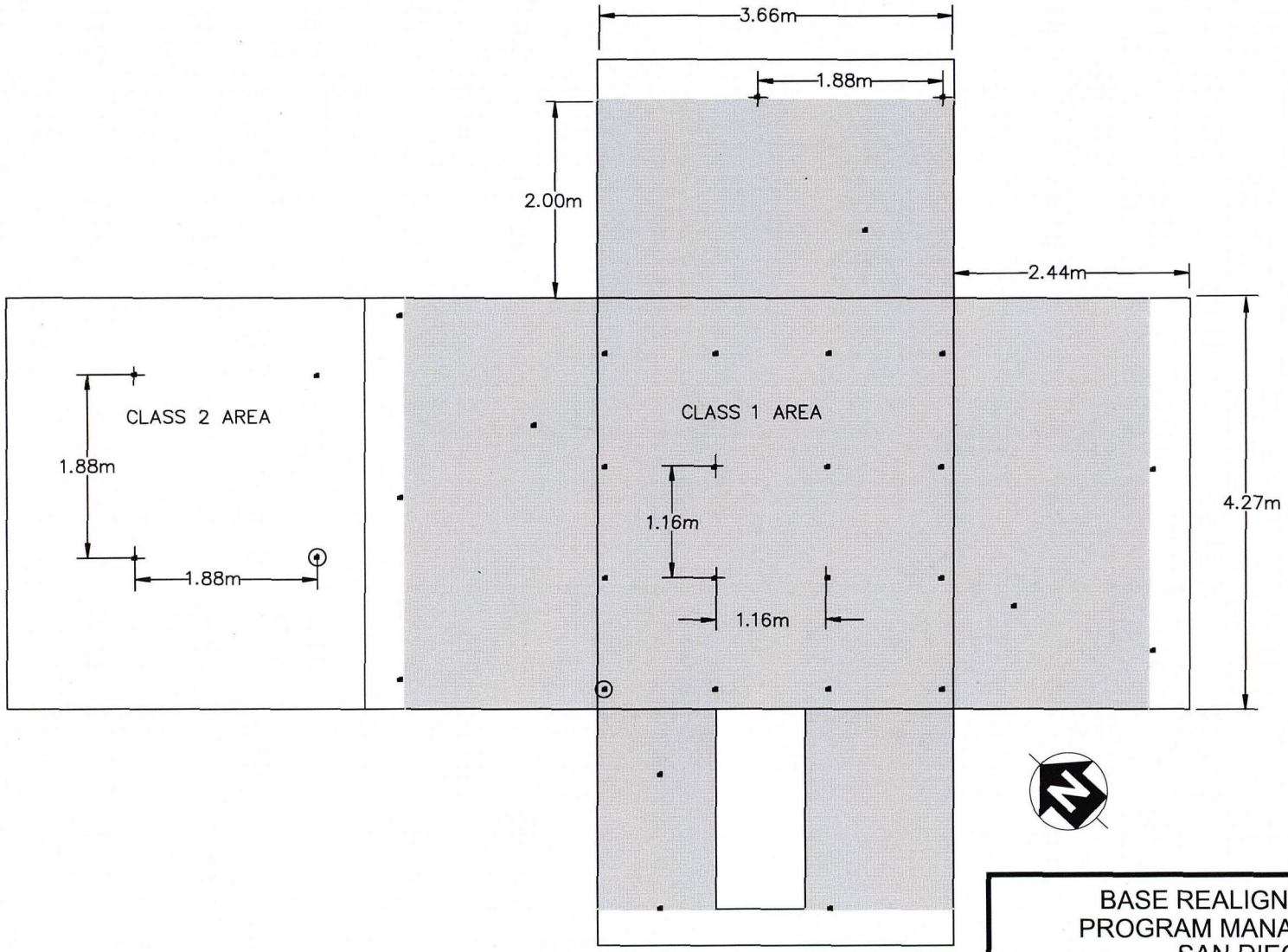
FIGURE 8-1

BUILDING 343, ROOM 101 SURVEY AREAS SHOWING SYSTEMATIC AND BIAS SAMPLING LOCATIONS

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 0
AUTHOR: KLD
FILE : FIGURE81.DWG

TETRA TECH EC, INC.



LEGEND:
- CLASS 1 AREA (FLOOR AND WALLS BELOW 2m)
- CLASS 2 AREA (CEILING AND WALLS ABOVE 2 m)
- SAMPLE POINT
- RANDOM START POINT
- M METER

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

FINAL RADIOLOGICAL WORK PLAN

FIGURE 8-2

BUILDING 344, SURVEY AREAS SHOWING
SYSTEMATIC AND BIAS SAMPLING LOCATIONS

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 0
AUTHOR: KLD
FILE : FIGURE82.DWG

TETRA TECH EC, INC.

APPENDIX A

SAMPLING AND ANALYSIS PLAN

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

CONTRACT NO. N62473-06-D-2201
CTO NO. 0021

APPENDIX A

FINAL

SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)
August 2007

BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

DCN: ECSD-2201-0021-0001

TETRA TECH EC, INC.
1230 Columbia Street, Suite 750
San Diego, CA 92101-8536
(619) 234-8696

for — 08/02/07
Gregory Joyce — Date
Quality Control Program Manager

8/13/2007
Narciso A. Ancog — Date
NAVFAC SW Quality Assurance Officer

ELEMENTS OF THE UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP

UFP-QAPP Worksheet	EPA QA/R-5	This SAP	Variance from UFP-QAPP
#1 Title and Approval Page	A1. Title and Approval Sheet	Title and Approval Page	None
#2 QAPP Identifying Information	N/A	Sections 1.2 and 3.1; Tables A.1-1 and A.2-1,	None
#3 Distribution List	A3. Distribution List	Table A.1-1	None
#4 Project Personnel Sign-off Sheet	N/A	Table A.2-3	None
#5 Project Organization Chart	A4. Project Task/Organization	Figure A.2-1	None
#6 Communication Pathways	N/A	Table A.2-2	None
#7 Personnel Responsibilities and Qualifications Table	A4. Project/Task Organization	Table A.2-1	None
#8 Special Personnel Training Requirements Table	A8. Special Training/Certification	Table A.2-4	None
#9 Project Scoping Sessions Participants Sheet	N/A	N/A	Sign-in sheets and meeting minutes of scoping sessions are maintained in the DON project file.
#10 Problem Definition	A5. Problem Definition/Background A6. Project/Task Description	Sections 3.1 and 3.2; and Table A.3-1	None
#11 Project Quality Objectives/Systematic Planning Process Statements	A7. Quality Objectives and Criteria	Sections 6.0 and 7.0	None
#12 Measurement Performance Criteria Table	B5. Quality Control	Table A.7-4	None
#13 Secondary Data Criteria and Limitations Table	N/A	Section 3.1.1	None
#14 Summary of Project Tasks	A6. Project/Task Description	Section 5.0, Table A.5-1, Sections 8.1 and 8,2; and Table A.8-1	None

ELEMENTS OF THE UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP

UFP-QAPP Worksheet	EPA QA/R-5	This SAP	Variance from UFP-QAPP
#15 Reference Limits and Evaluation Table	N/A	Tables A.7-1 and A.7-2	None
#16 Project Schedule/Timeline Table	N/A	Figure A.1-1	None
#17 Sampling Design and Rationale	B1. Sample Process Design	Section 5.1 and Table A.3-1	None
#18 Sampling Locations and Methods/SOP Requirement Table	N/A	Table A.5-1	None
#19 Analytical SOP Requirement Table	N/A	Table A.6-2	None
#20 Field Quality Control Sample Summary Table	B5. Quality Control	Table A.7-5	None
#21 Project Sampling SOP Reference Table	B2. Sampling Methods	Section 6.3	None
#22 Field Equipment Calibration, Maintenance, Testing, and Inspection Table	B6. Instrument/Equipment Testing, Inspection, and Maintenance B7. Instrument/Equipment Calibration and Frequency	Section 6.1 and Table A.6-1	None
#23 Analytical SOP Reference Table	B4. Analytical Methods	Not included.	Eberline Services is the laboratory to be used. Information will be provided with the laboratory data packages.
#24 Analytical Instrument Calibration Table	N/A	Section 7.1.4.1	None
#25 Analytical Instrument and Equipment, Maintenance, Testing, and Inspection Table	N/A	Not included.	Eberline Services is the laboratory to be used. Information on analytical instruments will be in accordance with their laboratories' QA plan as described in Section 7.1.4.9.

ELEMENTS OF THE UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP

UFP-QAPP Worksheet	EPA QA/R-5	This SAP	Variance from UFP-QAPP
#26 Sampling Handling System	B3. Sample Handling and Custody	Section 6.5	None
#27 Sample Custody Requirements	B3. Sample Handling and Custody	Sections 4.1.4 and 7.1.2	None
#28 Quality Control Samples Table	B5. Quality Control	Section 7.1.4	None
#29 Project Documents and Records Table	A9. Project Documents and Records	Table A.4-1	None
#30 Analytical Services Table	N/A	Not included.	Eberline Services is the laboratory to be used.Analytical data package turnaround time is identified in Section 8.1.2.
#31 Planned Project Assessment Table	C1. Assessment and Response Actions	Table A.9-1	None
#32 Assessment Findings and Response Actions	C1. Assessment and Response Actions	Table A.9-2	None
#33 QA Management Reports Table	C2. Reports to Management	Table A.9-3	None
#34 Sampling and Analysis Verification (Step 1) Process Table	D1. Data Review, Verification, and Validation D2. Verification and Validation Methods	Table A.8-1	None
#35 Sampling and Analysis Validation (Steps 2a and 2b) Process Table	D1. Data Review, Verification, and Validation	Table A.8-2	None
#36 Sampling and Analysis Validation (Steps 2a and 2b) Summary Table	D1. Data Review, Verification, and Validation	Section 8.2	None

ELEMENTS OF THE UFP-QAPP AND EPA QA/R-5 IN RELATION TO THIS SAP

UFP-QAPP Worksheet	EPA QA/R-5	This SAP	Variance from UFP-QAPP
#37 Data Usability Assessment	D3. Reconciliation with User Requirements	Section 8.2	None

I certify that this SAP is in compliance with the latest version of the UFP-QAPP and the EPA QA/R-5

Gregory Joyce	Lisa A. Bierkowski for	08/02/07
PRINT NAME (TtEC Quality Control Program Manager)	SIGNATURE	DATE

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ATTACHMENTS

Attachment 1 Example of Sample Label, Chain of Custody, and Custody Seal
Attachment 2 Standard Operating Procedures for the Off-Site Laboratory

ABBREVIATIONS AND ACRONYMS

%R	percent recovery
CHP	Certified Health Physicist
cm^2	square centimeters
COC	chain of custody
CTO	Contract Task Order
DHS	Department of Health Services
DoD	Department of Defense
DOE	Department of Energy
DON	Department of the Navy
dpm	disintegration per minute
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EDD	electronic data deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	U.S. Environmental Protection Agency
EWI	Environmental Work Instruction
FCR	Field Change Request
FSS	final status survey
HASL	Health and Safety Laboratory
HPS	Hunters Point Shipyard
ICAL	initial calibration
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LLD	lower limit of detection
MARSSIM	Multi-Agency Survey and Site Investigation Manual
MDA	minimum detectable activity
mL	milliliter
mm	millimeter
MS/MSD	matrix spike/matrix spike duplicate
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSTA TI	Naval Station Treasure Island

ABBREVIATIONS AND ACRONYMS
(Continued)

NCR	Nonconformance Report
NEDD	Navy electronic data deliverable
NFESC	Naval Facilities Engineering Service Center
NRC	Nuclear Regulatory Commission
NRMP	Navy Radioactive Material Permit
NTTC	Naval Technical Training Center
OSHA	Occupational Safety and Health Administration
PARCC	precision, accuracy, representativeness, completeness, and comparability
PjM	Project Manager
PPE	personal protective equipment
PQCM	Project Quality Control Manager
QA	quality assurance
QAO	Quality Assurance Officer
QC	quality control
QCM	Quality Control Program Manager
QL	quantitation limit
RAC	Remedial Action Contract
RASO	Radiological Affairs Support Office
RPD	relative percent difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SDG	sample delivery group
SOP	Standard Operating Procedure
TtEC	Tetra Tech EC, Inc.
VOA	volatile organic analysis
YBI	Yerba Buena Island

1.0 INTRODUCTION

This project-specific Sampling and Analysis Plan (SAP) has been prepared by Tetra Tech EC, Inc. (TtEC), under the Naval Facilities Engineering Command, Southwest (NAVFAC SW) Remedial Action Contract (RAC) IV No. N62473-06-D-2201, Contract Task Order (CTO) No. 0021. The purpose of the SAP is to provide guidance on sampling, analysis, and quality assurance (QA) for specific sampling activities pertaining to the survey and decontamination approaches that will be implemented in support of radiological release of buildings and drain lines at Naval Station Treasure Island (NAVSTA TI), San Francisco, California.

This SAP will be used as a reference document by all field and laboratory personnel engaged in the sampling and analysis for this project. This document will be provided to individuals listed in Table A.1-1. Included in this SAP are data quality objectives (DQOs), field sampling procedures, QA/quality control (QC) requirements, and data gathering methods that will be used during this project. The QA elements of this SAP were prepared in accordance with the *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP) (U.S. Environmental Protection Agency [EPA], 2005) and *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS* (EPA, 2006) to ensure that all data collected are precise, accurate, representative, complete, and comparable to meet their intended use.

1.1 OBJECTIVES

The objectives of this SAP are to: 1) provide guidance for the field sampling activities; 2) describe consistent field sampling procedures; 3) describe data gathering, handling, and documentation methods; and 4) define QA/QC measures to ensure consistency and confidence in the data obtained.

The primary objective of this project is to conduct radiological surveys and sediment sampling to evaluate impacted sites that may contain residual radioactive contamination as a result of past activities at NAVSTA TI and confirm that Buildings 343 and 344 at NAVSTA TI meet the release criteria. The radiological survey and sediment sampling at Building 233 will be conducted as a scoping/characterization survey.

Specific objectives will include the following:

- Reference (Background) Surveys
- Scoping Surveys
- Final Status Surveys (FSSs)
- Swipe and Sediment Sampling

Where applicable, survey activities will be conducted consistent with the guidelines in the *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), (Nuclear Regulatory Commission [NRC] NUREG-1575, 2000) and *Multi-Agency Radiological Laboratory Analytical Protocols* (MARLAP), NRC NUREG-1576, 2004).

A detailed project schedule is included as Figure A.1-1.

1.2 RELEASE CRITERIA

The release criteria for the surveys are listed in Table A.1-2. Release criteria for equipment and material are taken from Atomic Energy Commission *Regulatory Guide 1.86* (1974). Criteria for structures (surfaces) are taken from either *Regulatory Guide 1.86* or a dose-based calculation. The dose-based calculation will be performed with a dose limit of 25 millirem per year, using RESRAD-Build Version 3.3 (Argonne National Laboratory, 2003).

1.3 REGULATORY OVERSIGHT

The Department of the Navy (DON) represented by the Base Realignment and Closure Project Management Office, Radiological Affairs Support Office (RASO), and Naval Facilities Engineering Command, Southwest (NAVFAC SW) is the lead agency responsible for this project, and the EPA is the lead regulatory agency, with state regulatory oversight provided by the California Department of Toxic Substances Control (DTSC) and the California Department of Health Services (DHS).

TABLE A.1-1

DISTRIBUTION LIST
(UFP-QAPP Worksheet #3)

This document will be distributed to the following project participants listed below once all approval signatures have been received.

SAP Recipients	Title	Organization	Telephone Number	email address
Mr. Jim Whitcomb	RPM	NAVFAC SW	(619) 532-0936	james.h.whitcomb@navy.mil
Ms. Diane Silva	Administrative Record Manager	NAVFAC SW	(619) 532-3676	diane.silva@navy.mil
Mr. Narciso Ancog	QAO	NAVFAC SW	(619) 532-3046	narciso.ancog@navy.mil
Ms. Shirley Ng	ROICC	EFA West	(510) 749-5939	shirley.ng@navy.mil
Mr. Mike Mentink	CSO	NAVFAC SW	(415) 743-4729	mike.mentink@navy.mil
Mr. William Morris	RASO	NAVSEA	(757) 887-4692	william.j.morris@navy.mil
Ms. Christine Katin	U.S. EPA Rep	EPA Region 9	(415) 972-3112	katin.christine@epa.gov
Mr. Daniel Murphy	DTSC Unit Chief/Rep	California DTSC	(510) 540-3772	dmurphy1@dtsc.ca.gov
Ms. Agnes Farres	RWQCB Rep	San Francisco RWQCB	(510) 622-2401	afarras@waterboards.ca.gov
Mr. Marc McDonald	Facilities Director	TIDA	(415) 274-0382	marc.mcdonanld@fgov.org
Mr. Jack Sylvan	Mayor's Office of Base Reuse and Redevelopment	TIDA	(415) 554-5313	jack.sylvan@sfgov.org
Mr. Keith Sheets	Consultant to the City of San Francisco	CH2M Hill	(510) 587-7601	ksheets@ch2m.com
Mr. Gary Foote	Consultant to the City of San Francisco	Geomatrix Consultants	(510) 663-4260	gfoote@geomatrix.com
Ms. Marcie Rash	Installation Coordinator/Project Manager	TtEMI	(415) 222-8324	marcie.rash@ttemi.com
Mr. Pete Bourgeois	CERCLA Program Project Manager/Installation Coordinator	Shaw Environmental	(415) 277-6983	peter.bourgeois@shawgrp.com
Mr. Nathan Brennan	Technical Review Committee Member	None	[redacted]	nbrennan@centralmarinasa.org
Ms. Dale Smith	Technical Review Committee Member	None	[redacted]	[redacted]

TABLE A.1-1

DISTRIBUTION LIST
(UFP-QAPP Worksheet #3)

SAP Recipients	Title	Organization	Telephone Number	email address
Mr. Douglas Ryan	Technical Review Committee Member	None	[redacted]	[redacted]
Mr. Woody Baker-Cohn	Technical Review Committee Member	None	[redacted]	[redacted]
Ms. Saul Bloom	RAB Member	Arc Ecology	(415) 643-1190	saulbloom@arcecolgy.org
Brian Maidrand, PG	PjM	TtEC	(619) 471-3570	brian.maidrand@tteci.com
Mr. Greg Joyce	QCM	TtEC	(360) 780-0371	greg.joyce@tteci.com
TBD	Project Chemist	TtEC	TBD	TBD

Abbreviations and Acronyms:

CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
CSO – Caretaker Support Office
DTSC – Department of Toxic Substances Control
EFA West – Engineering Field Activity, West
EPA – U.S. Environmental Protection Agency
NAVFAC SW – Naval Facilities Engineering Command, Southwest
NAVSEA – Naval Sea Systems Command
PG – Professional Geologist
PjM – Project Manager
QAO – Quality Assurance Officer
QCM – Quality Control Program Manager
RAB – Restoration Advisory Board
RASO – Radiological Affairs Support Office
Rep – representative
ROICC – Resident Officer in Charge of Construction
RPM – Remedial Project Manager
RWQCB – Regional Water Quality Control Board
TBD – to be determined
TIDA – Treasure Island Development Authority
TtEC – Tetra Tech EC, Inc.
TtEMI – Tetra Tech EMI, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

TABLE A.1-2

RELEASE CRITERIA

Radionuclide	Primary Radiation Properties		Release Criteria			
			Buildings and Structures (dpm/100cm^2)			Sediment (pCi/g)
	Half-life	Type	Total Surface Activity	Removable Activity	Maximum	
^{226}Radium	1600 y	Alpha Gamma	100	20	300	1.0[a]
^{137}Cesium	30.17 y	Beta Gamma	5,000	1,000	15,000	NE[b]

Notes:

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

[b] ^{137}Cesium is not a radionuclide of concern for the sediment samples. Therefore, the release criteria is listed as not established for ^{137}cesium.

Abbreviations and Acronyms:

cm^2 – square centimeter
dpm – disintegration per minute
EPA – U.S. Environmental Protection Agency
NE – not established
pCi/g – picourie per gram
PRG – Preliminary Remediation Goal
y – year

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2.0 PROJECT ORGANIZATION

This section describes project organization, the communication pathway that will be used, and general and specialized training requirements.

2.1 PROJECT ORGANIZATION

Key personnel from the DON and TtEC responsible for the oversight and/or implementation of the proposed sampling activities include the NAVFAC SW Quality Assurance Officer (QAO), Remedial Project Manager (RPM), Project Manager (PjM), Quality Control Program Manager (QCM), Program Chemist, Project Chemist, and Data Manager. The project organization chart shown in Figure A.2-1 provides lines of responsibility and communication. In addition, responsibilities of each of the key personnel are listed in Table A.2-1.

Table A.2-2 describes the communication pathways and modes of communication that will be used during the project. These pathways include obtaining approval between project personnel, subcontractors, and the DON.

2.2 TRAINING REQUIREMENTS

Project personnel are required to meet the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations (29 CFR, Part 1910.120[e]). These requirements include 40 hours of formal off-site instruction; a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and 8 hours of annual refresher training.

Before work begins, project personnel will receive site-specific training that thoroughly covers the following areas:

- Names of personnel and alternates responsible for health and safety at the project site
- Health and safety hazards present on site
- Selection of the appropriate personal protection levels
- Correct use of personal protective equipment (PPE)
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate over-exposure to hazardous substances

Copies of health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized supervisor training, and first aid and cardiopulmonary resuscitation training, are to be maintained in the project files.

In addition to the health and safety training, the samplers will be provided with the following training:

- Sediment or water sampling as applicable to the project
- Sample handling, packaging, and shipping
- Use of related field equipment

All training will be documented, and training records will be maintained in the project file. Sampling personnel will be required to read and understand the SAP prior to any sample collection activities. The Project Personnel Sign-off Sheet (Table A.2-3) will be signed by any on-site personnel conducting sampling to indicate that they have read the SAP and will perform the tasks as described. The sign-off sheet will be maintained in the project file.

2.2.1 Specialized Training

In addition to the general training described above, the sampler(s) must receive general awareness training for radiation, asbestos, and lead prior to any field activities. The specialized training requirements are listed in Table A.2-4.

TABLE A.2-1

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS
(UFP-QAPP Worksheet #7)

Name	Title	Organizational Affiliation	Responsibilities
Mr. Narciso Ancog	QAO	NAVFAC SW	Reviewing and approving this SAP Providing the DON 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 DON'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
Brian Maidrand, PG	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 administration 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

TABLE A.2-1

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS
(UFP-QAPP Worksheet #7)

Name	Title	Organizational Affiliation	Responsibilities
			Ensuring that all work activities are conducted in a safe manner in accordance with the Site Health and Safety Plan, USACE's *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
Mr. Greg Joyce	QCM	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 of 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
Ms. Lisa Bienkowski	Program Chemist	TtEC	Implementing contract requirements for chemical data collection Supporting projects as the technical lead for chemical data collection and analysis Ensuring Project Chemist has adequate training in sample collection and analytical methods Monitoring performance of subcontract laboratory and data validator

TABLE A.2-1

PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS (UFP-QAPP Worksheet #7)

Name	Title	Organizational Affiliation	Responsibilities
Sabina Sudoko	Project Chemist	TtEC	Developing the SAP Ensuring that sampling personnel have documented training on sampling procedures for specific project requirements Evaluating and selecting a qualified subcontractor laboratory Performing audit of sample collection activities 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 that data quality meets the intended use of the data
Mr. Jonathan Karnath	Data Manager	TtEC	Uploading field information and laboratory data into the database Checking all data for completeness (e.g., all required fields are entered) and providing output to the project team as requested in the format requested Submitting NEDD-formatted data to the DON in accordance with the requirements set forth in *Environmental Work Instruction EVR.6, Environmental Data Management and Required Electronic Delivery Standards* (SWDIV, 2005)

Abbreviations and Acronyms:

DON – Department of the Navy
EM – Engineer Manual
NAVFAC SW – Naval Facilities Engineering Command, Southwest
NEDD – Navy electronic data deliverable
OSHA – Occupational Safety and Health Administration
PjM – Project Manager
QAO – Quality Assurance Officer
QC – quality control
QCM – Quality Control Program Manager
RPM – Remedial Project Manager
SAP – Sampling and Analysis Plan
SWDIV – Southwest Division, Naval Facilities Engineering Command
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans
USACE – United States Army Corps of Engineers

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TABLE A.2-2

COMMUNICATION PATHWAYS
(UFP-QAPP Worksheet #6)

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
SAP approval	NAVFAC SW QAO	Mr. Narciso Ancog	(619) 532-3046	NAVFAC SW QAO will review and approve SAP. Field sampling will not begin without approved SAP.
Project management	PjM	Brian Maidrand, PG	(619) 471-3570	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	Program Chemist	Ms. Lisa Bienkowski or Mr. Gregory Joyce	(949) 756-7592 (360) 598-8117	SAP will be reviewed by the Program Chemist or QCM prior to submittal to the NAVFAC SW QAO.
Coordination of laboratory supplies for field activities	Project Chemist	Sabina Sudoko	(949) 756-7545	The Project Chemist will contact the 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 laboratory	Sampling Personnel	TBD	TBD	Sampler will fax COCs to the laboratory after samples have been picked up by commercial courier.
Daily COC reports and shipping documentation	Sampling Personnel	TBD	TBD	COCs and shipping documentation will be submitted via fax or e-mail to the Project Chemist at the end of each day that samples are collected.
Reporting laboratory data quality issues	Laboratory Project Manager	Melissa Mannion	(510) 235-3633	All QA/QC issues will reported by the Laboratory Project Manager to the Project Chemist in writing within 2 business days.
Field and analytical corrective actions	Project Chemist	Sabina Sudoko	(949) 756-7545	The Project Chemist will immediately notify the PQCM, QCM, and Program Chemist in writing of any field or analytical procedures not performed in accordance with this SAP. The Project Chemist in coordination with the PQCM will complete documentation of the non-conformance and corrective actions to be taken. The Project Chemist will verify that the corrective actions have been implemented.

TABLE A.2-2

COMMUNICATION PATHWAYS
(UFP-QAPP Worksheet #6)

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure
Release of analytical data	Project Chemist	Sabina Sudoko	(949) 756-7545	The Project Chemist will review faxed/e-mailed data to verify that data quality is met as described in this SAP prior to releasing the data. Analytical data will be released to the PjM (or their designee) after the Project Chemist has verified that the data is in accordance with the SAP requirements.
SAP procedure revision during field activities	Project Chemist	Sabina Sudoko	(949) 756-7545	The Project Chemist or designee will prepare an FCR for any changes in sampling procedures that occur because of conditions in the field.
SAP amendments	Project Chemist	Sabina Sudoko	(949) 756-7545	Any changes to the SAP will require that the Project Chemist prepare an addendum, which will be approved by NAVFAC SW prior to any field activities.

Abbreviations and Acronyms:

COC – chain of custody
FCR – Field Change Request
NAVFAC SW – Naval Facilities Engineering Command, Southwest
PjM – Project Manager
PQCM – Project Quality Control Manager
QA – quality assurance
QAO – Quality Assurance Officer
QC – quality control
QCM – Quality Control Program Manager
SAP – Sampling and Analysis Plan
TBD – to be determined
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

TABLE A.2-3

PROJECT PERSONNEL SIGN-OFF SHEET
(UFP-QAPP Worksheet #4)

I have read and understood the SAP and perform the task as described in the SAP.

Project Personnel	Organization	Title	Signature	Date SAP Read

Abbreviations and Acronyms:

SAP – Sampling and Analysis Plan
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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TABLE A.2-4

SPECIAL TRAINING REQUIREMENTS
(UFP-QAPP Worksheet #8)

Project Function	Specialized Training – Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records and Certificates
Sediment sampling	General awareness training for radiation, asbestos, and lead	CHP	Prior to field work	Sampling personnel	CHP, TtEC	TtEC project files
Sampling handling, documentation, and packaging procedures	On-site demonstration	Project Chemist	Prior to sampling activities	Sampling personnel	Sampler, TtEC	TtEC Project file

Abbreviations and Acronyms:

CHP – Certified Health Physicist
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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3.0 PROJECT OVERVIEW

This section describes the project background, scope, and DQOs.

3.1 BACKGROUND

NAVSTA TI is located on two islands in San Francisco Bay approximately midway between the City of San Francisco and the City of Oakland. NAVSTA TI is a man-made island of approximately 403 acres. Yerba Buena Island (YBI) is a natural island of approximately 170 acres connected to NAVSTA TI via a man-made causeway.

The first documented use of radioactive materials on NAVSTA TI began in 1947. Two separate, but closely related, operational areas accounted for the major uses of radioactive materials on NAVSTA TI, as follows:

- Use of radioactive sources to train naval personnel on the calibration and operation of radiation monitoring instruments
- Use of radioactive sources to train naval personnel on monitoring and decontamination of ships and airplanes

A third possible source of radioactive materials is the berthing of OPERATION CROSSROADS ships at NAVSTA TI. A pier on YBI was used for a few days to provide accommodation berthing for a few OPERATION CROSSROADS ships after they were decontaminated at Hunters Point Shipyard (HPS), but before the ship was given final radiological clearance. There are no known current uses of licensed or unlicensed radioactive materials on NAVSTA TI.

3.1.1 Site Description

Building 233 Radium Spill

The first known radiological investigation of a spill of radioactive material on NAVSTA TI took place in January 1950 following the spill of approximately 40 milligrams of radium in Building 233. The investigation of the magnitude and extent of this spill involved monitoring for alpha airborne activity and radon activity inside Building 233. In addition, alpha swipe surveys and beta-gamma direct radiation survey measurements were performed. Since many of the occupants of Building 233 left the building before the extent of the spill was fully identified, radioactive contamination was spread by personnel (on shoes, clothing, etc.) to personal automobiles and personal residences. Direct measurements and swipe surveys of alpha radioactivity revealed various levels of contamination in automobiles, on furniture, and on clothing.

Numerous innovative decontamination techniques were utilized to control, contain, and eventually remove the radium contamination. Some of the techniques were as simple as using damp wipes and hot tri-sodium phosphate cleaning solutions. Other methods included the use of high-efficiency filtered vacuum cleaners, paint removal, wire brushing, flame decontamination (burning off the surface layer of concrete and wood), and material disposal. Some items such as small portable furniture, rubber floor mats, linoleum flooring, etc. were simply packaged as low-level radioactive waste and disposed of. More than 200 barrels of radioactive waste were generated and were stored aboard the USS Independence at HPS. The drums were weighted with concrete and sunk at sea at a depth of more than 100 fathoms.

Building 344 Investigation

In March 1988, a scheduled routine beta-gamma swipe survey of the waste containers inside the storage vault revealed low levels of loose contamination on the inside of the waste containers. Only swipe surveys were feasible in this location because the numerous sources maintained in the vault made direct radiation surveys difficult to perform. After the swipes were removed from the vault and counted, revealing the low levels of contamination, an investigation quickly identified the source to be a mini-generator kit located on a shelf near the waste containers. No spread of radioactive contamination was found outside of the mini-generator kit and the waste containers.

Cleanup of the low levels of contamination simply involved packaging and off-site disposal of the mini-generator kit and the waste containers. Arrangements for off-site disposal were made by Naval Supply Center Oakland.

Closeout Survey of Building 344

The closeout survey of Building 344 was conducted in 1991. Alpha, beta, and gamma swipes were collected and analyzed by the Naval Technical Training Center (NTTC). Following review of the initial survey data, the NTTC submitted a summary of the Building 344 survey data to the RASO, along with a request for amendment of the Navy Radioactive Material Permit (NRMP) to remove Building 344 from the authorized storage locations. Further review by RASO resulted in an additional report from the NTTC to RASO to clarify calculations of minimum detectable activity (MDA) for alpha activity. RASO reviewed the Building 344 survey data and recommended approval of termination of the NRMP by letter in 1994. The actual change to the NRMP, Amendment No. 3, was issued in November 1990. This amendment removed Building 344 from the NRMP, leaving only Building 343 as an authorized location for possession of radioactive materials.

Closeout Survey of Building 343

Closeout surveys of Building 343, the last authorized location for possession of licensed radioactive material, were conducted in June 1993. The NTTC submitted a request to RASO for termination of the NRMP No. 04-62639-C1NP. The request, an 86-page document, contained documentation of the disposal of all sources, swipe surveys of all sources and source containers, and swipe surveys of the rooms in Building 343. This document included the leak tests of the sealed and plated calibration sources and AN/UDM-7 alpha calibrators stored in Building 343. All leak tests were less than the MDA of the counting system used by NTTC. RASO analyses of 172 swipe samples taken in a portion of Building 343 were reported in July 1993. RASO reported that all beta swipes were equal to or less than the lower limit of detection (LLD) for beta of 88 disintegrations per minute (dpm). All but six alpha swipes were equal to or less than the LLD for alpha of 2.5 dpm. Two of the six alpha swipes above the LLD were also above release limits. They were located on a counter top in the storeroom. Of the remaining four swipes above the LLD (but well below release limits), two were in shelves in the storeroom, one was on the floor in the restroom, and one was in a drawer in the Chemical, Biological, Radiological Defense Laboratory. Follow-up swipes were taken by the NTTC to resolve the six alpha swipes. The NTTC reported that the areas were decontaminated using commercial decontamination spray foam. RASO analyses of the six areas resurveyed by NTTC determined that all six were less than the LLD for both alpha and beta. There were no direct surveys taken and the swipe samples were not analyzed for gamma-emitting isotopes. An additional 95 swipe samples were forwarded to RASO for alpha, beta, and gamma analyses of the remainder of Building 343 in July 1993. RASO reported that all beta swipes were equal to or less than the LLD for beta of 92 dpm, and that all but two of the alpha swipes were less than or equal to the LLD for alpha of 2.1 dpm. The two alpha swipes above the LLD were well below the release limits. All swipes were counted as a group for gamma radiation in a High Purity Ge (Germanium) detector for 50,000 seconds. No gamma radiation other than natural background activity was detected.

3.2 DATA QUALITY OBJECTIVES

The DQOs specify the project objectives, the data collection boundaries and limitations, the most appropriate type of data to collect, and the level of decision error that will be acceptable for the decision. The quality and quantity of data required to implement environmental remedial action are also defined. The scope, level of detail, and verification for the design and planning documents may vary from project to project, depending on the project-specific conditions and the nature and complexity of the proposed activities. The project-specific DQOs are defined through the seven-step process by MARSSIM as follows:

1. State the problem.
2. Identify the goals of the study.
3. Identify information inputs.

4. Define the boundaries of the study.
5. Develop the analytic approach.
6. Specify performance or acceptance criteria.
7. Develop the plan for obtaining data.

The DQOs are presented in Table A.3-1.

TABLE A.3-1

SUMMARY OF DATA QUALITY OBJECTIVES

State the Problem	Identify the Goals of the Study	Identify Information Inputs	Define the Boundaries of the Study	Develop the Analytic Approach	Specify Performance or Acceptance Criteria	Develop the Plan for Obtaining Data
STEP 1	**STEP 2**	**STEP 3**	**STEP 4**	**STEP 5**	**STEP 6**	**STEP 7**
The existing data are not sufficient to support release of the radiologically impacted areas. A scoping survey is needed to provide data to plan the release or remediation of a building or area. A final status survey is needed to provide data for free release of a building or area.	For scoping survey, the decision is, "Does the survey identify the radionuclides of concern and assess general levels and extent of contamination?" For a final status survey, the decision is, "Do the FSS results demonstrate compliance with the release criteria?"	Inputs will vary, depending on the specific survey. However, in general, some or all of the following data will be used. • Gamma scan survey • Alpha/beta scan surveys • Systematic and biased static alpha, beta, and gamma static readings • Systematic and biased sediment and swipe sampling • Systematic and biased exposure rate measurements	Study boundaries will depend on the particular survey performed. For a building or room, it will be the physical boundaries of those spaces. For a drain line, it will be the physical boundaries of entrance of the drainage (i.e., manhole, sump, gutter). Field activities are scheduled to begin in May 2007.	For a scoping survey, the decision rule is, "If the survey identifies the radionuclides of concern and assesses general levels of contamination, then design and perform an optimized FSS. Otherwise, design and perform an optimized characterization survey." For a final status survey, the decision rule is, "If the FSS results demonstrate compliance with the release criteria stated in Table A.1-2 then document the results in the FSS report. Otherwise, additional assessment and/or remediation are necessary." In evaluating this decision, MARSSIM Scenario A will be applied. In Scenario A, the null hypothesis (Ho) is tested to verify if the residual contamination exceeds the release criterion; also, the alternative hypothesis (Ha) is tested to determine if the residual contamination meets the release criterion.	There are two types of decision errors that can be made. The first type of decision error, called a Type I error, occurs when the null hypothesis is rejected when it is actually true. A Type I error is sometimes called a "false positive." The probability of a Type I error is usually denoted by α. The Type I error rate is often referred to as the significance level or size of the test. The second type of decision error, called a Type II error, occurs when the null hypothesis is not rejected when it is actually false. A Type II error is sometimes called a "false negative." The probability of a Type II error is usually denoted by β. The power of a statistical test is defined as the probability of rejecting the null hypothesis when it is false. It is numerically equal to $1-\beta$, where β is the Type II error rate. This survey is designed to limit Type I and Type II errors to 5 percent. It is important to minimize the chances of concluding that a survey unit meets the release limits (reject the null hypothesis) when it actually exceeds the limits (Type I Error), and concluding that a survey unit exceeds the release limit (accept the null hypothesis) when it actually meets the limit (Type II Error).	Review Outputs and Existing Data for Consistency: 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 RTM (or designee) will review the information each day to verify the equipment is operating satisfactorily. The RTM, or qualified designee 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 survey data collected. Develop Data Collection Design Alternatives: MARSSIM guidelines will be used and a 95 percent confidence level for detecting radioactivity above the release criteria will be assumed with Type I and Type II errors limited to 5 percent. Document Operational Details and Theoretical Assumptions: Operational details for the radiological survey process have been developed for and are included as part of the Work Plan. The theoretical assumptions are based on guidelines contained in MARSSIM. Generic information regarding types of radiation measurements, instrument detection capabilities, selecting the quantities and locations of data to be collected, investigation levels, and release criteria are contained in Section 1.2 of this SAP.

Abbreviations and Acronyms:

FSS – Final Status Surveys
MARSSIM – Multi-Agency Survey and Site Investigation Manual
RTM – Radiological Task Manager
SAP – Sampling and Analysis Plan

4.0 DOCUMENTATION AND RECORDS

This section discusses the types of documentation and records required for this project, and Table A.4-1 lists where the documentation and records will be maintained.

4.1 FIELD DOCUMENTATION

Field documentation associated with sampling activities includes logbooks, field forms, sample labels, chain-of-custody (COC) records, sample shipping records, field surveillance and Nonconformance Reports (NCRs), and Field Change Request (FCR) forms. Descriptions of each type of field documentation are described in the following sections.

4.1.1 Logbooks

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 analysis, and sample identification
- Field analyses performed, including results, instrument checks, problems, and calibration records for field instruments
- 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

4.1.2 Field Forms

Field forms required for this project will include COC forms described in Section 4.1.4. A sample COC form can also be found in Attachment 1.

4.1.3 Sample Labels

Sample labels will be filled out in indelible black or blue ink and affixed to sample containers at the time of sample collection. An example sample label is provided in Attachment 1. 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
- Analyses required
- Preservative (if any)

4.1.4 Chain of Custody

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, such that the sample cannot be reached without breaking the seal

Attachment 1 presents an example of the COC record. The COC record lists each sample and the individuals performing the sample collection, shipment, and receipt. Attachment 1 also 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. Sampling personnel upon collecting a sample will initiate the COC record in the

field. 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 the name of their project or company affiliation will accompany each signature. The waybill number and courier name will be recorded on the COC when a commercial carrier 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 of the laboratory.

Sample custody will be the responsibility of sampling personnel from the time of sample collection until the samples are accepted by either the commercial courier or laboratory-provided courier. After samples are received by the laboratory, custody of samples will be the responsibility of the laboratory staff in accordance with the laboratory Standard Operating Procedures (SOP).

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

- The top two copies will be sent to the analytical laboratory with samples. The laboratory will include the top copy in the data packages.
- The third copy will be retained on site. The sampler must also fax a copy to the Project Chemist on the day samples are collected.
- The last copy will be sent to the Project Chemist.

4.1.5 Sample Shipping Records

Samples will be transported to the laboratory via laboratory-provided courier or FedEx®. For samples received by a laboratory courier, the courier will sign the COC and accept the samples. For samples shipped via FedEx, the COC will be included in 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. Detailed information on sample handling and shipping procedures are detailed in Section 6.6.

4.1.6 Field Surveillance Reports

The Project Quality Control Manager (PQCM) will perform on-site field inspections once, preferably at the beginning of field sampling activities for a project lasting less than six months. For projects longer than six months, two inspections may be conducted per year. The PQCM will use a surveillance checklist during inspections. A surveillance report will be prepared and provided to the PjM and QCM.

4.1.7 Field Change Request

An FCR will be prepared by the Project 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. 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 NAVFAC SW QAO prior to conducting sampling and analysis.

4.2 LABORATORY DOCUMENTATION

Laboratory records associated with project samples 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
- NCRs including corrective actions

The laboratory will prepare analytical data packages comprised of documentation mentioned above for each sample and provide them to TtEC. Laboratory deliverables will include two copies of the hard-copy data package, submitted as either EPA Level III-equivalent or IV-equivalent packages as specified in the COC.

Detailed information on the requirement of the hard-copy data package is presented below.

The pages in the data package will be sequentially numbered. The package will contain a table of contents referencing individual sections, 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 sample delivery group number, as well as project name and project number)
- Table of contents

- Case narrative
- Sample management records including the original, white copy of COC records (including sample condition), shipping documents, and laboratory sample receipt forms
- Cross-reference table
- Analytical results and QA/QC information by test as follows:
  - Radiological raw data sequence
    - Sample results forms, including method blanks
    - Sample raw data (EPA Level IV only)
    - QC summaries
    - Initial calibration (ICAL)
    - Calibration checks, including all related continuing calibration verifications (CCVs)
    - Instrument run log
    - Sample preparation log

All relevant laboratory raw data and documentation, including, but not limited to, logbooks, data sheets, electronic files, and final reports, will be maintained by the laboratory for at least 7 years. TtEC will be notified 30 days before disposal of any relevant laboratory records.

In addition to the hard-copy data, an electronic data deliverable (EDD) will be submitted in ASCII format. The EDD will be compatible with the Navy electronic data deliverable (NEDD) standard. Both the EDD and the hard-copy report will present results to three significant figures.

When revisions to data reports are required, the revised pages will be stamped with the notation "amended or revised report." If revisions affect the EDD, then a revised EDD must be sent along with the revised hard-copy pages.

4.3 DATA VALIDATION REPORTS

All analytical data generated from laboratories, with the exception of waste characterization samples, will be validated by an independent data validation company. The validator shall provide one original and one copy of the Data Validation Reports, which include analytical result pages with appropriate qualifiers and the Data Validation Findings Worksheets. The original and copy reports will be submitted in separate sets. The reports will be arranged in increasing sample delivery group (SDG) 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.

The validation reports will contain the following information:

- Title page, which includes project name, sample collection date, validator subcontractor name, report date, type of analysis, laboratory, SDG, sample identifications, sample matrix, and validation level (EPA Level III or IV)
- Introduction page, which includes the number of samples per matrix, analytical method reference, validation guideline reference, 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:
  - Technical holding times
  - Calibration
  - Laboratory blanks
  - Accuracy and precision data
  - Target compound identification
  - System performance checks
  - Analyte quantitation and quantitation limits (QLs)
  - Field QC samples (if not applicable, report will note)
  - Overall assessment of data
  - Assessment of compliance with scope of work requirements
- QC deviation summaries, which will include in a tabular format:
  - Unique identification of QC run (e.g., date/time, etc.)
  - Associated project and sample numbers (not the laboratory internal-sample IDs)
  - Associated constituents
  - Actual value for noted deviation
  - Applicable QC criteria
  - Applicable qualifiers
  - Qualifier classifications (advisory or protocol)
- Copies of analytical result pages, which will be flagged with the appropriate changes in results/qualifiers based on the data validation findings; each analytical result page with changes will be initialed and dated; if there are no changes in results/qualifiers, the analytical result pages should still be included.
- 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 (i.e., **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.**

- The analytical result pages will be stamped 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, revised pages, and revised analytical result pages.

The data validation subcontractor will maintain validation records for at least 7 years. TtEC will be notified 30 days before disposal of any relevant records.

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TABLE A.4-1

PROJECT DOCUMENTS AND RECORDS
(UFP-QAPP Worksheet #29)

Document	Where Maintained
Field logbook	Project file
Field forms	Project file
Chain of custody	Project file
Shipping records	Project file
Field surveillance and Nonconformance Reports	Project file
Laboratory data package including: Sample receipt and login Laboratory internal chain of custody Instrument calibration logs Sample preparation logs Sample analysis/run logs Nonconformance Reports including corrective actions	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

Abbreviations and Acronyms:

NAVFAC SW – Naval Facilities Engineering Command, Southwest
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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5.0 SAMPLING STRATEGY

This section provides a brief description of the approach that will be used to collect samples. Table A.5-1 provides a summary of the sampling locations, matrix, depths, and analytical requirements. The analytical methods used for this project will be in conjunction with the *Gamma Emitting Radionuclides by Gamma Ray Spectroscopy, Prescribed Procedures for Measurement of Radioactivity in Drinking Water (EPA/600/4-80-032)* (EPA, 1980); the *Environmental Measurements Laboratory* (EML) *Procedures Manual, HASL-300* (Department of Energy [DOE], 1997); and the laboratory's analytical SOP (see Attachment 2).

5.1 SURVEYS AND SAMPLING

Several types of radiological surveys will be conducted at NAVSTA TI. Surveys will be used to support release of materials, equipment, drain lines, and buildings; and identify radionuclides and levels of contamination present. Types of surveys for radiological release of buildings and areas include reference (background) area, scoping, characterization, and FSS. In addition, personnel, equipment and materials, and truck surveys will be conducted to ensure that personnel and equipment are free of radiological contamination. Detailed information on type, selection, and implementation of surveys is presented in Sections 4.0 and 8.0 of the Work Plan. In addition, Figures 8-1 and 8-2 of the Work Plan show the systematic and bias sampling locations for Buildings 343 and 344.. (Actual diagrams will be provided in the closeout report.)

Swipe sampling will be performed to assess the presence of radioactive contamination that is readily removed from a surface. Swipe samples will be taken to evaluate the presence of alpha and beta surface activity during surveys. Swipe samples will be processed using a Protean IPC 9025 gas-flow proportional alpha/beta 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 analysis at levels required for environmental release surveillance. Data is reported in units of dpm per 100 square centimeters (cm^2). As a backup to the gas-flow proportional counters, a Ludlum Model 2929 scaler with a Model 43-10-1 ZnS(Ag) scintillation probe (or equivalent) may be used. Data is reported in units of dpm. The frequency of swipe samples will be determined in the field based on survey scan results. Sample collection procedures are provided in Section 6.3.1.

A sediment sample will be collected from each access point to the drain lines within and around the outside of the Building 233 up to and including the first downstream sanitary sewer manhole that is accessible. The number of access points and thus samples collected will be determined during field activities. Sediment samples will be analyzed by the off-site radiological laboratory for gamma spectroscopy analysis. Sample collection procedures are provided in Section 6.3.2.

5.2 WASTE CHARACTERIZATION SAMPLING

Wastes generated during the field activities include wastewater and PPE.

One wastewater sample will be collected and analyzed for gamma spectroscopy. Waste characterization sampling procedures are detailed in Section 6.3.3.

PPE generated from field activities will be stored in containers on site. PPE will not be sampled for waste characterization, but will be characterized based on knowledge of the process generating the waste and the results of the sampling associated with this work.

TABLE A.5-1

SAMPLING LOCATIONS/IDS, SAMPLE DEPTHS, SAMPLE ANALYSES, AND SAMPLING PROCEDURES (UFP-QAPP Worksheet #18)

Sampling Location	Matrix	Depth (feet)	Analytical Group	Sampling Section Reference
Building X-Swipe [a]	Swipe	N/A	Gamma spectroscopy	SAP Section 6.3.1
Drain Line [b]	Sediment	TBD [d]	Gamma spectroscopy	SAP Section 6.3.2
Wastewater [c]	Water	N/A	Gamma spectroscopy	SAP Section 6.3.3

Notes:

[a] The frequency of swipe samples will be determined in the field based on survey scan results. Sample locations will be numbered sequentially during field sample collection activities.

[b] The amount of sediment samples cannot be determined at this time. Due to building access issues, there is no way to determine how many access points will be found. Sample locations will be numbered sequentially during field sample collection activities.

[c] Wastewater will be generated from decontamination and possibly from within drain lines. Extent of wastewater cannot be determined at this time. Once wastewater has been completely generated, sample locations will continue to be numbered sequentially.

[d] Sediment samples will be obtained from within the drain lines in the building at the first downstream manhole. Therefore, the depth of the sediment samples is to be determined since the sediment depth through the manhole or access point is unknown.

Abbreviations and Acronyms:

N/A – not applicable
SAP – Sampling and Analysis Plan
TBD – to be determined
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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6.0 SAMPLING PROCEDURES

The following section describes the field instrument calibration and maintenance procedures, inspection of supplies and consumables, and sample collection procedures.

6.1 FIELD INSTRUMENTATION

Field instruments to be used during this project are for radiation detection to conduct radiological surveys. Field equipment will be maintained in accordance with manufacturer's manual specifications. A check of the field equipment will be performed before field activities begin, and any potential spare parts (e.g. batteries, connectors, etc.) and maintenance tools will be brought on site to minimize equipment downtime during field activities. Visual checks of the equipment will be conducted on a daily basis.

Routine preventative maintenance will be performed to assure proper operation of the equipment. Any maintenance performed on the equipment will be documented on the instrument calibration form or in the field logbook. Information to be recorded includes (as applicable):

- Name of device/instrument repaired, including serial/identification number
- Manufacturer
- Date of rental/purchase
- Date of maintenance
- Reason for maintenance
- Maintenance performed
- Adjustments made (if any)
- Signature of field personnel conducting repair
- Comments

Table A.6-1 lists the field equipment calibration, maintenance, testing, and inspection frequency, acceptance criteria, and corrective action.

6.2 SUPPLIES AND CONSUMABLES

Supplies and consumables necessary for field activities will be obtained through the appropriate commercial markets and will meet any supply-specific requirements outlined in this section. All supplies and consumables will be inspected by field sampling personnel prior to use. Any supplies and consumables that do not meet requirements will be discarded or returned to the supplier.

Sample containers will meet all guidelines specified in *Specification and Guidance for Obtaining Contaminant-Free Sample Containers*, EPA 540/R-93/051 and OSWER Directive 9240.0-05A (EPA, 1992). Certifications from the supplier will be retained in the project files.

Supplies and consumables will be stored in a designated area. The storage area will be protected from adverse conditions (e.g., weather, heat, fuels, etc.) to protect the supplies/consumables from possible outside contamination and breakage.

6.3 SAMPLING PROCEDURES

The following sections provide the sampling procedures and sample handling protocols to be used for this project. Table A.6- lists the sample containers, preservatives, and holding time requirements for each analytical method.

6.3.1 Swipe Sampling

Swipe sampling will be performed to assess the presence of radioactive contamination that is readily removed from a surface. Swipe samples will be taken to evaluate the presence of alpha and beta surface activity. Swipes samples will be obtained from surfaces or equipment from the predetermined locations within each survey unit to obtain data for use in FSSs. A round 47 millimeter (mm) piece of filter paper is used to collect the swipe sample. The frequency of swipe samples will be determined in the field based on survey scan results. Sample locations will be numbered sequentially during field sample collection activities.

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting swipe samples at each location.
2. Swipes will be labeled with a number.
3. Swipes will be wiped over approximately 100 cm^2 (16 square inches) of the surface to be sampled.
4. Moderate pressure will be applied.
5. Care on rough surfaces will be exercised so as not to tear the swipes.
6. Care on wet surfaces will be exercised so as not to degrade the swipes.
7. Swipe sampling personnel will ensure contamination is not spread to clean areas when obtaining swipes.
8. Swipes will be handled in a manner that will prevent cross-contamination, such as by placing each swipe in a separate envelope.
9. When collecting swipe samples on equipment:
   a. Swipes will be obtained on large surfaces.
   b. Swipes will be obtained in cracks or crevices where contamination may have settled.
   c. Swipes will be obtained on openings to internal surfaces

10. Each individual swipe sample will be placed in an envelope.
11. Each envelope will be labeled with the sample number, date, and collection time.
12. Each day samples are submitted, a blank swipe sample will also be submitted. The blank swipe sample is for laboratory QC purpose. The blank swipe sample envelope will be labeled as "blank" and a sample number will not be assigned.
13. Samples will be sent to an off-site laboratory for alpha and beta analysis.

6.3.2 Sediment Sampling

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting sediment samples at each location.
2. Grab samples will be collected with a disposable plastic scoop into sample containers that will be filled completely.
3. Each container will be labeled and clear packing tape will be placed over the label to secure it.
4. Samples will be custody sealed and packaged in accordance with Section 6.6 of this SAP. Field documentation including field logbooks and COCs will be filled out in accordance with Section 4.0.
5. Samples will be stored in a cooler without ice.
6. Field documentation including field logbooks and COCs will be filled out during sample collection in accordance with Section 4.0.
7. The sediment samples will then be sent to an off-site laboratory for gamma spectrometry analysis.

6.3.3 Waste Characterization Sampling

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples.
2. The top of the drum or other approved container will be carefully opened and samples will be collected using the disposable bailers into containers.
3. Sample collection will be collected by placing the larger-diameter emptying tube (that is also supplied with the bailer) into the bottom of the bailer.
4. As the water begins to flow from the tube, containers for gamma spectroscopy will be collected. Container size and preservation requirements are listed in Table A.6-2.
5. Each container will be labeled and clear packing tape will be placed over the label to secure it.
6. Samples will be custody sealed and packaged in accordance with Section 6.6 of this SAP.
7. Samples will be stored in a cooler without ice.
8. Field documentation including field logbooks and COCs will be filled out during sample collection in accordance with Section 4.0.

9. The sediment samples will then be sent to an off-site laboratory for gamma spectroscopy analysis.

6.4 DECONTAMINATION PROCEDURES

Prior to decontamination, all equipment will be screened using a hand-held alpha/beta survey meter. If radioactive contamination exceeds the release limits for equipment and materials of 1000 dpm/100 cm^2 fixed and 200 dpm/100 cm^2 removable for beta/gamma contamination and 100 dpm/100 cm^2 fixed and 20 dpm/100 cm^2 for alpha contamination, the equipment and local area will be secured and the Certified Health Physicist (CHP) will be notified. If decontamination is necessary on equipment that cannot be submersed in water, the CHP will recommend proper decontamination procedures. Otherwise, the following decontamination procedures will be conducted:

1. The nonphosphate detergent will be diluted with potable water in a bucket as directed by the manufacturer. The equipment will be washed with the nonphosphate detergent and potable water solution.
2. A second bucket with potable water will be used to rinse the equipment.
3. A third bucket with potable water will be used to rinse the equipment again.
4. A fourth bucket with deionized water will be used as a final rinse for the equipment. (Certificates from the supplier demonstrating that the deionized water is analyte-free will be kept in the project files for each lot.)

For this project, decontamination will not be conducted on sampling equipment because samples will be collected using disposable scoops.

Decontamination water will be collected in containers on site and sampled for gamma spectroscopy as described in Section 6.3.3.

6.5 SAMPLE NUMBER

Samples will be uniquely designated using a numbering system that identifies the CTO number and a sequential number (i.e., 21-001).

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.

6.6 SAMPLE PACKAGING AND SHIPMENT

Sample packaging and shipment procedures for this project will conform to Department of Transportation/International Air Transport Association procedures as applicable for packaging.

Swipe samples will be placed in labeled envelope. Custody seals will be affixed to each container collected for sediment samples and that container will be placed in a resealable plastic bag. Envelopes and containers will be placed in a box, cooler, or similar container for shipment or to be picked up by laboratory-assigned courier (ice is not required).

Two custody seals will be taped across the cooler lid: one seal in the front and one seal in the back. If the samples are picked by laboratory courier, the COC record will be completed and signed by the courier. The cooler 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. The COC record will include the airbill 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 airbill will be placed on the cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple coolers are being shipped, then the original airbill will be placed on the cooler with the COC record, and copies of the airbill will be placed on the other coolers. The number of packages should be included on each airbill (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.

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TABLE A.6-1

FIELD EQUIPMENT CALIBRATION, MAINTENANCE, TESTING, AND INSPECTION (UFP-QAPP WORKSHEET #22)

Field Equipment	Calibration Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
Large-area gas - proportional 43-37 (582 cm^2)	Calibration verification, physical inspection, battery check, and a source response check	Daily	Within manufacturer recommended value	According to manufacturer instructions	Radiation Safety Officer	Section 6.1	None
Large-area gas - proportional 43-68 (126 cm^2)	Calibration verification, physical inspection, battery check, and a source response check	Daily	Within manufacturer recommended value	According to manufacturer instructions	Radiation Safety Officer	Section 6.1	None
Scintillation, Ludlum Model 43-89 (100 cm^2)	Calibration verification, physical inspection, battery check, and a source response check	Daily	Within manufacturer recommended value	According to manufacturer instructions	Radiation Safety Officer	Section 6.1	None
NaI 2-inch x 2-inch scintillation Ludlum Model 44-10	Calibration verification, physical inspection, battery check, and a source response check	Daily	Within manufacturer recommended value	According to manufacturer instructions	Radiation Safety Officer	Section 6.1	None
Dust meter	Calibration verification, physical inspection, battery check, and a source response check	Daily	Below manufacturer recommended value	According to manufacturer instructions	Radiation Safety Officer	Section 6.1	None

Abbreviations and Acronyms:

cm^2 – square centimeters
NaI – sodium iodide
SOP – Standard Operating Procedure
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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TABLE A.6-2

ANALYTICAL METHODS, CONTAINERS, PRESERVATIVES, AND HOLDING TIME REQUIREMENTS (UFP-QAPP Worksheet #19)

Matrix	Analytical Group	Analytical and Preparation Method	Container (number, size, type)	Preservation Requirements (chemical, temperature, etc.)	Maximum Holding Time (preparation/analysis)
Swipe	Gross alpha and beta	On-site field analysis using gas-flow proportional alpha/beta radiation counter	One 47 mm piece of round filter paper	None	6 months
Sediment	Gamma Spectroscopy	EPA Method 901.1 M	250-mL or 500-mL plastic container	None	6 months
Water*	Gamma Spectroscopy	EPA Method 901.1	Two 1-L HDPE	pH ≤ 2 w/HNO_3	6 months

Notes:

* Water samples will be collected for the purpose of characterizing wastewater generated from decontamination activities and water from drain lines.

Abbreviations and Acronyms:

DOE – Department of Energy
EPA – U.S. Environmental Protection Agency
HNO_3 – nitric acid
HDPE – high-density polyethylene
L – liter
mL – milliliter
mm - millimeter
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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7.0 ANALYTICAL DATA QUALITY OBJECTIVES

This section identifies the laboratory quality objectives, data quality indicators, and field quality objectives.

7.1 LABORATORY QUALITY OBJECTIVES

The following sections describe analytical laboratory requirements including qualifications, sample custody, and QC procedures.

7.1.1 Laboratory Qualifications

Eberline Services is the laboratory that will provide analytical services for this project. They are a State of California DHS Environmental Laboratory Accreditation Program (ELAP)-certified analytical laboratory. They have successfully completed the Naval Facilities Engineering Service Center (NFESC) Laboratory Evaluation Program. Any deviations from these requirements will require approval by the NAVFAC SW QAO.

Eberline Services is capable of meeting all the requirements listed in this SAP, including turnaround time (to be determined), QLs, QC criteria, and data deliverables.

7.1.2 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.

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 samples. 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 as to the fate of the sample(s) in question on a case-by-case basis.

The laboratory will have a system for tracking samples that is consistent with Section 5.8 of the *Quality Systems Manual for Environmental Laboratories* (Department of Defense [DoD], 2006). The laboratory will archive the samples and maintain their custody up to 90 calendar days after sample collection, at which time the laboratory will dispose of them.

7.1.3 Laboratory Quality Control Requirements

The analytical laboratory will have written SOPs defining the instrument operation and maintenance, tuning, calibration, MDA determination, QC acceptance criteria, blank requirements, and stepwise procedures for each analytical method (Attachment 2). 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 and the Installation Restoration Chemical Data Quality Manual (NFESC, 1999), as well as the frequency, acceptance criteria, and corrective action as defined in the Quality Systems Manual (DoD, 2006) for the following QC checks for each project-specific method.

Radioactive isotopes (EPA Methods 901.1M):

- Demonstrate acceptable analyst capability
- Initial calibration
- Second source calibration verification
- Calibration verification (initial and continuing calibration)
- Method blank
- Laboratory control sample (LCS)
- Background checks, efficiency checks, self-absorption curves as applicable

The laboratory must also maintain written records of all activities that have an impact on the quality of the laboratory results.

Any portion of the method subcontracted by the laboratory to another laboratory or sent to another facility of the same network of laboratories must have the prior approval of the Project Chemist.

7.1.4 Laboratory Quality Control Checks

The following subsections describe in detail the laboratory QC checks required by this project.

7.1.4.1 Calibration

All instruments and equipment must be calibrated in accordance with the specified methods, unless different instructions are included in this document. Each instrument must be calibrated with the standard solutions 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.

7.1.4.2 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 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 QLs. 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 QLs 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.

7.1.4.3 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/laboratory control sample duplicate (LCSD) preparation is of a source different from the stock that was 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 matrix spike/matrix spike duplicate (MS/MSD), the LCS will be prepared and analyzed in duplicates.

7.1.4.4 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.

7.1.4.5 Preventative Maintenance

All instruments must be maintained in accordance with the manufacturers' recommended procedures. The laboratory must define in its QA plan 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 Project Chemist.

In addition to preventive maintenance, the 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 laboratory must demonstrate the instrument's return to operating conditions and must recalibrate the instrument prior to resumption of sample analyses.

7.2 DATA QUALITY INDICATORS

In order to meet project DQOs, the QLs listed in Table A.7-1 (sediment) and A.7-2 (water) were established below action levels, and the QC criteria presented in Table A.7-3 are in accordance with the *Quality Systems Manual for Environmental Laboratories* (DoD, 2006).

Analytical DQOs will be assessed through application of precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters discussed in this section.

7.2.1 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 relative percent difference (RPD) between the duplicate sample results as follows:

$$RPD = 100 \times 2 \times (\text{result} - \text{duplicate result})/(\text{result} + \text{duplicate result})$$

The RPD limits for laboratory duplicate, MSD, and LCSD are presented in Table A.7-3, and the field duplicate limits are listed in Table A.7-4. Associated samples that do not meet the criteria will be evaluated by the validator as described in Section 8.4.

7.2.2 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 include MS, MSD, and LCS analyzed for every batch of up to 20 samples to serve as a measure of analytical accuracy. Surrogate standards added to all samples, blanks, MS, MSD, and LCS analyzed for organic contaminants evaluate the method's accuracy and help to determine matrix interferences. %R for spiked samples and surrogate standards is calculated as follows:

%R = 100 x (spiked sample result - unspiked sample result)/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 Table A.7-3. Otherwise, data will be qualified as discussed in Section 8.4.

7.2.3 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 collection, packaging, preservation, or COC procedures may result in samples being judged non-representative and may form a basis for rejecting the data.

7.2.4 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:

% completeness = 100 x (number of valid analyte results/number of possible results)

7.2.5 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, standardized report formats, follow the calculations as referenced in approved analytical methods, and use a standard statistical approach for QC measurements.

7.3 FIELD QUALITY OBJECTIVES

Field QC samples will be collected and analyzed during the project to assess the consistency and performance of the sampling program. Field QC samples are necessary for establishing data comparability, determining the total measurement error (the overall precision of the measurement system from sample collection to analysis), and for QA during sample handling and shipment. Field QC samples may include field duplicates, equipment rinsates, source blanks, trip blanks, and temperature blanks. Measurement performance criteria for field QC samples in listed in Table A.7-4, and field QC sample frequency is listed in Table A.7-5.

Field QC samples associated with waste sampling will not be collected.

7.3.1 Field Duplicates

Field duplicates consist of two distinct samples (an original and a duplicate) of the same matrix collected at the same time and location to the extent possible and using the same sampling techniques. The purpose of field duplicates is to measure the consistency of field sampling. Field duplicates will be collected at a frequency of one for every ten sediment samples taken and will be analyzed for the same analytes as the original sample. Field duplicates are uniquely identified so that the identity of the field duplicates is "blind" to the analytical laboratory. Exact locations of field duplicate samples and their identifications will be recorded in the field logbook.

7.3.2 Equipment Rinsate Samples

Equipment rinsate is a sample of analyte-free water collected from a final rinse of sampling equipment after the decontamination procedure has been performed. Rinsate samples will be collected directly from the sampling equipment, placed in appropriate pre-cleaned containers supplied by the analytical laboratory, and analyzed for the same analytes as the field samples under the same analytical conditions. Equipment rinsate samples help determine the effectiveness of the decontamination procedure and potential for cross-contamination during sampling events. Equipment rinsates will not be collected for this project since only disposable sampling equipment will be used to collect samples.

7.3.3 Source Blank Samples

A source blank consists of analyte-free, reagent-grade water provided by the laboratory to be used for the collection of equipment rinsate samples as described in Section 7.3.2. In order to assure that the source blank is free of contamination, one of two courses of action will be

followed before the source blank water is used. First, the laboratory will be asked to provide a certificate of analysis that the water provided for the equipment rinsate samples does not contain analytes above the project QLs. If the laboratory cannot provide a certificate of analysis, then a sample of the laboratory water will be collected at the beginning of the project and analyzed for the same parameters as the equipment rinsate samples to verify that the results are not above the project QLs. Source blank samples will not be collected since equipment rinsate samples will not be collected for the project.

7.3.4 Trip Blanks

Trip blanks are hydrochloric acid-preserved, analyte-free, deionized water prepared by the laboratory in 40 milliliter (mL) volatile organic analysis (VOA) vials that will be carried to the field, stored with water samples collected for VOA, and returned to the laboratory for VOA. Trip blanks will not be required for this project since volatile organic compound (VOC) samples will not be collected.

7.3.5 Temperature Blanks

A temperature blank is a container of tap water that is shipped in each cooler containing field samples and ice. Laboratory personnel will use the temperature blank to measure the temperature of the cooler upon arrival at the laboratory. Radiological samples do not require storage or shipment with ice; therefore, temperature blanks are not applicable.

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TABLE A.7-1

REFERENCE LIMITS FOR SEDIMENT SAMPLES
(UFP-QAPP Worksheet #15)

Analytical Group/Method	Analyte	CAS Number	Project Action Limit for Sediment Samples	Project QLs	Analytical Method MDAs	Analytical Method QLs	Units
Radionuclides / EPA Method 901.1M	Actinium-228	14331-83-0	NE	*	*	*	pCi/g
	Americium-241	86954-36-1	NE	*	*	*	pCi/g
	Bismuth-212	14913-49-6	NE	*	*	*	pCi/g
	Bismuth-214	14733-03-0	NE	*	*	*	pCi/g
	Cobalt-60	10198-40-0	NE	*	*	*	pCi/g
	Cesium-137	10045-97-3	NE	*	*	*	pCi/g
	Europium-152	14683-23-9	NE	*	*	*	pCi/g
	Europium-154	15585-10-1	NE	*	*	*	pCi/g
	Lead-210	14255-04-0	NE	*	*	*	pCi/g
	Lead-212	15092-94-1	NE	*	*	*	pCi/g
	Lead-214	15067-28-4	NE	*	*	*	pCi/g
	Radium-226	13982-63-3	1.0[a]	*	*	*	pCi/g
	Potassium-40	13966-00-2	NE	*	*	*	pCi/g
	Protactinium-234m	378783-76-7	NE	*	*	*	pCi/g
	Thallium-208	14913-50-9	NE	*	*	*	pCi/g
	Thorium-230	14269-63-7	NE	*	*	*	pCi/g
	Thorium-232	7440-29-1	NE	*	*	*	pCi/g
	Thorium-234	15065-10-8	NE	*	*	*	pCi/g
	Uranium-235	15117-96-1	NE	*	*	*	pCi/g

Notes:

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

* Project quantitation limits for radiological analyses are calculated per samples per analysis. They are selected based on background, sample size, and count time.

TABLE A.7-1

REFERENCE LIMITS FOR SEDIMENT SAMPLES
(UFP-QAPP Worksheet #15)

Abbreviations and Acronyms:

CAS – Chemical Abstract Service
EPA – U.S. Environmental Protection Agency
MDA – minimum detectable activity
NE – none established
pCi/g – picocurie per gram
PRG – Preliminary Remediation Goal
QL – quantitation limit
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

TABLE A.7-2

REFERENCE LIMITS FOR WATER SAMPLES
(UFP-QAPP Worksheet #15)

Analytical Group/Method	Analyte	CAS Number	Project Action Limit for Wastewater Samples [a]	Project QLs	Analytical Method MDAs	Analytical Method QLs	Units
Radionuclides / EPA Method 901.1	Actinium-228	14331-83-0	NE	*	*	*	pCi/L
	Americium-241	86954-36-1	NE	*	*	*	pCi/L
	Bismuth-212	14913-49-6	NE	*	*	*	pCi/L
	Bismuth-214	14733-03-0	NE	*	*	*	pCi/L
	Cobalt-60	10198-40-0	NE	*	*	*	pCi/L
	Cesium-137	10045-97-3	NE	*	*	*	pCi/L
	Europium-152	14683-23-9	NE	*	*	*	pCi/L
	Europium-154	15585-10-1	NE	*	*	*	pCi/L
	Lead-210	14255-04-0	NE	*	*	*	pCi/L
	Lead-212	15092-94-1	NE	*	*	*	pCi/L
	Lead-214	15067-28-4	NE	*	*	*	pCi/L
	Radium-226	13982-63-3	NE	*	*	*	pCi/L
	Potassium-40	13966-00-2	NE	*	*	*	pCi/L
	Protactinium-234m	378783-76-7	NE	*	*	*	pCi/L
	Thallium-208	14913-50-9	NE	*	*	*	pCi/L
	Thorium-230	14269-63-7	NE	*	*	*	pCi/L
	Thorium-232	7440-29-1	NE	*	*	*	pCi/L
	Thorium-234	15065-10-8	NE	*	*	*	pCi/L
	Uranium-235	15117-96-1	NE	*	*	*	pCi/L

Notes:

[a] Water analysis for this project is for characterizing wastewater only. Criteria (action limits) for water generated as a result of remedial activities will be negotiated with regulators, and therefore, are currently not available.

*Reporting limits for radiological analyses are calculated with every analysis. They are selected based on background, sample size, and count time.

TABLE A.7-2

REFERENCE LIMITS FOR WATER SAMPLES
(UFP-QAPP Worksheet #15)

Abbreviations and Acronyms::

CAS – Chemical Abstract Service
EPA – U.S. Environmental Protection Agency
MDA – minimum detectable activity
NE – none established
pCi/L – picocurie per liter
QL – quantitation limit
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

TABLE A.7-3

QUALITY CONTROL ACCEPTANCE CRITERIA

Method	Analyte	CAS Number	Accuracy Soil (%R) [a]	Precision Soil (RPD) [b]	Accuracy Water (%R) [a]	Precision Water (RPD) [b]
EPA Method 901.1 M (Soil) and EPA Method 901.1 (Water) or equivalent	Cesium-137	10045-97-3	75-125	≤ 30	75-125	≤ 30
	Radium-226	13982-63-3	75-125	≤ 30	75-125	≤ 30

Notes:

[a] Percent recovery (%R) limits listed are for LCS/LCSD and MS/MSD. (LCSD is required if sufficient volume is not available for an MSD.)
[b] Relative percent difference (RPD) limits listed are for LCS/LCSD and MS/MSD. (LCSD is required if sufficient volume is not available for an MSD.)

Abbreviations and Acronyms:

%R – percent recovery
CAS – Chemical Abstract Service
EPA – U.S. Environmental Protection Agency
LCS – laboratory control sample
LCSD – laboratory control sample duplicate
MS – matrix spike
MSD – matrix spike duplicate
RPD – relative percent difference

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TABLE A.7-4

MEASUREMENT PERFORMANCE CRITERIA – FIELD QC SAMPLES (UFP-QAPP Worksheet #12)

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Field duplicate [a]	Gamma Spectroscopy	10%	Precision	RPD <50% for sediment	S &A
Method Blank	Gamma Spectroscopy	Per analytical batch	Accuracy	Less than the minimum detectable activity	A
Laboratory Control Sample	Gamma Spectroscopy	Per analytical batch	Precision and accuracy	Percent recovery limits: 75-125 percent	A
Duplicate	Gamma Spectroscopy	Per analytical batch	Precision and accuracy	Percent RPD limits: ≤30 percent	A

Notes:

[a] Field duplicates are not applicable to the collection of swipe samples. Field duplicates will only be collected for sediment samples.

Abbreviations and Acronyms:

QC – quality control
RPD – relative percent difference
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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TABLE A.7-5

FIELD QUALITY CONTROL SAMPLE SUMMARY
(UFP-QAPP Worksheet #20)

Matrix	Analytical Group	Analytical and Preparation SAP Reference	# of Primary Sampling Locations	# of Field Duplicates	# of MS/MSDs	# of Field Blanks	# of Equipment Rinsates	# of Trip Blanks	Total # of Samples to Laboratory
Swipe [a]	Gross alpha and beta	SAP Section 5.1	TBD	N/A	N/A	N/A	N/A	N/A	TBD
Sediment [b]	Gamma Spectroscopy	SAP Section 5.1	TBD	1 per 10 samples	N/A	N/A	N/A	N/A	TBD
Water [c]	Gamma Spectroscopy	SAP Section 5.2	1	N/A	N/A	N/A	N/A	N/A	1

Notes:

[a] The frequency of swipe samples will be determined in the field based on survey scan results. Sample locations will be numbered sequentially during field sample collection activities.

[b] The amount of sediment samples cannot be determined at this time. Due to building access issues, there is no way to determine how many access points will be found. Sample locations will be numbered sequentially during field sample collection activities.

[c] Water samples for this project will consist of wastewater generated from decontamination activities and drain lines.

Abbreviations and Acronyms:

MS/MSD – matrix spike/matrix spike duplicate
N/A – not applicable
SAP – Sampling and Analysis Plan TBD – to be determined
TBD – to be determined
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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8.0 DATA MANAGEMENT

This section discusses the data management procedures for samples collected for this project, tracing the path of the field and laboratory data from generation, review, and verification to storage and final use. The quality of the data collection process will be assessed through reviews of all documentation and measurements performed and verified to confirm that the information recorded is accurate and complete. Project documentation that will be generated is presented in Table A.4-1.

8.1 DATA GENERATION

Two types of data will be generated – field data and laboratory data. These types are described in the following sections.

8.1.1 Field Data

Field sampling data, including field logbooks and field forms, will be maintained. The logbooks will be numbered sequentially on the cover by the PQCM and that number will be entered into a logsheet maintained by the PQCM for the project. Field logbooks and forms will be reviewed by the PQCM and verified as described in Table A.8-1. A copy of all field forms containing information pertaining to sample collection (such as calibration forms) will be forwarded to the Project Chemist.

A copy of the COCs will be faxed/e-mailed to the Project Chemist on a daily basis for review and communication with the laboratory. The COCs will be reviewed daily by the Project Chemist for completeness. The manila copy of the COC form will be mailed to the Project Chemist. The Project Chemist will maintain field documents and forward them to the main project file in San Diego, California, at the completion of the project.

8.1.2 Laboratory Data

The laboratory will report data to TtEC by submitting data packages as described in Section 4.2. For this project, 90 percent of the data will be submitted in an EPA Level III-equivalent data package and 10 percent submitted in an EPA Level IV-equivalent data package as described in Section 4.2. (For waste characterization samples, 100 percent of the data will be submitted in an EPA Level III-equivalent data package.) All data reported by the laboratory will be verified as described in Table A.8-1 and validated as described in Table A.8-2.

As described in Section 7.1.2, the laboratory will verify sample receipt and document it on the sample receipt form. In addition, samples will be assigned a unique number and that will be recorded on the laboratory-internal COC record.

Prior to reporting it, all data reported by the analyst must be reviewed by a peer analyst qualified to perform the method and a supervisor. In addition, the laboratory QA manager must review 10 percent of the data reported for each section annually. The laboratory QA manager review may be conducted after the data have been reported to TtEC.

All data will be reported to TtEC on or before the designated turnaround time by fax/e-mail. The Project Chemist will review the data upon receipt prior to releasing it to project personnel to verify that the sampling procedures and analytical results were obtained following the protocols in this SAP and are of sufficient quality to satisfy DQOs.

On or before 21 days from sample receipt, the laboratory will submit hard-copy data with associated QC information as described in Section 4.2 along with an electronic format of the data to TtEC. The format to be used for the electronic data deliverable will be compatible with NEDD and will be described in the Statement of Work.

8.1.3 Electronic

Field data from the COCs (date and time collected, sample identification, etc.) will be entered into the TtEC database by the Project Chemist. Survey data will be recorded by a field surveyor and also entered into the database. All swipe and sediment sample locations will be surveyed in accordance with *Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards* (Naval Facilities Engineering Command, Southwest Division [NAVFAC SW], 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 level (North American Vertical Datum 88) in feet. Waste characterization sample locations are not fixed locations and therefore will not be surveyed. 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 EDD from the laboratory, which will be compatible with NEDD requirements, 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 either be corrected by TtEC or the laboratory will be notified to make corrections. Ten percent of the data will be checked by the Project Chemist against the hard-copy data package. If errors are found in the electronic data, the Project Chemist will contact the laboratory for correction.

The Data Manager will conduct a weekly backup of the database and maintain the backup file for three months.

Electronic data will be submitted to NEDD-Naval Installation Restoration Information Solution website in NEDD format in accordance with the *EWI EVR6, Environmental Data Management and Required Electronic Delivery Standards* (NAVFAC SW, 2005).

8.2 DATA VALIDATION

The following documents will be used as guidance for validating all data, except waste characterization samples: 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); *Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical, Data Validation* (Southwest Division, Naval Facilities Engineering Command, 2001); and the QC criteria specified in this SAP.

Data validation will be performed by an independent data validation company. For this project, 90 percent of the data will require EPA Level III-equivalent data validation and 10 percent EPA Level IV equivalent data validation. 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.

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. An additional section showing RPD values will be included to demonstrate field duplicate precision. If the results cannot be calculated, this will be noted in the report.
- **Field Blanks** – Identifications for field blanks including trip blanks, equipment rinsates, and source blanks will be provided on the COC forms by TtEC. Any analyte detected in field blanks will be discussed in this section of the report.

Data validation reports will be submitted to TtEC as described in Section 4.3. The validator reports will be filed with the respective analytical data package.

8.3 DATA QUALITY ASSESSMENT

After data are validated, the Project Chemist will review and assess field and laboratory quality control samples data. The PARCC will be determined as described in Section 7.2. Data validation reports will be reviewed and assessed for meeting DQOs. The Project Chemist will review the data validation reports for any deviations and qualify data, if necessary. The following data qualifiers will be used:

J – Result is estimated
U – Analyte is not detected at or above the stated QL
R – Data are rejected
UJ– Analyte is not detected, but there is an uncertainty about the QL

Data qualifiers are used to indicate uncertainties associated with the data. The assigned qualifiers will be entered into the validation code field in the database. In addition, data will be assessed through the evaluation of the PARCC parameters.

The Project Chemist will prepare a data quality assessment, which will summarize the findings of the data review and discuss usability of the data.

Data will be presented in tabular format to be included in the project summary report. The electronic data in NEDD format will be submitted to the DON as described in *Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards* (NAVFAC SW, 2005). These data will also be placed in the project file located in the TtEC San Diego office.

TABLE A.8-1

VERIFICATION PROCESS
(UFP-QAPP Worksheet #34)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Field logbook	Field logbooks will be reviewed weekly and verified to confirm that the information is complete in accordance with requirements in Section 4.1.1. 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
Sample receipt	For samples shipped via FedEx®, the Project Chemist will verify receipt of samples by the laboratory the day following shipment.	I	Project Chemist, TtEC
Sample logins	Sample logins will be reviewed against the COC and verified that the requirements in this SAP have been met. Prior to release, data will be verified as follows: 100 percent of the data comply with the method and project specific requirements, and that any deviations or failure to meet criteria are documented for the project file. 100 percent of manual entries are free of transcription error and manual calculations are accurate; computer calculations are spot-checked to verify program validity; data reported are in compliance with the method and project-specific QC requirements; raw data and supporting materials are complete; spectra assignments are confirmed; description 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. The reported information is complete; the information in the report narrative is complete and accurate; results are reasonable. 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.	I E	Project Chemist, TtEC Laboratory Project Manager, Eberline
Laboratory data prior to release	Laboratory data will be reviewed and verified for completeness against analyses requested on the COC forms.	E	Laboratory Project Manager, Eberline

TABLE A.8-1

VERIFICATION PROCESS
(UFP-QAPP Worksheet #34)

Verification Input	Description	Internal/ External	Responsible for Verification (Name, Organization)
Laboratory data due at turnaround time listed on COC	Laboratory data will be verified that the analyses reported are consistent with the analyses requested on the COC forms.	I	Project Chemist, TtEC
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 Section 4.5. Subsequently, data packages will be evaluated externally by undergoing data validation as described in Section 8.2.	E I E	Laboratory, Eberline Project Chemist, TtEC Third-party data validators
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	Project Chemist, TtEC

Abbreviations and Acronyms:

COC – chain of custody
PQCM – Project Quality Control Manager
QC – quality control
SAP – Sampling and Analysis Plan
SOP – Standard Operating Procedure
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

TABLE A.8-2

VALIDATION STEPS (IIA AND IIB) PROCESS
(UFP-QAPP Worksheet #35)

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
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 is accurate and in accordance with the requirements in this SAP.	Project Chemist, TtEC
IIa	Sample receipt	The sample cooler will be checked for compliance with temperature and packaging requirements listed in Section 6.5 of this SAP.	Laboratory sample custodian, Eberline
IIa	Sample logins	Sample login will be reviewed for accuracy against the COC form.	Project Chemist, TtEC Laboratory Project Manager, Eberline
IIa	Laboratory data prior to release	Laboratory data will be reviewed to ensure that the data is accurate and meets the requirements in this SAP. Prior to release, data will be validated as follows:	Laboratory Project Manager, Eberline
		100 percent of the data comply with the method- and project-specific requirements and that any deviations or failure to meet criteria are documented for the project file.	Laboratory Analyst, Eberline
		100 percent of manual entries 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, Eberline
		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, Eberline
		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.	Laboratory Quality Assurance Manager, Eberline

TABLE A.8-2

VALIDATION STEPS (IIA AND IIB) PROCESS
(UFP-QAPP Worksheet #35)

Step IIa/IIb	Validation Input	Description	Responsible for Validation (Name, Organization)
	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 Tables A.7-1 and A.7-2.	Project Chemist, TtEC
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, Eberline
		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
		Data packages will be evaluated externally by undergoing data validation as described in Section 8.2.	Third-party data validator, Eberline
IIb	Data validation reports	Data validation reports will be reviewed in conjunction with the project DQOs and data quality indicators (listed in Section 7.2).	Project Chemist, TtEC

Abbreviations and Acronyms:

COC – chain of custody
DQO – data quality objective
PQCM – Project Quality Control Manager
QC – quality control
SAP – Sampling and Analysis Plan
SOP – Standard Operating Procedure
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

9.0 QUALITY ASSURANCE OVERSIGHT

QA oversight for this project will include surveillance of field activities and of the laboratories performing analysis. Tables A.9-1 through A.9-3 describe the assessment activities for this project.

9.1 FIELD SURVEILLANCE

NAVFAC SW QAOs and TtEC Quality Control Program Manager may schedule surveillance of field activities at any time to evaluate the execution of sample collection, identification, and control in the field. The TtEC QCM will conduct surveillance of field activities at a minimum of once for a project lasting less than six months and once every six months for project lasting longer than six months. The surveillance will also include observations of COC procedures, field documentation, instrument calibrations, and field measurements.

Field documents and COC records will be reviewed to ensure that all entries are printed or written in indelible black or blue ink, dated, and signed. Sampling operations will be reviewed and compared to this SAP and other applicable SOPs. Use of proper sample containers, proper handling of samples, and adequate documentation of the sampling operation will be verified.

Field measurements will be reviewed by random spot-checking to determine that the instrument is within calibration, the calibration is done at the appropriate frequency, and that the sensitivity range of the instrument is appropriate for the project.

9.1.1 Corrective Action

Findings identified during the field surveillance will be recorded on a surveillance checklist. A surveillance report will be prepared and provided to the PjM. The PjM shall assign an individual to identify and implement corrective actions.

The TtEC QCM will monitor corrective action documentation, verify implementation of and track and analyze the corrective action, and close out corrective action documentation upon completion of the corrective action.

9.2 LABORATORY ASSESSMENT

The laboratory to be used for this project will have a State of California DHS ELAP-certified analytical laboratory. All environmental analytical laboratories would have successfully completed the NFESC Laboratory Evaluation Program. TtEC will only conduct a laboratory assessment if warranted during the project. The scope of the laboratory assessment by TtEC will be determined based on quality issues encountered.

Planned project assessments and assessment findings and corrective action responses are included in Tables A.9-1 and A.9-2, respectively.

TABLE A.9-1

PLANNED PROJECT ASSESSMENTS
(UFP-QAPP Worksheet #31)

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	PjM, TtEC	PjM, TtEC	PjM, TtEC	PQCM, TtEC
Field Sampling Surveillance	Once at the beginning of field sampling activities	Internal	TtEC	PQCM, TtEC	PjM, TtEC	PjM, TtEC	PQCM, TtEC
Data Review Surveillance	Once for project duration less than six months	Internal	TtEC	Program Chemist, TtEC	Project Chemist, TtEC	Program Chemist, TtEC	QCM, TtEC
Management Review	Once	Internal	TtEC	QCM, TtEC	PjM, TtEC	PjM, TtEC	PQCM, TtEC

Abbreviations and Acronyms:

PjM – Project Manager
PQCM – Project Quality Control Manager
QCM – Quality Control Program Manager
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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TABLE A.9-2

ASSESSMENT FINDINGS AND CORRECTIVE ACTION RESPONSES (UFP-QAPP Worksheet #32)

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (Name, Title, Organization)	Time Frame of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response (Name, Title, Org.)	Time Frame for Response
Field Sampling Surveillance	Surveillance Report	PjM, TtEC	7 days after completion of the inspection	Corrective Action Report	PjM and QCM, TtEC	5 days after notification
Data Review Surveillance	Surveillance Report	PjM, TtEC	7 days after completion of the inspection	Corrective Action Report	PjM and QCM, TtEC	14 days after notification
Management Review	Surveillance Report	PjM, TtEC	7 days after completion of the inspection	Corrective Action Report	QCM, TtEC	14 days after notification

Abbreviations and Acronyms:

PjM – Project Manager
QCM – Quality Control Program Manager
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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TABLE A.9-3

QA MANAGEMENT REPORT
(UFP-QAPP Worksheet #33)

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	One at startup of sampling	TBD	PQCM, TtEC	PjM, Program Chemist, QCM, TtEC
Data Review Surveillance Report	One after all data generated and reviewed	TBD	Program Chemist, TtEC	PjM, Program Chemist, QCM, TtEC
Management Review Report	One after management review is completed	TBD	QCM, TtEC	PjM, Program Manager, TtEC

Abbreviations and Acronyms:

PQCM – Project Quality Control Manager
PjM – Project Manager
QCM – Quality Control Program Manager
TBD – to be determined
TtEC – Tetra Tech EC, Inc.
UFP-QAPP – Uniform Federal Policy for Quality Assurance Project Plans

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10.0 SAP REVISION OR AMENDMENT

Significant change in work scope affecting the original project DQOs will require the SAP to be amended. Any changes to the SAP will be documented prior to sampling and analysis activities. Minor changes will be documented by completing a FCR form. The FCR must be approved prior to field implementation. Major changes to work scope affecting the original DQOs or meeting criteria described in *Environmental Work Instruction (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 NAVFAC SW QAO prior to conducting sampling and analysis.

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11.0 REFERENCES

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_____. 1999. *National Functional Guidelines for Organic Data Review, EPA 540/R-99/008.* Contract Laboratory Program. October.

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_____. 2005. *Uniform Federal Policy for Quality Assurance Project Plans* (UFP-QAPP.

_____. 2006. *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS.*

FIGURES

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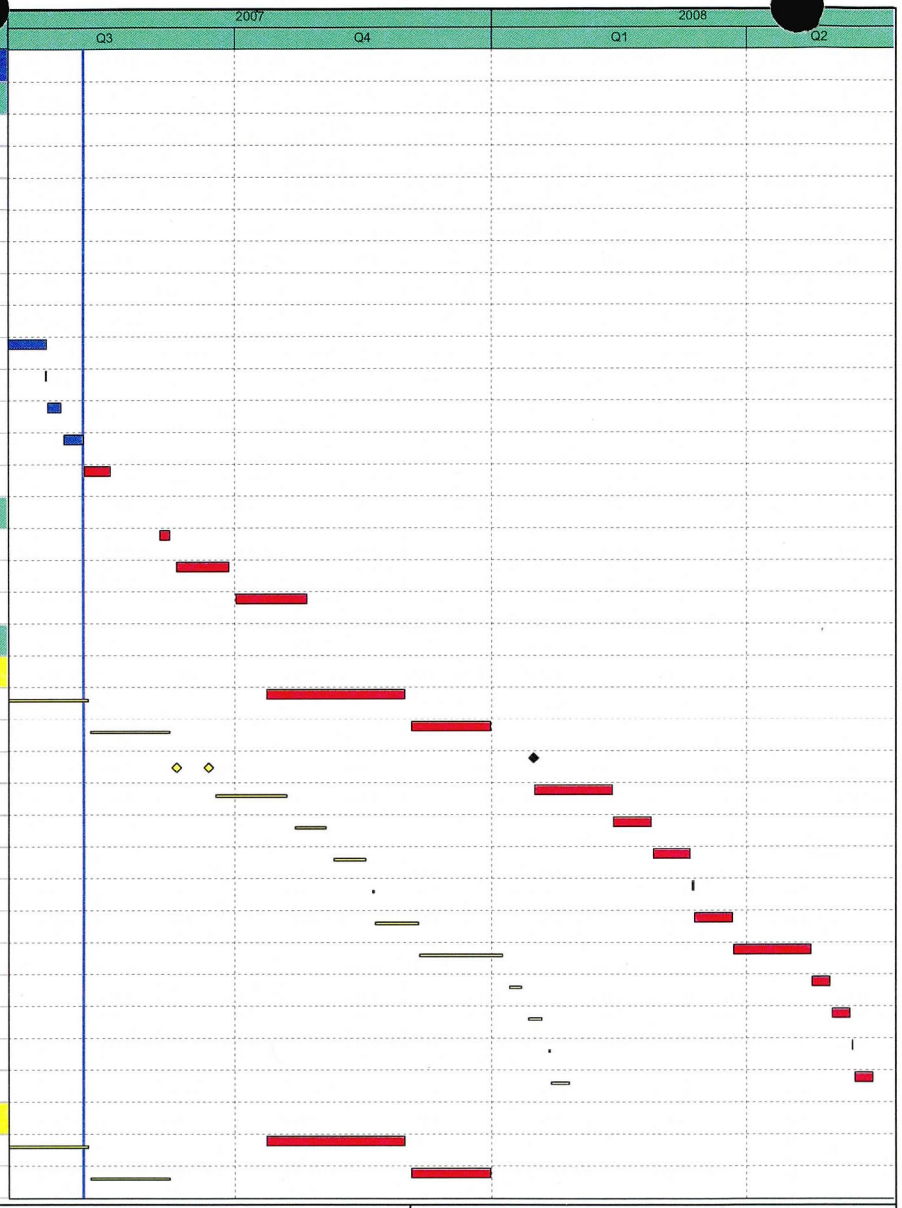
Activity ID	Activity Name	Current Duration	Start	Finish
Treasure Island - Base-wide Radiological Support		426	28-Sep-06 A	15-May-08
Pre-Construction		232	28-Sep-06 A	17-Aug-07
TO-21-0001	Contract Award	1	28-Sep-06 A	28-Sep-06 A
TO-21-0010	Prepare and Submit - Pre-Draft Work Plan to Navy	42	28-Sep-06 A	29-Nov-06 A
TO-21-0015	Navy Review - Pre-Draft Work Plan	25	29-Nov-06 A	04-Jan-07 A
TO-21-0018	Prepare Draft Work Plan	34	04-Jan-07 A	20-Feb-07 A
TO-21-0020	Submit - Draft Work Plan to Agencies	0	21-Feb-07 A	21-Feb-07 A
TO-21-0025	Regulatory Review - Draft Work Plan	31	21-Feb-07 A	04-Apr-07 A
TO-21-0030	Prepare RTCs - Draft Work Plan	11	05-Apr-07 A	20-Apr-07 A
TO-21-0035	Resolve RTCs - Draft Work Plan	66	23-Apr-07 A	25-Jul-07 A
TO-21-0040	Regulatory Concurrence on RTCs	1	25-Jul-07 A	25-Jul-07 A
TO-21-0045	Finalize and Submit - Draft Final Work Plan to Navy	3	26-Jul-07 A	31-Jul-07 A
TO-21-0050	Navy Review - Draft Final Work Plan	5	01-Aug-07 A	07-Aug-07 A
TO-21-0070	Finalize and Submit - Final Work Plan	8	08-Aug-07	17-Aug-07
Construction		39	04-Sep-07	26-Oct-07
TO-21-0075	Site Mobilization	4	04-Sep-07	07-Sep-07
TO-21-0080	Site Work	15	10-Sep-07	28-Sep-07
TO-21-0085	Samples Analyzed	20	01-Oct-07	26-Oct-07
Post Construction Submittals		155	12-Oct-07	15-May-08
FSS Report - Building 343 Storeroom / Building 344		155	12-Oct-07	15-May-08
TO-21-0090	Prepare and Submit - Pre-Draft FSS Report	35	12-Oct-07	30-Nov-07
TO-21-0095	Navy Review - Pre-Draft FSS Report	20	03-Dec-07	31-Dec-07
TO-21-0100	Submit - Draft FSS Report	0		15-Jan-08
TO-21-0105	Regulatory Review - Draft FSS Report	20	16-Jan-08	12-Feb-08
TO-21-0110	Prepare RTCs - Draft FSS Report	10	13-Feb-08	26-Feb-08
TO-21-0115	Resolve RTCs - Draft FSS Report	10	27-Feb-08	11-Mar-08
TO-21-0120	Regulatory Concurrence on RTCs	1	12-Mar-08	12-Mar-08
TO-21-0125	Finalize and Submit - Draft Final FSS Report	10	13-Mar-08	26-Mar-08
TO-21-0130	Regulatory Review - Draft Final FSS Report	20	27-Mar-08	23-Apr-08
TO-21-0135	Prepare RTCs - Draft Final FSS Report	5	24-Apr-08	30-Apr-08
TO-21-0140	Resolve RTCs - Draft Final FSS Report	5	01-May-08	07-May-08
TO-21-0145	Regulatory Concurrence on RTCs - Draft Final FSS Report	1	08-May-08	08-May-08
TO-21-0150	Finalize and Submit - Final FSS Report	5	09-May-08	15-May-08
FSS Report - Building 233 (Internal Drain, etc.)		155	12-Oct-07	15-May-08
TO-21-0155	Prepare and Submit - Pre-Draft FSS Report	35	12-Oct-07	30-Nov-07
TO-21-0160	Navy Review - Pre-Draft FSS Report	20	03-Dec-07	31-Dec-07



Primary Baseline
Actual Work
Remaining Work
Critical Remaining Work
Baseline Milestone
Milestone

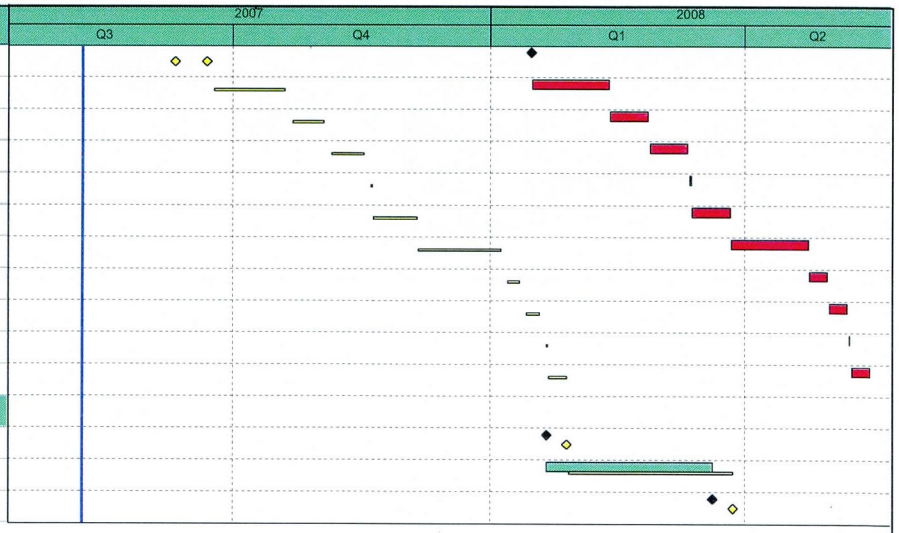
Figure A.1-1 **Project Schedule**

Naval Station Treasure Island

San Francisco, CA

TETRA TECH EC, INC.

Activity ID	Activity Name	Current Duration	Start	Finish
TO-21-0165	Submit - Draft FSS Report	0		15-Jan-08
TO-21-0170	Regulatory Review - Draft FSS Report	20	16-Jan-08	12-Feb-08
TO-21-0175	Prepare RTCs - Draft FSS Report	10	13-Feb-08	26-Feb-08
TO-21-0180	Resolve RTCs - Draft FSS Report	10	27-Feb-08	11-Mar-08
TO-21-0185	Regulatory Concurrence on RTCs	1	12-Mar-08	12-Mar-08
TO-21-0190	Finalize and Submit - Draft Final FSS Report	10	13-Mar-08	26-Mar-08
TO-21-0195	Regulatory Review - Draft Final FSS Report	20	27-Mar-08	23-Apr-08
TO-21-0200	Prepare RTCs - Draft Final FSS Report	5	24-Apr-08	30-Apr-08
TO-21-0205	Resolve RTCs - Draft Final FSS Report	5	01-May-08	07-May-08
TO-21-0210	Regulatory Concurrence on RTCs - Draft Final FSS Report	1	08-May-08	08-May-08
TO-21-0215	Finalize and Submit - Final FSS Report	5	09-May-08	15-May-08
Job Closeout		43	21-Jan-08	20-Mar-08
TO-21-0220	Technical Completion	0		21-Jan-08
TO-21-0225	Project Closeout	43	21-Jan-08	20-Mar-08
TO-21-0230	Project Completion	0		20-Mar-08



Primary Baseline
Actual Work
Remaining Work
Critical Remaining Work
Baseline Milestone
Milestone

Figure A.1-1 **Project Schedule**

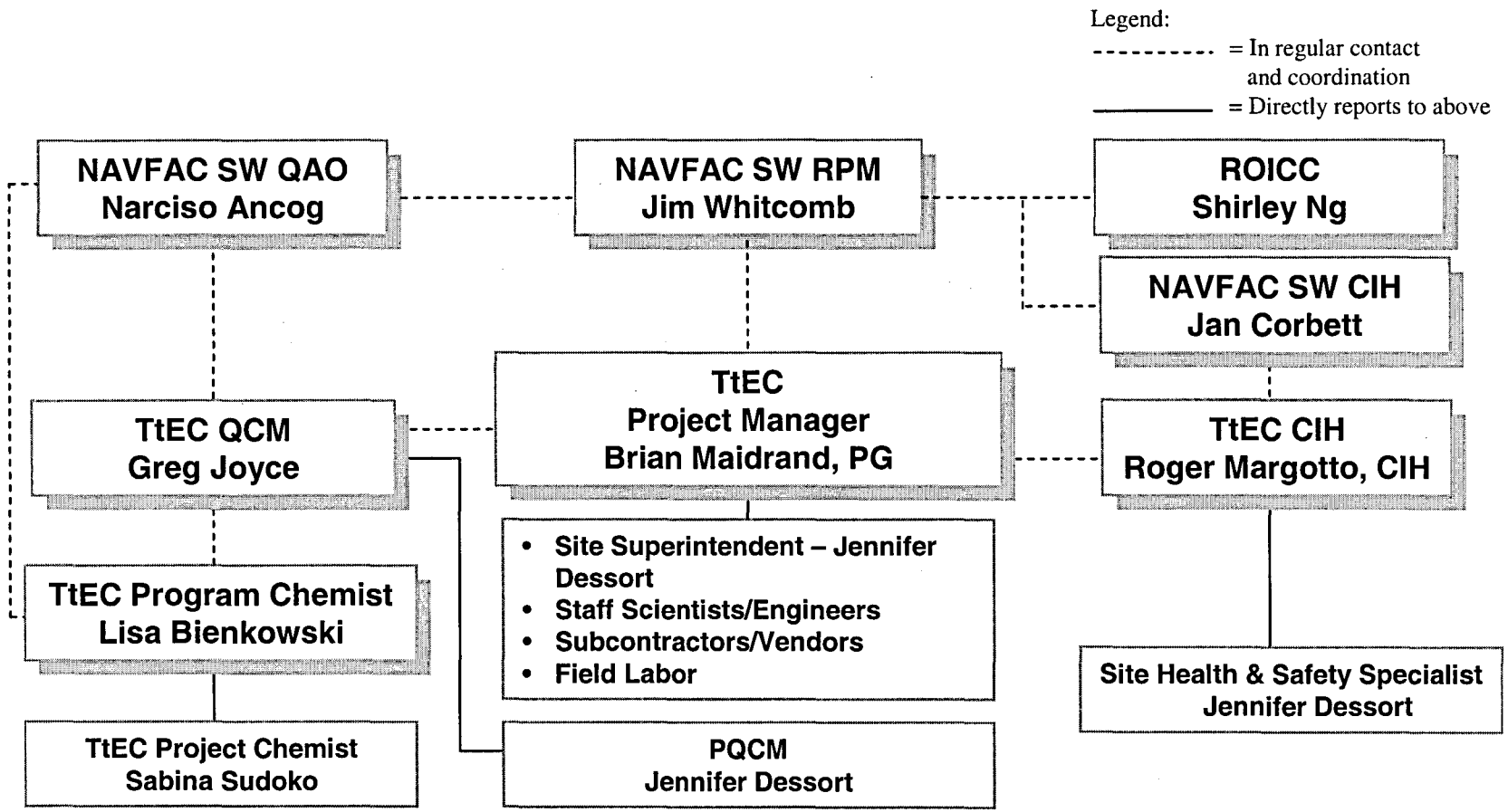
Naval Station Treasure Island

San Francisco, CA

TETRA TECH EC, INC.

Figure A.2-1

Project Organization Chart



0021-0001 Figure A.2-1

ATTACHMENT 1

EXAMPLE OF CHAIN OF CUSTODY, SAMPLE LABEL, AND CUSTODY SEAL

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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)
COMPANY	TIME	COMPANY
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
COMPANY	TIME	COMPANY
RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
COMPANY	TIME	COMPANY

LABORATORY INSTRUCTIONS/COMMENTS

COMPOSITE DESCRIPTION

SAMPLE CONDITION UPON RECEIPT (FOR LABORATORY)
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

STANDARD OPERATING PROCEDURES FOR THE OFF-SITE LABORATORY

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1.0 **INTRODUCTION:**

1.1 Preface

A homogeneous aliquot of water and solid sample is put into a standard geometry for gamma counting. The counting efficiency for this geometry must have been determined with standard (known) radionuclide activity. Sample aliquot are counted long enough to meet the required sensitivity of measurement.

1.2 Purpose

To provide a protocol for aliquoting samples requiring a Ge(Li) scan.

1.3 Scope

1.3.1 This procedure describes the use of gamma spectroscopy for the measurement of gamma photons emitted from radionuclides without separating them from the sample matrix. This technique makes it possible to ascertain whether a hazardous concentration of a specific gamma emitter is present in a hazardous waste sample.

1.3.2 The method is applicable for analyzing water samples that contain radionuclides emitting gamma photons with energies ranging from about 60 to 2000 keV.

1.3.3 The detection limits for photon emitters must be 1/10 of the applicable limit. The detection limits for Cs-134 and Cs-137, which are 10 and 20 pCi/L respectively, are met by this procedure.

2.0 **REFERENCES:** In addition to the references listed in CP-000:

2.1 EPA Method 901.1

3.0 **DEFINITIONS:** Definitions are listed in CP-000.

4.0 **RESPONSIBILITY:** Supervisor and technician responsibilities are detailed in CP-000.

5.0 **SAFETY:**

5.1 The Health & Safety Program and the Radiation Protection Program requirements' will be observed at all times at the Richmond laboratory. Personnel will know how to respond properly in the event of an emergency.

5.2 Personal Protective Equipment (PPE), minimum required:

- Lab coat
- Safety glasses with side shields
- Protective gloves

5.3 Waste Disposal - Waste residues are processed in accordance with CP-010.

5.4 Waste Residues - There are no hazardous wastes generated during this process.

6.0 **MATERIAL:**

Materials	Reagents
Ge(Li) container: Marinelli beaker	None

Counting jar
Petri dish
Small Petri dish
Electrical tape
Plastic bags
1000 mL graduated cylinder

7.0 **PROCEDURES:**

Before beginning the operation, assure that required materials are available. Allow sufficient time to complete the operation.

7.1 Water Samples

Shake sample well. Measure the received volume and record into the sample logbook. Measure out the required aliquot size into an appropriate geometry (see 7.4, Summary of Geometries). Seal with electrical tape. Label Ge(Li) type code as GLW or GLY and place in a plastic bag.

7.2 Soil Samples

7.2.1 Take the received weight of the sample and record the weight into the appropriate sample logbook. Note (a)

a. For special preparation follow CP-060 "Soil Preparation."

7.2.2 Take the aliquot from the received sample from CP-060 by filling up the tared geometry or container to the calibrated volume.

7.2.3 Take the net weight of the aliquot, and record the weight into the sample logbook.

7.2.4 Fit the lid of the container. Label the lid with the appropriate Ge(Li) designation (GLY or GLS). Wipe the outside with moistened paper towel to remove dust. Seal with electrical tape, and place in the plastic bag.

7.2.5 Fill-in the log-in form and turn the samples in for counting. Return the remaining sample into the original container.

7.3 Vegetation Samples

7.3.1 Take the received weight of the sample and record into the appropriate sample log book.

7.3.2 Chop samples into a small pieces and transfer into an appropriate tared geometry. Record the net weight as the aliquot for counting.

7.3.3. Fit a lid onto the container and wipe the outside with a moist paper towel to remove dust particles. Seal with electrical tape and label with the appropriate Ge(Li) designation and place in plastic bag, (Note a).

a. In some cases the Ge(Li) aliquot may be taken after dissolution.

7.4 Fish Samples

7.4.1 Take the received weight of the sample and record into the appropriate sample log book.

7.4.2 Place the fish sample in tared aluminum tray and dry in a drying oven at 100-110 °C for 8 hours.

7.4.3 Remove the sample from the oven and cool. Take the dry weight and record into the sample logbook.

7.4.4 Crush the dried fish and transfer into a tared geometry. Fill the container up to the calibrated volume and correct the dry aliquot to wet weight aliquot, if required, using the formula below.

A.

$$MC = \frac{NRW - NDW}{NRW}$$

Where:

MC = Moisture Content
NRW = Net Received Weight
NDW = Net Dried Weight

B. Corrected Aliquot Calculation

a. $$\text{Corrected Wet Aliquot} = \frac{\text{Aliq. Dry}}{1 - MC}$$

or

b. $$\text{Corrected Wet Aliquot} = \frac{\text{Dry Aliq. X Net Rec'd Wt.}}{\text{Net Dried Weight}}$$

7.4.5 Label with the appropriate Ge(Li) designation, wipe the outside of the container with a moist paper towel to remove dust particles, seal with electrical tape, place in a plastic bag and turn-in for counting.

7.5 Sludge and Sediments Samples

Sludge and Sediments samples are prepared according to the procedure below to prevent gassing during storage and counting process in radiometric department.

7.5.1 Take the received weight of the sample and record into the appropriate sample log book.

7.5.2 Transfer the received sample into a tared aluminum tray. Dry in a drying oven at 100 - 110 °C for at least 8 hours.

7.5.3 Remove the sample from the oven and cool. Take the dry weight and record into the sample logbook.

7.5.4 Fill a tared geometry up to the calibrated volume. Take the weight of the aliquot for counting and correct the aliquot, if required, using the formula in step 7.4.

7.5.5 Fit the lid of the container and seal with electrical tape. Wipe the outside of the container and place the planchet in a plastic bag.

For all Ge(Li) samples, record aliquots in appropriate log book. Each sample should be labeled with the appropriate type code, group and sample number, date, and initials. When turned into the counting room submit with a log-in plus a Ge(li) Info Sheet with a copy of the batch ID information sheet presenting sample reference times and Ge(Li) aliquots.

Summary of Geometries (Note b)

		Calibrated Volume
Marinelli Beaker	MB	500 mL
100 mL jar	JR	100 mL
Petri Dish	PD	50 mL

Small Petri Dish (with composites)	SP	8 mL
Small Petri Dish (with only one filter)	AL	

b. Be sure bottom of planchet is smooth and flat.

After completing the operation, put materials away and dispose of wastes that were generated.

8.0 **APPENDIX:** N/A

9.0 **SUPERSESSION:** This procedure supersedes CP-100, Rev. 06, same title, dated 01-13-03.

1.0 INTRODUCTION

1.1 Preface

For high resolution gamma spectroscopy, sample preparation varies with the required analysis. Radiochemistry may or may not be performed prior to sample counting. Prepared or unprepared sample material is mounted in an appropriate counting geometry prior to counting.

1.2 To provide program description and calculation methodology for high resolution gamma spectroscopy.

1.3 Scope

This document describes the calculation methodology of gamma spectroscopy analysis.

2.0 REFERENCES: N/A

3.0 DEFINITIONS: N/A

4.0 RESPONSIBILITIES: N/A

5.0 SAFETY:

The Health & Safety Program and the Radiation Protection Program requirements' shall be observed at all times at the Richmond Laboratory. Personnel shall know how to respond properly in the event of an emergency.

6.0 MATERIAL/EQUIPMENT: N/A

7.0 PROCEDURES:

7.1 Counting

Samples are counted for sufficient time to meet the required detection limits.

7.2 Calculation

All calculations are performed by a computer program system. The calculations performed and the resultant output are detailed in the following example:

```
*****************************************************************************
6201    GLY  38        G-3 PD 319.763 90  104.60 MIN    64.19000 GR       473
LIBR=WEST  REF TIME= 282.792 90
*****************************************************************************
P

                          SPECIAL ANALYSIS
PK-ENERGY-GAMMA   BRANCH   EFFICIENCY   CPM CORR     DPM      ERROR   PCI/GRAM
     KEV           FRAC       FRAC      CNTG DECAY   NOW       PCT    AT TZERO

K  40   4.602E+11 DAYS     LAMBDA= 1.506E-12    DECAY= 1.000E+00  1G
1461 (1460.85)   0.110000   0.00556       1.083  1.770E+03 s11.61%  1.242E+01

Cs137   1.102E+04 DAYS     LAMBDA= 6.290E-05    DECAY= 9.977E-01  3G
 661 ( 661.64)   0.851000   0.01293       2.056  1.869E+02 s 8.54%  1.315E+00

Co 60   1.921E+03 DAYS     LAMBDA= 3.608E-04    DECAY= 9.867E-01  4G
**** (1173.21)   0.999200   0.00706       0.251  3.554E+01 s     <  2.528E-01
1333 (1332.48)   1.000000   0.00615       0.242  3.924E+01 s30.72%  2.791E-01

Cs134   7.531E+02 DAYS     LAMBDA= 9.204E-04    DECAY= 9.665E-01  9G
**** ( 475.30)   0.015000   0.01810       0.381  1.404E+03 s     <  1.019E+01
**** ( 604.60)   0.980000   0.01419       0.337  2.427E+01 s     <  1.762E-01
**** ( 795.80)   0.880000   0.01066       0.249  2.657E+01 s     <  1.929E-01

Ce144   2.842E+02 DAYS     LAMBDA= 2.439E-03    DECAY= 9.138E-01 15G
**** (  40.93)   0.005000   0.00344       0.709  4.120E+04 s     <  3.164E+02
**** (  80.12)   0.015400   0.04408       0.849  1.251E+03 s     <  9.605E+00
**** ( 133.53)   0.108000   0.05961       0.728  1.130E+02 s     <  8.679E-01
```

<--- Sample ID, detector number (G-3), geometry (PD), date of count (319.763 90), length of count, aliquot and units (64.19000 GR), disk file ID (473).

<- Specific Analysis library and reference time.

<--- Nuclide in Specific Analysis library (K40), half life, decay constant (in reciprocal days), decay from reference time to counting time, number of gamma lines in general library (1G).

<--- Energy (keV) of found peak (1333), known energy of peak (1332.48), Branch (1.00000), detector efficiency at this energy, cpm corrected for decay during counting, dpm uncorrected for aliquot or decay, pCi/unit aliquot. An "s" after the dpm indicates an entry in the Sp. Anal. file.

<- Asterisks in the first column indicate a peak was not found near this energy. In this case, the cpm column indicates the approximate cpm that would have had to have been present to find a peak, the dpm column is the dpm calculated from this cpm, and the final column is an MDA based on 4.66 std dev's of the background.

```
*****************************************************************************
6201    GLY  38       G-3 PD 319.763 90  104.60 MIN    64.19000 GR       473
LIBR=WEST  REF TIME= 282.792 90
*****************************************************************************
P
*****************************************************************************
* Group......................... 6201 * Time of count         319.763 1990 *
* Sample........................ 38 * Reference GMT........ 282.792 1990 *
* Element.........................  * Elapsed Live Tm.............. 104.6 *
* Type code...................... GLY * Dead Time Pct............ 0.504134 *
* ID..................... 90-3062-02 * Background GMT....... 315.026 1990 *
* Geometry, detector........... PD-3 * Standard GMT......... 318.072 1990 *
* Aliquot................... 64.19001 * Days since T0............ 36.97101 *
* Unit of Aliquot.............. GRAM * Time on.......... 10:18 PST 15-NOV *
* Data Sheet Units........ PCI /GRAM * Time off......... 12:03 PST 15-NOV *
* Library....................... WEST * Number times calc............... 0 *
*****************************************************************************
* Slope..................... 0.993209 * Width slope............... 0.003654 *
* Intercept................ 7.916329 * Width offset............... 2.052999 *
* X**2 TERM.......... 0.30387376E-07 * Sensitivity.................... 4. *
```

Self explanatory information about the count

The keV/channel is defined by the polynomial keV=a+b*ch+c*ch^2. The resolution is defined by FWHM= SQRT(d+e*keV). The three terms on the left are a, b and c in the keV/ch expression. The Width slope and Width offset are d & e in the FWHM expression. The Sensitivity is a peak search parameter that controls how big a peak must be before it is accepted as a peak.

```
NP:[7,67]473.GSP                    18 PEAKS

*****************************************************************************
 PK IT   ENRG LEFT WD BKGND FWHM   AREA   CHAN       CPM  ERR  EFF  K  FIT
  1  0   27.3   19  6   112 1.42     61   21.2  5.79E-01 32.50.147  0  0.00
  2  0   74.7   64 10   591 3.78    190   68.8  1.82E+00 25.1 3.99  0  0.00
  3  0   90.8   82  8   367 2.03    117   85.1  1.12E+00 31.5 5.07  0  0.00
  4  0  184.4  176  9   243 1.92     74  179.1  7.04E-01 42.8 4.76  0  0.00
  5  0  237.2  228  8   242 1.25    260  232.2  2.49E+00 11.5 3.68  0  0.00
  6  0  293.8  286  7   124 1.30     75  289.2  7.17E-01 29.0 3.00  0  0.00
  7  0  337.2  328  9   102 1.76     83  332.7  7.98E-01 24.6 2.58  0  0.00
  8  0  350.6  343  6    71 1.65    128  346.3  1.22E+00 14.2 2.47  0  0.00
  9  0  511.0  501 13   101 3.30     76  507.5  7.24E-01 32.3 1.68  0  0.00
 10  0  582.2  574 10    55 1.48     80  579.1  7.65E-01 19.7 1.48  0  0.00
 11  0  608.4  600 11    54 2.18     94  605.5  9.03E-01 19.2 1.41  0  0.00
 12  0  660.7  654  9    37 1.68    219  658.0  2.09E+00  8.4 1.30  0  0.00
 13  0  910.3  904 10    28 1.77     45  908.9  4.34E-01 24.40.929  0  0.00
 14  8  965.5  960 11    12 2.10     17  964.4  1.67E-01 41.90.870  0  1.81
 15  8  968.8  960 11     8 2.10     29  967.7  2.82E-01 26.60.866  0  0.00
 16  0 1119.0 1117  7    17 1.51      7 1118.7  6.99E-02103.90.745  0  0.00
 17  0 1333.0 1329 11     3 1.12     27 1333.9  2.59E-01 28.70.619  0  0.00
 18  0 1460.9 1457 11     7 2.61    128 1462.4  1.22E+00 10.30.558  0  0.00
COMMENT FILE OPENED NEW IN SBGVT1
```

This section lists the peaks found by the peak search. PK is the peak number. IT is the number of iterations required for deconvolution (for multiple peaks only). ENRG is the energy in keV. LEFT is the leftmost channel of the peak region. WD is the width of the integration region in channels. BKGND is the background counts under the peak. FWHM is the resolution in channels. AREA is the area. CHAN is the centroid channel. CPM is the counts/min. ERR is the 1 sigma percent error. EFF is the percent efficiency at the peak center. (K is unused). FIT is a normalized chi^2 statistic indicating goodness of fit for a multiple peak separation.

```
*******************************************************************************
BACKGROUND INFO 6201    GLY  38       319.763 90 G- 3     BG DATE 315.026 90
*******************************************************************************
```

<--- BG DATE is the date of the most recent background on this detector.

<--- This section shows the subtraction of known background peaks from the peaks found. Only those peaks found that are very close to known background peaks are listed here. Under PEAK are columns for the ENERGY, CPM and %ERROR of the found peaks before any subtraction. under BACKGROUND are columns for the energies of the known background peaks, the average CPM of each peak for the last ten backgrounds and the %ERROR in this average CPM. Under NET are columns for the net CPM of the peak after the background cpm is subtracted and the %ERROR in the net cpm after accumulation with the error in the background peak.

v--------PEAK---------v			v------BACKGROUND------v			v------NET----v	
ENERGY	CPM	%ERROR	ENERGY	CPM	%ERROR	CPM	%ERROR
90.84	1.1178	31.54	92.00	0.1665	0.00	0.9513	37.06
184.36	0.7043	42.83	186.00	0.1147	4.10	0.5896	51.16
237.19	2.4859	11.50	238.60	0.1778	3.31	2.3081	12.39
293.83	0.7168	28.96	295.20	0.0000	0.00	0.7168	28.96
337.16	0.7976	24.65	338.40	0.0548	1.22	0.7428	26.47
350.63	1.2197	14.23	351.90	0.0389	0.66	1.1808	14.70
511.00	0.7237	32.34	511.00	0.3924	3.16	0.3313	70.75
582.22	0.7648	19.67	583.10	0.0595	0.58	0.7054	21.32
608.45	0.9029	19.22	609.30	0.0438	1.98	0.8591	20.20
660.72	2.0898	8.40	661.60	0.0342	0.83	2.0556	8.54
910.31	0.4342	24.42	911.10	0.0462	1.28	0.3880	27.33
968.81	0.2818	26.61	968.90	0.0271	0.94	0.2547	29.44
1118.99	0.0699	103.87	1120.30	0.0205	0.75	0.0494	147.06R
1333.03	0.2586	28.70	1332.50	0.0171	0.41	0.2415	30.72
1460.89	1.2216	10.29	1461.00	0.1390	1.24	1.0826	11.61

1 PEAKS REJECTED BY BACKGROUND

<- If the net 1 sigma error in a peak after background subtraction is greater than 85%, The peak is rejected from further analysis and is flagged with "R" after the net error

```
*******************************************************************************
NATURAL ISOTOPE ANALYSIS 6201    GLY  38       319.763 90 G- 3
*******************************************************************************


RA226     609.32  0.4840                REF NAT ISOTOPE PEAK
v-----------PEAK----------------v      v--CALCULATED--v     v-----NET--------v
ENERGY     CPM       DPM  %ERROR        ENERGY   CPM            CPM  %ERROR

 293.83    0.717     119.0 28.96        295.20  0.7580        -0.0412****** R
 350.63    1.181     121.8 14.70        351.96  1.2205        -0.0397****** R
 608.45    0.859     125.9 20.20        609.32  0.8591    <-reference peak->
 965.50    0.167    4497.7 41.86        964.10  0.0047         0.1624 43.07 S

TH228     238.62  0.4480                REF NAT ISOTOPE PEAK
v-----------PEAK----------------v      v--CALCULATED--v     v-----NET--------v
ENERGY     CPM       DPM  %ERROR        ENERGY   CPM            CPM  %ERROR

 237.19    2.308     139.9 12.39        238.62  2.3081    <-reference peak->
 511.00    0.331     257.1 70.75        510.69  0.1803         0.1510155.91 R
 582.22    0.705     166.6 21.32        583.17  0.5923         0.1130148.04 R

AC228     911.10  0.2500                REF NAT ISOTOPE PEAK
v-----------PEAK----------------v      v--CALCULATED--v     v-----NET--------v
ENERGY     CPM       DPM  %ERROR        ENERGY   CPM            CPM  %ERROR

 337.16    0.743     276.7 26.47        338.40  0.4485         0.2943 78.72 S
 511.00    0.151    2137.3155.91        509.60  0.0118         0.1392169.15 R
 910.31    0.388     167.1 27.33        911.10  0.3880    <-reference peak->
 965.50    0.162     397.2 43.07        964.60  0.0683         0.0941 76.95 S
 968.81    0.255     196.0 29.44        968.90  0.2171         0.0375254.67 R
```

<--- This section helps interpret spectra which contain naturally occurring activity by subtracting appropriate amounts from known daughter peaks of these nuclides.

<--- This is a naturally occurring reference nuclide and its main reference peak energy.

<--- Under PEAK, the ENERGY column is the found energy of a peak close to a known daughter of the reference nuclide and CPM is its count rate. DPM and %ERROR are the corresponding activity and error of the reference nuclide based on this peak. Under CALCULATED is the known ENERGY of a daughter radiation and what the CPM would be based on the reference peak. The calculated cpm is subtracted from the peak cpm and the result is shown under NET. If the net error is greater than 100%, the peak is rejected from further analysis

```
RGF TRANSFERS DATA FROM NP:[7,67]903197623.GTX          TO GSTOR 473
GLB WRITES THE FOLLOWING TO NP:[7,67]GYDCSVT01.DAT          6201=GROUP
    0=LRW            0=LRA       WEST=LIBR
JLYKTL PARAMETERS
       JELYKTL READ
EFFICIENCY FILE NP:[25,4]GELI03PD0.EFF
GEODET
       Effs fetched  33.000    90
FETCH CALIBRATION LINE
       Calibration line fetched318.072     1990
BKG FETCH ROUTINE GETS BG FOR  315.026 1990 IERR=   0
SPANF
        FETCHING SPANF
WHDTR CALLED
       HDR WRITTEN IN
GSTFIL
       PEAKFILE UPDATED
```

<-- These are processing comments generated during the analysis by the computer program. They assist the analyst in diagnosing potential processing problems

QC USED IN DATA REDUCTION OF SAMPLE 6201 38 GLY RUN AT 319.763/1990

<--- These next sections document the continuing calibration of the detector.

BACKGROUND FOR GELI DETECTOR 3 OF 315.026/1990

<--- This first section is a summary of the background peaks used for background subtraction. It consists of columns of background peak energies, the average cpm of each peak over the last ten backgrounds and the error in the average cpm. If the cpm's are 0.0 then the peak has not been found in the last ten backgrounds.

ENERGY	CPM	ERROR	ENERGY	CPM	ERROR	ENERGY	CPM	ERROR
62.0	0.0000	0.00	511.0	0.3924	8.05	1120.3	0.0205	36.53
92.0	0.1665	0.00	583.1	0.0595	9.75	1173.2	0.0266	49.98
143.0	0.0000	0.00	609.3	0.0438	45.23	1238.1	0.0137	0.00
186.0	0.1147	35.76	661.6	0.0342	24.26	1332.5	0.0171	24.03
198.0	0.0000	0.00	727.2	0.0277	0.00	1377.7	0.0000	0.00
238.6	0.1778	18.62	846.0	0.0316	12.04	1461.0	0.1390	8.92
279.0	0.0000	0.00	860.4	0.0247	0.00	1586.0	0.0067	0.00
295.2	0.0000	0.00	911.1	0.0462	27.69	1591.0	0.0172	51.79
338.4	0.0548	22.26	968.9	0.0271	34.67	1729.6	0.0122	0.00
351.9	0.0389	16.98	1001.0	0.0000	0.00	1764.5	0.0177	14.12

GELI STANDARD EFFICIENCY QC FOR DETECTOR G- 3 ON 11/15/90

<--- This section documents the last ten counts of the Ra226 standards. Two standards (High and Low) are counted and the data is divided into separate tables for each standard. Each table has a column for the date of the counts (GMT and YEAR), the average of the normalized cpm's of selected peaks and the associated errors in these averages. The peak cpm's are normalised to 1.00 to indicate significant shifts in detector efficiencies.

HIGH RADIUM STANDARD					LOW RADIUM STANDARD				
GMT	YEAR	NORMALISED CPM	% ERROR	LENGTH IN MINUTES	GMT	YEAR	NORMALISED CPM	% ERROR	LENGTH IN MINUTES
0.000	0	0.0000	0.000	0.	0.000	0	0.0000	0.000	0.
270.968	90	1.0038	8.256	7.	0.000	0	0.0000	0.000	0.
279.956	90	1.0062	9.992	34.	0.000	0	0.0000	0.000	0.
293.932	90	0.9634	6.325	11.	0.000	0	0.0000	0.000	0.
04.302	90	0.9278	8.929	18.	0.000	0	0.0000	0.000	0.
309.706	90	0.9341	10.637	10.	0.000	0	0.0000	0.000	0.
311.010	90	0.8957	7.326	11.	0.000	0	0.0000	0.000	0.
311.911	90	1.0151	10.983	14.	0.000	0	0.0000	0.000	0.
316.705	90	0.8713	6.612	6.	0.000	0	0.0000	0.000	0.
318.072	90	1.0102	9.838	13.	0.000	0	0.0000	0.000	0.
AVERAGE		0.9586	0.054		AVERAGE		0.0000	0.000	

CALIBRATION LINE FROM STANDARD FOR G- 3 OF 318.072 90
ENERGY= 7.916329 + 0.9932099*CH + 3.038738E-08*CH**2
FWHM =SQRT(2.0530 + 0.003655*ENERGY) (CO60= 2.631)

<--- This section reiterates the energy calibration and resolution polynomials as shown previously on the header page. This data is generated new each time the Ra standard is counted.

EFFICIENCIES FOR GEOMETRY PD3 CALIBRATED 33.000 1990

<--- This is a summary of the primary efficiency calibration for this detector in the geometry used for this count. The geometry and date of calibration are shown, followed by a table of energies and percent efficiencies for the range 55 to 3000 keV.

ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*	ENERGY	EFFC*
55.0	2.000*	110.0	5.770*	170.0	5.200*	400.0	2.160*	1200.0	0.690*
60.0	2.620*	120.0	5.950*	200.0	4.400*	500.0	1.720*	1500.0	0.540*
80.0	4.400*	130.0	5.970*	220.0	4.000*	600.0	1.430*	2000.0	0.400*
90.0	4.950*	140.0	5.900*	250.0	3.500*	800.0	1.060*	2500.0	0.315*
100.0	5.450*	150.0	5.650*	350.0	2.480*	1000.0	0.835*	3000.0	0.263*

```
*******************************************************************************
6201  38          GLY                                        GSTOR 473
*******************************************************************************

   PK  ENERGY    CPM %ERR      COMMENT
    1   27.3    0.58 32.5 ..............................................
    2   74.7    1.82 25.1 ..............................................
b   3   90.8    0.95 37.1 ..............................................
b   4  184.4    0.59 51.2 ..............................................  Cs137c
b   5  237.2    2.31 12.4 Th228 ........................................
bn  7  337.2    0.29 78.7 Ac228 ........................................
b  11  608.4    0.86 20.2 Ra226 ........................................
b  12  660.7    2.06  8.5 ........................................ Cs137s
b  13  910.3    0.39 27.3 Ac228 ........................................
 n 14  965.5    0.09 76.9 Ra226 Ac228 ..................................
b  17 1333.0    0.24 30.7 ..................................... Ag110 Co 60s
b  18 1460.9    1.08 11.6 ........................................ K  40s
                  REJECTED PEAKS
B  16 1119.0    0.05 99.9 Ra226 ...................................... Co 60c
bN  6  293.8   -0.04 99.9 Ra226 ...................................... Ru103
bN  8  350.6   -0.04 99.9 Ra226 ........................................
bN  9  511.0    0.14 99.9 Ac228 Th228 ................... La140 Ru106 Na 22
bN 10  582.2    0.11 99.9 Th228 ........................................
bN 15  968.8    0.04 99.9 Ac228 ......................................Sb124
```

<- This section is summary of the nuclide identification processing that has taken place. It is designed to assist the analyst in evaluating the data.
The first column indicates background and natural activity processing: "b" means a background peak was subtracted ("B" means it was rejected after subtraction); "n" means the peak had a natural activity peak subtracted ("N" indicates the peak was rejected after this subtraction). All peaks that were rejected are grouped into the bottom section of the list. Under the COMMENT section are listed common nuclides which are often associated with the peaks listed. Other symbols are "s" for an entry in the specific Analysis library, "c" for a compton peak, and + for a pair production peak.

8.0 **APPENDIX:** N/A

9.0 **SUPERSESSION:** This Procedure supersedes CR-105, Rev. 01, same title, dated 01-28-97.

APPENDIX B

PROJECT CONTRACTOR QUALITY CONTROL PLAN

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

CONTRACT NO. N62473-06-D-2201
CTO NO. 0021

APPENDIX B

FINAL

PROJECT CONTRACTOR QUALITY CONTROL PLAN

August 2007

BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

DCN: ECSD-2201-0021-0001

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

Greg Joyce
QC Program Manager

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ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
BRAC	Base Realignment and Closure
CHP	Certified Health Physicist
CIH	Certified Industrial Hygienist
CQC	Contractor Quality Control
CSO	Caretaker Site Office
CTO	Contract Task Order
DFW	definable feature of work
DoD	Department of Defense
DON	Department of the Navy
EHS	Environmental Health and Safety
EM	Engineer Manual
EPA	U.S. Environmental Protection Agency
FCR	Field Change Request
FSS	Final Status Survey
HPS	Hunters Point Shipyard
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
NCR	Nonconformance Report
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSTA TI	Naval Station Treasure Island
NRC	Nuclear Regulatory Commission
NTR	Navy Technical Representative
PCQC	Project Contractor Quality Control
PjM	Project Manager
PMO	Program Management Office
PQCM	Project Quality Control Manager
QAO	Quality Assurance Officer
QC	quality control
QCM	Quality Control Program Manager
RASO	Radiological Affairs Support Office

ABBREVIATIONS AND ACRONYMS
(Continued)

RCT	Radiological Control Technician
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RSO	Radiation Safety Officer
RTM	Radiological Task Manager
RWP	Radiation Work Permit
SAP	Sampling and Analysis Plan
SHSP	Site-Specific Health and Safety Plan
SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
TI	Treasure Island
UFGS	Unified Facilities Guide Specification
USACE	U.S. Army Corps of Engineers
YBI	Yerba Buena Island

1.0 INTRODUCTION

This Project Contractor Quality Control (PCQC) Plan describes procedures and methods to be implemented for survey and decontamination in the support of radiological release of Buildings 343, and 344, and drain lines at Building 233 on Naval Station Treasure Island (NAVSTA TI), San Francisco, California. The Department of the Navy (DON), represented by the Base Realignment and Closure (BRAC) Program Management Office (PMO) West, Naval Facilities Engineering Command, Southwest (NAVFAC SW), and the Radiological Affairs Support Office (RASO), are directing this removal action. This removal action is being performed under Remedial Action Contract No. N62473-06-D-2201, Contract Task Order (CTO) No. 0021. This PCQC Plan fulfills the requirements of the TtEC Contractor Quality Control (CQC) system requirements.

1.1 BACKGROUND

The Army Corps of Engineers constructed NAVSTA TI in 1936 to be the site of the 1939 Golden Gate International Exposition.

The first documented use of radioactive materials on NAVSTA TI began in 1947. Two separate, but closely related, operational areas accounted for the major uses of radioactive materials on NAVSTA TI. These two areas are:

- Use of radioactive sources to train naval personnel on the calibration and operation of radiation monitoring instruments
- Use of radioactive sources to train naval personnel on monitoring and decontamination of ships and airplanes

A third possible source of radioactive materials is the berthing of OPERATION CROSSROADS ships at NAVSTA TI. Although no ship decontamination operations were known to have occurred at NAVSTA TI, some OPERATION CROSSROADS ships that were decontaminated at Hunters Point Shipyard (HPS) were temporarily berthed at NAVSTA TI prior to those ships receiving final radiological clearance.

As early as 1968, the Navy had leased several NAVSTA TI buildings to private tenants and Navy-related entities for various uses. Many non-Navy and even non-military tenants occupied space on NAVSTA TI including the American Red Cross, the U.S. Environmental Protection Agency (EPA), the National Maritime Union Job Corps, and the Treasure Island Yacht Club.

There is no indication that any of the buildings on Yerba Buena Island (YBI) were used in support of the radiological activities of the various training schools on NAVSTA TI. A pier on YBI was used for a few days to provide accommodation berthing for an OPERATION

CROSSROADS ship after it was decontaminated at HPS, but before the ship was given final radiological clearance. Many of the buildings had multiple uses over the life of the Naval Station.

Several alternative scenarios are under review for development of the former Naval Station. All scenarios include some combination of residential, open space, publicly oriented, and institutional and community uses. There are no known current uses of licensed or unlicensed radioactive materials on NAVSTA TI.

1.2 OBJECTIVES

The objectives of these activities are to evaluate impacted sites that may contain residual radioactive contamination as a result of past activities at NAVSTA TI and confirm that Buildings 343 and 344 on NAVSTA TI meet the release criteria. The radiological survey and sediment sampling at Building 233 will be conducted as a scoping/characterization survey. These activities include:

- Reference (Background) Surveys
- Scoping Surveys
- Final Status Surveys (FSSs)
- Media Sampling

Where applicable, survey activities will be conducted consistent with the guidelines in the *Multi-Agency Radiation Survey and Site Investigation Manual* (Multi-Agency Radiation Survey and Site Investigation Manual [MARSSIM]; *NUREG-1575*, Department of Defense [DoD] et al., 2000), as incorporated into this PCQC Plan. Survey activities, as well as activities not addressed by MARSSIM, will be performed in accordance with this PCQC Plan and Standard Operating Procedures (SOPs) of the selected radiological subcontractor.

1.3 SCOPE

All work activities will be conducted in accordance with this Work Plan.

The Project CQC Plan will be implemented for the following activities:

- Mobilization
- Background static and scan measurements
- Scoping surveys that include a preliminary contamination assessment; identification of radionuclide contaminants; assessment of radionuclide ratios and general levels and extent of radionuclide contamination, support of classification designated for impacted areas; evaluation of whether the survey strategy can be optimized for use in the characterization or FSSs

- FSS to demonstrate that radiological parameters satisfy the established guideline values and conditions for radiological release, the primary objectives of which are to verify classification of impacted areas; and to demonstrate that the potential dose or risk from residual contamination is below the release criteria and that potential dose or risk from small areas of elevated activity is below the release criteria
- Media sampling and gamma energy analysis for discrete survey areas
- Demobilization

1.4 PURPOSE

The purpose of this PCQC Plan is to establish the specific procedures and methods for field inspections, and to provide an effective quality control (QC) system to ensure the quality of all work performed by TtEC and its subcontractor personnel for the removal activities. This plan is applicable to all field operations and will be available at the project field office. All work activities will be conducted in accordance with this Work Plan.

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2.0 ORGANIZATION AND RESPONSIBILITIES

This section describes management of the project including organizational, structural, and functional responsibilities.

2.1 ORGANIZATION

The project personnel will be organized to facilitate effective communications and to ensure that organizational lines of communications, roles and responsibilities, and reporting requirements are well defined. The organization will be defined to a level sufficient to ensure that each participant whose actions could affect the quality of radiological task planning, field operations, or reporting, has an understanding of his/her responsibilities and how these responsibilities fit into the overall team. The project organization chart is provided in Figure B.2-1.

The project personnel with the primary responsibilities for the achievement and verification of the project's radiological goals and objectives are the Project Manager (PjM), Certified Industrial Hygienist (CIH), Quality Control Program Manager (QCM), Site Superintendent, Project Quality Control Manager (PQCM), Certified Health Physicist (CHP), Radiation Safety Officer (RSO), Site Health and Safety Specialist (SHSS), Program Chemist, Radiological Task Manager (RTM), and Radiological Control Technicians (RCTs). Their roles and responsibilities are described in the following sections. DON oversight of the activities performed by the project team will be provided by RASO, BRAC PMO West, and NAVFAC SW personnel.

2.1.1 Project Manager

The PjM is responsible for the direction, execution, and successful completion of project tasks to achieve overall project goals. The PjM has the primary responsibility for coordinating activities and concerns with the DON Remedial Project Manager (RPM) and RASO. The PjM also has the responsibility and authority to perform the following:

- 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 project deliverables are completed on time and within budget
- Ensuring adherence to the requirements of the contract, project scope of work, and the project plans
- Ensuring that all work activities are conducted in a safe manner in accordance with the Site Health and Safety Plan (SHSP)

- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Serving as the senior contact between the DON and TtEC for actions and information related to the work
- Ensuring effective implementation of the radiological record management program
- Ensuring that all personnel assigned to perform fieldwork are appropriately monitored for exposure to ionization radiation
- Coordinating regulatory site visits

2.1.2 Certified Industrial Hygienist

The CIH has authority to implement and oversee the TtEC Health and Safety Program, and the CIH has the responsibility and authority to perform the following:

- Ensuring that all staff, including subcontractors, comply with the SHSPs, state and federal regulations, and corporate policies
- Interacting with the PjM on all aspects of health and safety from the initial planning phase through fieldwork and closeout
- Providing advice and assistance on any safety, industrial hygiene, or accident prevention issue to the SHSS, PjM, and Site Superintendent
- Reviewing all site health and safety documents and cost estimates, and working to properly staff projects
- Working to pre-qualify field subcontractors

2.1.3 Quality Control Program Manager

The QCM will report directly to the Director of Quality Programs and has the responsibility and authority to perform the following:

- Establishing and maintaining the QC program for the project
- Overseeing the QC program including data acquisition
- Working directly with the PjM and NAVFAC SW Quality Assurance Officer (QAO) to ensure implementation of the Program QC Plan
- Acting as a focal point for coordination of all QC project-related matters and resolving all QC issues
- Providing QC direction and training to the PQCM and others who are performing QC functions
- Suspending project activities if quality standards are not maintained

- Interfacing with the DON, including the NAVFAC SW QAO, on quality-related items
- Conducting field QC audits to ensure that site QC plans are being followed
- Performing reviews of audit and surveillance reports conducted by others
- Implementing DON technical direction letters related to QC topics

2.1.4 Site Superintendent

The Site Superintendent will report to the PjM and is responsible for coordinating, directing, implementing, and supervising site construction and support activities. The Site Superintendent has the responsibility and authority to perform the following:

- Implementing field activities in accordance with the Work Plan
- Scheduling and directing field activities, support personnel, and subcontractors
- Administering site access and communication within active work areas
- Maintaining work site, facilities, vehicles, and equipment
- Ensuring that all work activities in the field are conducted in a safe manner and in accordance with the health and safety plans
- Coordinating and maintaining logistics of components of on-site tasks, including personnel and equipment
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Preparing status reports and estimating future scheduling needs
- Preparing Daily Contractor Production Reports

2.1.5 Project Quality Control Manager

The PQCM is responsible for overall management of project QC and will report to the QCM. The PQCM will be on site at all times during field activities. The PQCM has the responsibility and authority to perform the following:

- Monitoring activities to ensure conformance with the Work Plan, and applicable policies, procedures, contract specifications, and sound practices
- Preparing the Daily QC reports
- Ensuring that the three phases of inspection (preparatory, initial, and follow-up) are implemented for all definable features of work (DFWs)
- Ensuring that required tests and inspections are performed and the results reported

- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Issuing and maintaining Field Change Requests (FCRs) and Nonconformance Reports (NCRs) for project activities (construction- and radiological-related)
- Maintaining an NCR and FCR log
- Ensuring that planning documents are current and controlled
- Maintaining the Submittal Register and a Submittal Log
- Stopping work not in compliance with the contract

An appointment letter for the PQCM is included in Attachment 1.

2.1.6 Certified Health Physicist

The CHP is responsible for implementing, directing, and supervising all radiological project-related activities. The CHP has the responsibility and authority to perform the following:

- Assisting in the development and approval of the SHSP
- Aiding in identifying radiological analysis needs
- Supplying technical support in subcontractor selection
- Providing health physics guidance on an as-needed basis
- Rendering radiological control protection services, if required
- Directing and assisting project personnel in proper completion of radiological records
- Assisting the RSO to determine if an external dose is to be assigned to an individual who reported lost or damaged dosimetry devices
- Ensuring that the required radiological safety training is provided to project personnel
- Reviewing and approving project field procedures that involve the handling of radioactive materials or access to radiological areas
- Ensuring timely and thorough review of records, in accordance with the TtEC radiological records procedure, prior to approval
- Approving records with verifiable signature and date once records meet the quality standards as described in the radiological records procedure
- Carrying out radiation incident investigations
- Conducting radiological project inspections
- Performing data assessment

2.1.7 Radiation Safety Officer

The RSO will be responsible for oversight of the inspection and certification activities for radiological safety-related activities. The duties specified for the RSO may be shared with the CHP as appropriate. In accordance with DON requirements, the RSO or a qualified designee will be on site during radiological work conducted under this Work Plan. The RSO has the responsibility and authority to perform the following:

- Providing radiological material-related safety briefings
- Assuring that specified radiological safety procedures are followed and that the radiological safety tests and inspections are complete and acceptable
- Conducting daily oversight and field safety inspections and tests required by the project technical specifications and applicable professional standards
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Serving as a contact person for lost or damaged dosimeters for TtEC staff
- Conducting search, investigating, and then documenting dosimeters that are reported lost or damaged for TtEC staff
- Ensuring that an individual who reported a lost or damaged dosimeter is excluded from a radiologically controlled area until the investigation is completed, documented, and the dosimetry device re-issued for TtEC staff
- Reviewing the exposure condition of an individual who reported lost or damaged dosimetry in order to assign an external dose with concurrence of the CHP
- Ensuring that each individual working at an impacted area wears a dosimetry device specified in the RWP
- Verifying compliance with on-site RWPs and SOPs (including laboratory SOPs and radiological SOPs from the selected radiological subcontractor)
- Assuring that all radiological safety documentation is provided to the PQCM for inclusion in the project files
- Providing surveillance of radiological-related activities
- Serving as a contact person for Nuclear Regulatory Commission (NRC) site inspections
- Stopping work that is not in compliance with RWPs, good radiological practices, and the subcontractor's approved SOPs

2.1.8 Site Health and Safety Specialist

The SHSS ensures that all elements of the approved SHSP are implemented and enforced on site. The SHSS will report directly to the CIH and will assist in implementing and enforcing the SHSP in the field. The SHSS has full authority to issue stop work orders or evacuation orders where work operations or noncompliance(s) may threaten the health and safety of site workers or the public. The SHSS has the responsibility and authority to perform the following:

- Making certain that all personnel understand the requirements of the TtEC Environmental Health and Safety (EHS) program and procedures through training and communication
- Ensuring enforcement of the SHSP by means of daily site inspections
- Investigating all accidents, injuries, illnesses, near-misses, and other incidents
- Ensuring that project personnel are trained on the dangers of hazardous substances on the project, maintaining Material Safety Data Sheet files to provide easy access to project personnel, and performing inspections to ensure that all waste containers are correctly labeled
- Ensuring that the TtEC SHSP is read, understood, and signed by all personnel including subcontractors
- Ensuring that tailgate safety meetings are conducted on days that work is performed and that documentation of all meetings and any other additional training is completed
- Verifying that project safety equipment is inspected, as required by the EHS program
- Coordinating site health and safety requirements with the Site Superintendent and PjM
- Ensuring maintenance of all health and safety monitoring equipment and personal protective equipment and directing site-monitoring activities
- Coordinating daily field activities with the Site Superintendent
- Coordinating site safety and emergency response duties; verifying site communications system with site personnel
- Performing inspection of safety equipment
- Reporting to the Resident Officer in Charge of Construction (ROICC) within 2 hours (all incidents are required to be reported by Engineer Manual [EM] 385-1-1 – United States Army Corps of Engineers [USACE], 2003); and immediately reporting to the ROICC any fatal injury, one or more persons admitted to a hospital, or property damage to government property
- Verifying that all personnel have the necessary training and medical clearance prior to entering the exclusion zone or contamination reduction zone at the site; informing the Site Superintendent of any site personnel with medical restrictions

- Determining and posting routes to medical facilities and emergency telephone numbers arranging for emergency transportation to medical facilities
- Serving as the Project Hazard Communication Coordinator
- Maintaining training records and medical certifications for all on-site personnel including subcontractors
- Initiating necessary revisions or changes to the SHSP
- Maintaining site control procedures
- Maintaining current records of certification for first aid and cardiopulmonary resuscitation for project field personnel
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings
- Notifying the PjM, RPM, and RASO regarding radioactive anomalies
- Managing the storage of radioactive waste in accordance with the radioactive material license
- Implementing and monitoring on-site radiological training programs

2.1.9 Program Chemist

The Program Chemist oversees sample collection, handling, analysis, and analytical data reporting. The Program Chemist has responsibility and authority for the following:

- Developing Sampling and Analysis Plan (SAP)
- Evaluating and selecting qualified subcontract laboratories
- Implementing data QC procedures and performing audits of field performance
- Reviewing off-site laboratory data prior to use
- Coordinating data validation of off-site laboratory data
- Reviewing data validation reports
- Preparing analytical reports and supporting project report preparation

2.1.10 Radiological Task Manager

The RTM will direct field survey personnel and health physics operations as assigned by the CHP. The RTM has the responsibility and authority to perform the following:

- Performing the functions enumerated in the Work Plan
- Supervising field staff for survey, site remediation and decontamination, use of survey equipment and instrumentation, and support of programs and projects

- Ensuring compliance by RCTs with the applicable SOPs from the selected radiological subcontractor for safety program, survey, and/or remediation actions
- Ensuring compliance with NRC, Occupational Safety and Health Administration, and EPA directives, as well as applicable local, state, and federal statutes and codes
- Interpreting and verifying data accumulated from surveys and monitoring activities
- Maintaining inventory and ensuring safe use and serviceability of tools, equipment, and vehicles on site
- Informing the RTM of work progress
- Ensuring that each individual working at an impacted area complies with the requirements specified in the Radiation Work Permit (RWP)

2.1.11 Radiological Control Technicians

The RCT has the responsibility and authority to perform the following:

- Conducting and documenting field surveys, sampling, and support in accordance with the Work Plan and SOPs
- Interpreting and verifying field data accumulated from surveys and monitoring activities
- As assigned, assisting in training support personnel in health physics and safety
- Supporting dose assessments, and ensuring compliance with QC programs, emergency plans, and procedures
- Performing effluent monitoring and radioactive material inventories
- Performing survey equipment efficiencies, response checks, and daily checks of the survey instruments
- Conducting safety evaluations of health physics field equipment
- Preparing and implementing use of RWPs, including being present at active work areas to ensure compliance with the RWPs in the absence of the RTM

2.1.12 Remedial Project Manager

The RPM has primary responsibility within the DON for day-to-day management of the project activities performed under this Work Plan and for its successful completion. The RPM's duties and authority include:

- 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

- Integrating Comprehensive Environmental Response, Compensation, and Liability Act issues at NAVSTA TI with ongoing radiological activities
- Acting as lead interface with agencies on non-radiological issues
- Together with the Radiological Site Manager, negotiating radiological release criteria with regulatory agencies

2.1.13 Radiological Site Manager

As a representative of RASO, the Radiological Site Manager has primary responsibility within the DON for the technical accuracy and the regulatory conformance of work performed under this PCQC Plan. The Radiological Site Manager's duties and authority include the following:

- Reviewing and approving project work plans and procedures
- Acting as lead interface with regulatory agencies on radiological survey plans and reports
- Together with the RPM, negotiating radiological release criteria with regulatory agencies
- Reviewing and approving project reports
- Ensuring compliance with applicable *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), *NUREG-1575* (Department of Defense [DoD] et al., 2000] requirements
- Recommending changes in TtEC's scope to the RPM, as appropriate
- Supporting public meetings

2.1.14 Quality Assurance Officer

The QAO is the DON representative with primary responsibility for ensuring that contract-required quality assurance measures are in place and effective for the work performed under this PCQC Plan. The QAO's duties and authority include:

- Reviewing and approving SAPs
- Providing DON oversight of the TtEC Quality Assurance Program
- Providing quality-related directives through the Contracting Officer Representative
- Providing technical and administrative oversight of TtEC surveillance audit activities
- Acting as point of contact for matters concerning quality assurance and the DON'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

2.1.15 Resident Officer in Charge of Construction

The ROICC staff has the primary responsibility for providing on-site quality assurance and safety oversight of contractors performing work at NAVSTA TI. The ROICC staff member's duties and authority include:

- Verifying that all work has been completed per contract and technical specifications prior to final government acceptance
- Performing ongoing field inspections to verify that all work is in compliance with both contract and technical specifications
- Notifying TtEC of any work that is not in compliance
- Interacting with the TtEC PQCM on quality-related issues
- Reviewing and signing waste manifests for non-radiological wastes as the generator's representative
- Reviewing contractor daily reports for completeness and accuracy
- Attending preparatory phase, initial phase, pre-final, and final acceptance inspections
- Attending weekly QC meetings

2.2 SUBCONTRACTORS AND VENDORS

The subcontractors for this project will be limited to a land surveyor, an analytical laboratory, a waste transporter, and waste disposal facilities. The subcontractors are required to provide labor, material, and equipment necessary to conduct their respective services as directed by the Site Superintendent. Subcontractors and vendors will be required to conform to the TtEC Project CQC Plan and the requirements of all approved procedures, technical specifications, and contract provisions.

The subcontractor's QC inspectors are responsible for field inspection of their construction, services, and operating activities. TtEC will monitor, oversee, and make on-site observations and inspections of work in progress to determine if the subcontractor's work is proceeding in accordance with the Project CQC Plan.

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 by the PQCM.

3.0 SUBMITTALS

This section describes the review and approval process of submittals. In addition, TtEC will institute and maintain a submittal register (included in Attachment 2) 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 Pre-construction Submittals
- SD-02 Shop Drawings
- SD-03 Product Data
- SD-04 Samples
- SD-05 Design Data
- SD-06 Test Reports
- SD-07 Certificate
- SD-08 Manufacturer's Instructions
- SD-09 Manufacturer's Field Reports
- SD-10 Operation and Maintenance Data
- SD-11 Closeout Submittals

The submittal descriptions are described in Section 1.4 of the UFGS 01330 (Naval Facilities Engineering Command [NAVFAC], 2006). The title list does not infer that they are all applicable to the DON's scope of work for this project.

3.1 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 by the PQCM, or designee, prior to acceptance. Approved submittals will be signed and dated. During the preparatory phase of the QC inspections, the PQCM or designee 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.

3.2 SUBMITTAL PROCESS

Required submittals will be submitted to the DON and project personnel as determined by the distribution schedule. Each submittal will have a unique submittal number. All possible attempts will be made to schedule submittals to allow for sufficient review and approval time. However, certain submittals will require accelerated processing to maintain the schedule.

A transmittal form will accompany each submittal. Each transmittal will be identified with:

- The 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 log regularly.

3.3 REVIEW AND PROCESSING OF SUBMITTALS THAT DO NOT REQUIRE DON APPROVAL

Material submitted for review by the PQCM will indicate that it either conforms to established requirements or does not conform to established requirements. The PQCM will advise submitter of the results of the review. The submittal log will be updated to indicate status.

Conforming submittals will be transmitted to project and DON personnel as determined by the distribution schedule. 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.

Nonconforming submittals will be returned to the submitter for correction, resolution of comments, and re-submittal.

3.4 REVIEW AND PROCESSING OF SUBMITTALS THAT REQUIRE DON APPROVAL

Material submitted for review by the PQCM will be signed to indicate that it conforms to requirements.

Submittals reviewed by the PQCM will then be transmitted to the DON in accordance with the project distribution schedule for 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 re-submittal, if required.

3.5 REVISED SUBMITTALS

Revised submittals will be logged, reviewed, and processed in a manner identical with the initial submittal.

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4.0 DEFINABLE FEATURES OF WORK

The DFWs establish the measures required to verify both the quality of work performed and compliance with specified requirements, and include inspecting materials and workmanship before, during, and after each DFW. The DFWs for this project include the following:

- Mobilization
- Background area static measurements
- Radiological scoping surveys
- Gamma spectroscopy survey
- Media sampling
- Identification and removal of radioactive material
- Final status survey
- Final status survey sampling
- Waste profiling
- Demobilization

Detailed descriptions of each DFW and the required phases of control are presented in Table B.3-1.

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5.0 QUALITY CONTROL MEETINGS

5.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to the start of site work, a coordination and mutual understanding meeting will be held with the ROICC to discuss the QC Program required by this contract. Attendees will include the RPM, ROICC/Navy Technical Representative (NTR), and Caretaker Site Office (CSO). 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 personnel required to attend the meeting shall include the PjM, Site Superintendent, PQCM, and RSO. Minutes of the meeting shall be prepared by the PQCM and signed by the PjM and the RPM and/or ROICC/NTR or designated representative. This meeting may be held as part of a normally scheduled CQC meeting.

5.2 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/NTR. The meetings will be held at the project site and will be attended by the ROICC/NTR, CSO, PjM, PQCM, RSO, SHSS, and the Site Superintendent. The PQCM will notify the ROICC/NTR at least 48 hours in advance of each meeting. The following shall be accomplished 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 2 weeks and documentation required. Schedule 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
  - Required testing
  - Status of off-site work or testing
  - Required documentation

- Resolve QC and production problems.
- Address items that may require revisions to the PCQC Plan.

6.0 INSPECTION PROCESS

6.1 PREPARATORY PHASE INSPECTION

The PQCM will conduct preparatory phase inspections prior to starting the DFWs identified for each survey area and classification. These inspections shall include the following:

- Reviewing the Work Plan and SOPs of the selected radiological subcontractor
- Ensuring that all materials and/or equipment have been tested, submitted, and approved
- Ensuring that provisions have been made to provide required control inspection and testing
- Examining the work area to ensure that all required preliminary work has been completed and is in compliance with the approved Work Plan requirements
- Physically examining the required materials and equipment to ensure that they are properly delivered to the site, conform to approved shop drawings or specifications, and are properly stored
- Reviewing the appropriate Activity Hazard Analysis (AHA) to ensure that safety requirements are met
- Discussing procedures for conducting the work, including potential repetitive deficiencies
- Documenting construction tolerance and workmanship standards for the particular phase of work
- Ensuring that the PCQC Plan for the work to be performed has been accepted by the DON

The PjM, RPM, ROICC/NTR, and the CSO shall be notified at least 2 working days in advance of preparatory phase activity. This phase shall include a meeting conducted by the PQCM and attended by the Site Superintendent and any other personnel involved in performing the DFW.

The issues discussed during the preparatory phase meetings will be documented on the Preparatory Phase Checklist (included in Attachment 3). The PQCM will direct personnel performing work activities as to the acceptable level of workmanship required.

6.2 INITIAL PHASE INSPECTION

An initial inspection will be performed at the beginning of a DFW and will include the following:

- A check of preliminary work to ensure that it is in compliance with contract requirements
- A review of the Inspection Checklist documenting results of the preparatory meeting
- Verification of full contract compliance, including required control inspection and testing
- Establishment of the required level of workmanship and verification to ensure that work meets minimum acceptable standards
- Resolution of all differences
- A check of safety requirements to include compliance with and upgrading of the SHSP and AHA
- A review of the AHA with project personnel

The PjM, the RPM, ROICC/NTR, and CSO will be notified at least 2 working days in advance of any initial phase activity. The PQCM will document initial inspections for each item using the Initial Phase Checklist (included in Attachment 3) and attach it to the Daily CQC Report (included in Attachment 3). The exact location of the initial phase inspection will be indicated for future reference and comparison with follow-up inspections.

An initial phase inspection will be conducted each time a new crew arrives on site or any time acceptable specified quality standards are not being met.

6.3 FOLLOW-UP PHASE INSPECTION

During the completion of a particular work feature, follow-up inspections will be conducted to ensure continued compliance with contract requirements. The frequency of the follow-up inspections will depend on the extent of the work being performed on each particular feature. Each follow-up inspection will be documented on the Follow-Up section of the Daily CQC Report. A final follow-up check will be conducted on any completed work phase prior to the commencement of a subsequent phase. Any deficiencies will be corrected prior to starting additional phases of work or will be identified on a list of items that do not conform to the specified requirements or are incomplete.

6.4 ADDITIONAL PREPARATORY AND INITIAL PHASES

The PQCM may conduct additional preparatory and initial inspections on the same DFWs under the following circumstances:

- If the quality of ongoing work is unacceptable, as determined by the PQCM, PjM, RPM, ROICC/NTR, or CSO
- If there are substantial changes in the staff, on-site supervision, or work crew

- If work on a DFW is resumed after a substantial period of inactivity
- If other problems develop

6.5 COMPLETION INSPECTION

Completion inspections will be performed as summarized in this section.

6.5.1 Pre-final Inspection

The PjM will conduct the pre-final inspection. The RPM, ROICC/NTR, CSO, PQCM, and other primary management representative(s), as applicable, will attend. The PjM will schedule the pre-final inspection in response to notification from the PQCM prior to the planned inspection date. 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 scheduled date for the pre-final inspection. At this inspection, the ROICC/NTR will develop a list of incomplete and/or unacceptable work performed under the contract and will provide this list to TtEC.

6.5.2 Final Acceptance Inspection

The PjM will schedule the final acceptance inspection based on notification from the PQCM of readiness. The RPM, ROICC/NTR, CSO, 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.

6.6 INSPECTION DOCUMENTATION

The PQCM is responsible for the maintenance of the inspection records. Inspection records will be legible and clearly provide all necessary information to verify that the items or activities inspected conform to the specified requirements or, in the case of nonconforming conditions, provide evidence that the conditions were brought into conformance or otherwise accepted by the ROICC/NTR. All inspection records will be made available to the DON.

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7.0 NONCONFORMANCES

The PQCM documents any work or materials not conforming to the technical specifications or project/contract requirements on an NCR (included in Attachment 3). The NCR will detail the nonconforming condition, the recommended corrective action(s), and the disposition of the corrective action(s). Qualified representatives from engineering, quality assurance, and construction will review the NCR and either accept or reject the recommended corrective action or disposition. The NCR will remain open until the nonconforming condition has been satisfactorily resolved and verified by the QC inspection staff and the PQCM.

7.1 IDENTIFICATION OF NONCONFORMING ITEMS

Items identified as nonconforming will be documented on an NCR that will include the following information:

- Description of nonconforming item or activity
- Referenced criteria
- Recommended disposition and corrective action
- Affected organization

7.2 CONTROL OF NONCONFORMING ITEMS

Nonconforming items will be controlled to prevent inadvertent use. All items noted as nonconforming will be clearly identified and segregated from acceptable items, when practicable.

7.3 CORRECTIVE ACTION MONITORING

The PQCM shall monitor corrective actions for proper implementation, acceptance, and closure.

7.4 DISPOSITION

The disposition of NCRs will include the necessary actions required to bring the nonconforming condition to an acceptable condition and may include reworking, replacing, retesting, or reinspecting. Implementation of the disposition may be done in accordance with the original procedural requirements, a specific instruction, or an FCR.

7.4.1 Field Change Requests

Site personnel shall document changes to the approved plans in the field through the FCR form. 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 if changes involve risk-sensitive items in that discipline
- Approval of the PjM, Site Superintendent, Program Environmental Safety Manager, and QCM

7.5 TRACKING LOGS

NCRs and FCRs will be tracked through to closure on logs that will contain the following information:

- A sequential document number (e.g., FCR-XX-001, NCR-XX-001, etc.)
- Date identified or created
- Description of item, activity or condition
- Affected location
- Date of closure or approval

8.0 DOCUMENT CONTROL, RECORDS MANAGEMENT, AND PROJECT SUBMITTALS

8.1 DOCUMENT CONTROL

Document control is the process of controlling a document so that it is distributed and used at the appropriate location in the most current form. It is the responsibility of the PjM to ensure that the most current plans, procedures, specifications, and drawings are being used on the project.

The requirements described in the following sections will be executed in addition to the implementing procedures.

Document controls include identification of documents to be controlled and their specified distribution, and identification of assignment of responsibility for preparing, reviewing, approving, and issuing documents.

The preparation, issuance, and revision(s) of documents that specify quality requirements or prescribe activities affecting quality will be controlled to ensure that current and approved documents are being used.

Reports, technical plans, SOPs, and other technical deliverables are subject to TtEC's internal review and approval process. A record of review comments will be documented in one of the following four ways:

- A memorandum from the reviewer to the author, with itemized comments, and a corresponding response memorandum from the author to the reviewer
- A marked-up copy of the document with the reviewer's comments and signature and the author's written response on the same copy
- A completed comment resolution sheet, consistency review checklist, and comment resolution sheet
- Appropriate approval boxes on forms, graphics, and printouts that have been initialed and dated

Only after the approved signatures have been obtained on a sign-off form can a document be copied and bound for delivery to the DON. The original sign-off form is kept with the original document.

Drawings, specifications, and other design documents will be distributed to all involved disciplines for review in order to ensure that the survey criteria have been properly implemented.

8.2 RECORDS MANAGEMENT

The PjM is responsible for establishing a records management system for each CTO to ensure clarity, completeness, retrievability, and conformance to contract requirements. Records of activities will be transmitted to the DON as requested and required by the contract. The originator of each record is responsible for the legibility, correctness, and completeness of the record. Records management includes controlling documents affecting quality, as well as report deliverables. These documents will contain a unique document control number to ensure traceability and accountability. Records shall be stored in a controlled area for the duration of the project and will be archived until files are requested by the DON, as specified in contract requirements. The PjM is responsible for ensuring document security.

Records to be controlled by this PCQC Plan include only those that furnish documentary evidence of the quality of items, services, environmental processes, and engineered systems. The term record(s) used throughout this PCQC Plan denotes QC records.

Records are specified, prepared, and maintained by the management of the organizations that generate the records. When records are controlled by organizations other than those generating the records, the delegation of that authority will be defined in implementing procedures or CTO-specific plans.

Administration of the records system consists of identification, generation, validation, indexing, distribution, classification, retention, and record correction requirements.

The records receipt control system involves receipt responsibilities, transmittal/receipt control, and record status.

Records storage requirements include preservation and safekeeping for a variety of temporary and permanent facilities. The storage system incorporates provisions for retrieval of information by designated personnel in accordance with planned retrieval intervals based upon the record type and need.

Disposition of records requires authorization by the DON, PjM, or designated senior management.

8.3 PROJECT SUBMITTALS

Task-specific documents will be issued as required by each individual CTO. The Submittal Register is included in Attachment 2. The Contractor Production Report, Daily CQC Report, and Rework Items List are included in Attachment 3. Required QC records may include, but are not limited to these documents.

8.3.1 Submittal Register

The Submittal Register will be maintained current by TtEC at the job site and will include the status of all submittals required by the contract (included in Attachment 2). All submittals will be reviewed for compliance with contract requirements, independent of the PQCM, prior to approval by the PQCM. The length of time for submission is specified in each CTO.

8.3.2 Contractor Production Report

The Contractor Production Report will be submitted by TtEC to the NTR identifying prime and subcontractor workforce and their labor hours, location, description of work performed, weather conditions and temperatures, list of job safety actions taken and safety inspections conducted, equipment left on the job site, equipment/materials received, and if applicable, submittal status, noncompliance notices received, errors and/or omissions in plans and specifications, visitors to the job site, and any other pertinent information (included in Attachment 3). The Contractor Production Report will be prepared and submitted daily to the PQCM, and will be included as an attachment to the Daily CQC Report. The Contractor Production Report will be signed by the Site Superintendent.

8.3.3 Contractor Quality Control Report

The Daily CQC Report will be submitted by the PQCM to the NTR recording inspection and/or testing performed, identification and location of each definable feature of work and its current phase (preparatory, initial, follow-up) of completion, results of inspections/testing, location and description of deficiencies, deficiencies corrected as of the date of the report, and status of any rework items (included in Attachment 3). The report will include a statement of certification. This required certification will be signed and dated by the authorized PQCM. The Daily CQC Report will be submitted every day work is performed, material delivered, direction pending, or a labor force present, and for every 7 consecutive calendar days of no work, and in the last day of the no-work period. Every calendar day throughout the life of the CTO will be accounted for. The Daily CQC Report will be provided to the NTR for review and signature by 10:00 a.m. on the working day following the day the work was performed, or as agreed to by the NTR.

8.3.4 Rework Items List

The Rework Items List will be used by TtEC to track nonconforming work (included in Attachment 3). The Rework Items List will be submitted to the NTR the last working day of the month. The PQCM will update the list, stating specifically what the nonconforming item is, the date the nonconforming work was originally discovered, and the date the work was corrected. The PQCM will not allow task personnel to add to or build upon nonconforming work unless, in the opinion of the NTR, correction can be made without disturbing the continuing work.

8.3.5 Completion Certification

The Completion Certification is a certificate signed by the PQCM, PjM, and QCM to indicate technical completion of each CTO prior to final DON inspection and acceptance. This document certifies that all work has been completed, inspected, tested, and is in compliance with the contract. The completion certification will be forwarded to the DON prior to administrative closeout.

Additional records may be required on a CTO-specific basis. Certain special inspection and documentation requirements may be contained in the specification sections of individual CTOs. A record of these requirements shall be included in the Submittal Register and/or test plan and the results attached to the Daily CQC Report, and submitted to the DON for record purposes on an "as occurred" basis, unless otherwise indicated. Each report will be signed by both the PQCM and designated personnel who witnessed the test or inspection, certifying compliance with the specific contract requirement.

9.0 REFERENCES

Department of Defense (DoD), Department of Energy, Nuclear Regulatory Commission (NRC), and U.S. Environmental Protection Agency (EPA). 2000. *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM). *NUREG-1575*. Revision 1. August.

Naval Facilities Engineering Command (NAVFAC). 2006. *Unified Facilities Specifications Guide (UFGS) Format Standard*. January.

United States Army Corps of Engineers (USACE). 2003. *Safety – Safety and Health Requirements*. EM 385-1-1. November 3.

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TABLES

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TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Mobilization	• Verify that ORR has been conducted. • Verify that the coordination and mutual understanding meeting has been conducted. • Verify that the RPM and ROICC have been notified about mobilization. • Verify that the list of field personnel has been submitted. • Verify that all site personnel, including subcontractors, have submitted health and safety documentation. • Verify that applicable procurements for products and subcontracted services have been awarded and that submittals are accepted. • Verify the list of vehicles and insurance records. • Verify that the Site Health and Safety Plan has been approved and reviewed by each field member. • Review the Work Plan and AHAs. • Verify that PPE is available and meets requirements of the Site Health and Safety Plan. • Verify that equipment inspection has been completed.		• Verify establishment of equipment staging areas. • Verify that permit conditions are followed. • Verify that the site is properly posted and secured. • Verify that site activities are being photographed. • Inspect investigation-derived waste storage area construction. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Verify that site-approved ingress and egress routes are used.		• Verify that the site is properly posted and secured. • Verify that utilities are disconnected or relocated as necessary. • Conduct ongoing inspection of material and equipment. • Verify that site-approved ingress and egress routes are used.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Background area static measurements	• Verify that the RPM and ROICC have been notified. • Verify that work crew members attended mobilization preparatory meeting or verify that crew members have relevant health and safety submittals and received appropriate site training (see Mobilization above). • Review scope of work. • Review the Work Plan for this activity. • Verify instrument calibration. • Verify systematic or random locations within the designated background area where measurements will be performed		• Verify systematic or random locations within the designated background area where measurements will be performed • Verify equipment calibration. • Verify that the crew uses appropriate PPE and uses proper disposal practices. • Verify that the field logbook is filled out. • Verify that site activities are being photographed.		• Verify that radiological data results are sent to the CHP. • Verify that data collected is plotted as a frequency distribution chart for statistical evaluation using a graphical format • Verify that site activities are being photographed. • Verify that the crew uses appropriate PPE and proper disposal practices.	
Radiological scoping surveys	• Verify that the RPM, RASO and CSO are notified. • Verify that an approved RWP is available and has been read and signed by assigned personnel. • Verify that Work Plan and AHAs 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 radiological instruments are as specified in the Work Plan. • Verify that a qualified RCT and SHSS are present at work areas. • Verify that site activities are being photographed. • Verify that the background reference area measurements have been obtained using the procedure described in the Work Plan • Verify that daily checks are performed on all portable survey instruments. • Verify that required dosimetry is being worn.		• Verify that the RCT and SHSS are present in an active work area. • Verify that the site is properly posted and secured, if necessary. • Conduct ongoing inspection of material and equipment. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that required dosimetry is being worn. • Verify that mean, maximum, and standard deviation quantities are calculated from data collected. • Verify that data assessment comparisons of the survey data to the DCGL for the building/area are being performed	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• Verify that the relevant SOPs and/or manufacturers' instructions are available and have been reviewed for equipment to be used for radiological surveys. • Verify that the limits and boundaries of surveys have been established and are understood. • Verify background check. • Verify that calibration of survey instrument is within 1 year. • Verify that equipment is on site.		• Verify that an RWP is available at the work site. • Verify that field logbooks and proper forms are in use. • Verify that direct measurements for statics (alpha and beta) are being conducted in accordance with the procedure described in the Work Plan. • Verify that direct measurements for statics (gamma) measurements are being conducted in accordance with the procedure described in the Work Plan. • Verify that exposure surveys (gamma) surveys are performed in accordance with the procedure described in the Work Plan. • Verify that survey limits and boundaries are being met.		• Verify that daily instrument checks and background measurements are obtained and documented. • Verify that survey results are documented. • Verify that an RWP is available at the work site. • Verify that personnel have read and signed the revised RWP, if revision is required. • Verify that the survey data and sample analysis results are reviewed as required by the SOPs. • Verify that the boundaries of the survey have been met. • Verify that the survey instrument is recalibrated after repairs or modifications. • Verify that personnel surveys are performed for all personnel leaving a radiologically controlled area. • Verify that RASO is notified of discovered radioactive material. • Verify that any area known or suspected to contain radioactive material is isolated. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Conduct gamma spectroscopy survey	• Verify that the RPM and ROICC have been notified. • Verify that crew members attended the mobilization preparatory meeting and verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Verify that background activity value has been established. • Verify that proper radiological survey equipment is on site and is in working order. • Verify that the sample locations are properly documented and marked. • Verify that the boundary of the radiological survey area is marked. • Verify that PPE is available and meets requirements of the Site Health and Safety Plan. • Verify instrument calibration. • Review AHAs. • Review Work Plan.		• Verify that site activities are being photographed. • Verify that proper radiological equipment and techniques are used. • Verify that equipment calibration is checked and recorded. • Verify that crew disposes of PPE as required. • Verify that PPE is screened for radiological contamination and containerized as appropriate. • Verify that site activities are being photographed. • Verify that the radiological survey is being conducted in accordance with procedures described in the Work Plan. • Verify that radiological records are prepared in accordance with the Work Plan.		• Continue to inspect ongoing work. • Verify that survey data are generated and stored. • Verify that site activities are being photographed. • Verify that the radiological survey is being conducted in accordance with procedures described in the Work Plan. • Verify that the data review process is being performed. • Verify that radiological records are being prepared, reviewed, and maintained in accordance with the Work Plan.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Media sampling	• Verify that RASO has approved the biased sampling locations. • Verify that the RPM and ROICC have been notified. • Verify that work crew members attended the mobilization preparatory meeting or verify that crew members have relevant submittals and received appropriate site training (see Mobilization above). • Review scope of work. • Review SAP. • Review control points. • Review AHAs. • Review the Radiological Survey Work Plan and drawings for this activity. • Verify that the sampling materials and equipment are appropriate. • Verify that the radiological survey equipment will be available for media screening radiation measurements. • Verify instrument calibration. • Verify that adequate equipment and materials are available to decontaminate sample equipment as necessary and that the containment area is established.		• Review biased sample location approved by the RASO. • Verify that media samples are collected. • Verify equipment calibration for radiological screening. • Verify that radiological measurements and readings on media samples are collected and that readings are recorded. • Verify that the crew uses appropriate PPE and proper disposal practices. • Verify that the field sample logbook is filled out. • Verify that sample collection and labeling are in accordance with the SAP. • Verify that samples are shipped using proper procedures for samples with radiological contamination. • Check COCs. • Verify that daily decontamination water is properly containerized and controlled. • Verify that decontamination water stored is in approved waste containment area.		• Verify that survey of media sample locations is recorded. • Plot map of media sample location with measurement results. • Verify that swipe sampling is performed in accordance with procedures described in the Work Plan. • Verify that COC is sent to Project Chemist. • Verify that samples are shipped using proper procedures for low-level radiological samples. • Verify that radiological data results are sent to the PHP. • Verify that site activities are being photographed. • Verify that the crew uses appropriate PPE and proper disposal practices. • Verify that radiological screening is being conducted in accordance with procedures described in the Radiological Survey Work Plan. • Verify that radiological records are prepared, reviewed, and maintained in accordance with the Work Plan.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
			• Verify that site activities are being photographed. • Verify that radiological screening is being conducted in accordance with the procedure described in the Work Plan. • Verify that radiological records are prepared in accordance with the Work Plan.			
Identification and removal of radioactive material	• Verify that the RPM, CSO, and RASO are notified. • Review procedures. Verify background activity and what constitutes a deviation. • Review AHAs. • Verify that equipment, instruments, and materials are on site, calibrated, and in working order. • Review the Work Plan. • Verify that PPE is available and meets requirements of the SHSP. • Verify that radiation awareness training has been completed and training is documented. • Verify that designated personnel have assigned dosimeters and completed NRC Form 4. • Verify that a log and database are established for identified material. • Verify that personnel have been given an emergency notification procedure.		• Verify that a qualified RCT and SHSS are present at active work areas. • Verify that required dosimetry is being worn. • Verify PPE of all workers. • Verify that the RTM has evaluated the radiological impact of the material prior to any action for each material. • Verify that the radiological safety instruction specific to each material has been reviewed by the RCT and RTM. • Verify that the 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 a qualified RCT and SHSS are present at active work areas. • Verify that required dosimetry is being worn. • Verify that removal of radioactive material is conducted in accordance with the procedures and work plans. • Verify that an additional 1 foot of soil in every direction is excavated, after removal of material. • Verify that the RCT scanned the excavated area after radioactive material removal. • Verify that personnel surveys are performed for all personnel leaving a radiologically controlled area. • Inspect the radiological logbook for completeness of documentation. • Inspect the contaminated material handling procedure.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• Verify that a pre-authorized area for storage of radioactive materials has been selected with the concurrence of RASO and the RPM.		• Verify that site activities are being photographed. • Verify that proper logging, recording, and photography of found point sources is being done.		• Verify that the removed point source has unique identification that is documented in the logbook and the drum inventory sheet. • Verify that the removed point source storage and management procedure is in accordance with the Work Plan. • Verify that all bags and drums are marked with unique identification and the information is recorded in the logbook. • Verify that filled drums are stored in approved storage areas. • Verify that the liner remains in good condition. • Verify that the log of radioactive material is routinely reviewed by the RSO. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Final status survey	• Verify that the RPM and CSO are notified. • Review the Work Plan, SAP, and SHSP. • Verify that radiation awareness training has been completed and training is documented. • Verify that designated personnel have assigned dosimeters and completed NRC Form 4. • Verify that PPE is available.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Conduct ongoing inspection of decontamination and survey activities. Verify that site activities are being photographed.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
			• Verify that the direct measurements for statics (alpha and beta) are being conducted in accordance with the procedure described in the Work Plan. • Verify that direct measurements for statics (gamma) measurements are being conducted in accordance with the procedure described in the Work Plan. • Verify that exposure (gamma) surveys are performed in accordance with the procedure described in the Work Plan.		• Verify that photographs are logged and stored. • Verify that survey forms are properly completed and stored.	
Final status survey sampling	• Verify that the RPM and CSO are notified. • Review the Work Plan, SAP, and the SHSP. • Verify that radiation awareness training has been completed and training is documented. • Verify that designated personnel have assigned dosimeters and completed the NRC Form 4. • Verify that PPE is available.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Inspect sample handling procedures.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • 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 radiologically controlled area. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
					• Verify that sample locations are surveyed. • Verify the sample chain-of-custody form.	
Waste profiling	• Verify that testing services will be available for the testing of the waste samples. • Review the WMP, Work Plan, and AHAs. • Verify that PPE is available and meets requirements of the SHSP. • Verify an adequate supply of equipment and materials to decontaminate sample equipment as necessary. • Inspect the record for radiation general awareness training for all workers. • Verify that NRC Form 4 is completed for each worker. • Verify that all personnel have signed the RWP.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn.		• Verify that the RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that data has been collected in compliance with the WMP. • Verify collection and labeling of samples. • Verify DOT labeling. • Continue to inspect ongoing work. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Demobilization	• Verify that the RPM and CSO are notified. • Review AHAs. • Verify that PPE is available and meets requirements of the SHSP. • Review site demobilization procedures.		• Verify that decontamination and survey procedures are being followed. • Verify that required dosimetry is being worn. • Verify documentation. • Verify that site activities are being photographed. • Verify that surveys are being documented on the appropriate form.		• Conduct ongoing inspection of decontamination and survey activities. • Verify that required dosimetry is being worn. • Verify that the RTM, SHSS, and Construction Manager inspected and approved all equipment and material prior to removing it from the site. • Verify that site activities are being photographed. • Verify that photographs are logged and stored. • Verify that survey forms are properly completed and stored.	

Abbreviations and Acronyms:

AHA – Activity Hazard Analysis
CHP – Certified Health Physicist
COC – chain of custody
CSO – Caretaker Site Office
DCGL – derived concentration guideline level
DOT – Department of Transportation
NRC – Nuclear Regulatory Commission
ORR – Operational Readiness Review
PPE – personal protective equipment
RASO – Radiological Affairs Support Office
RCT – Radiological Control Technician
ROICC – Resident Officer in Charge of Construction
RPM – Remedial Project Manager
RSO – Radiation Safety Officer
RTM – Radiological Task Manager
RWP – Radiation Work Permit
SAP – Sampling and Analysis Plan
SHSP – Site Health and Safety Plan
SHSS – Site Health and Safety Specialist
SOP – Standard Operating Procedure
WMP – Waste Management Plan

FIGURES

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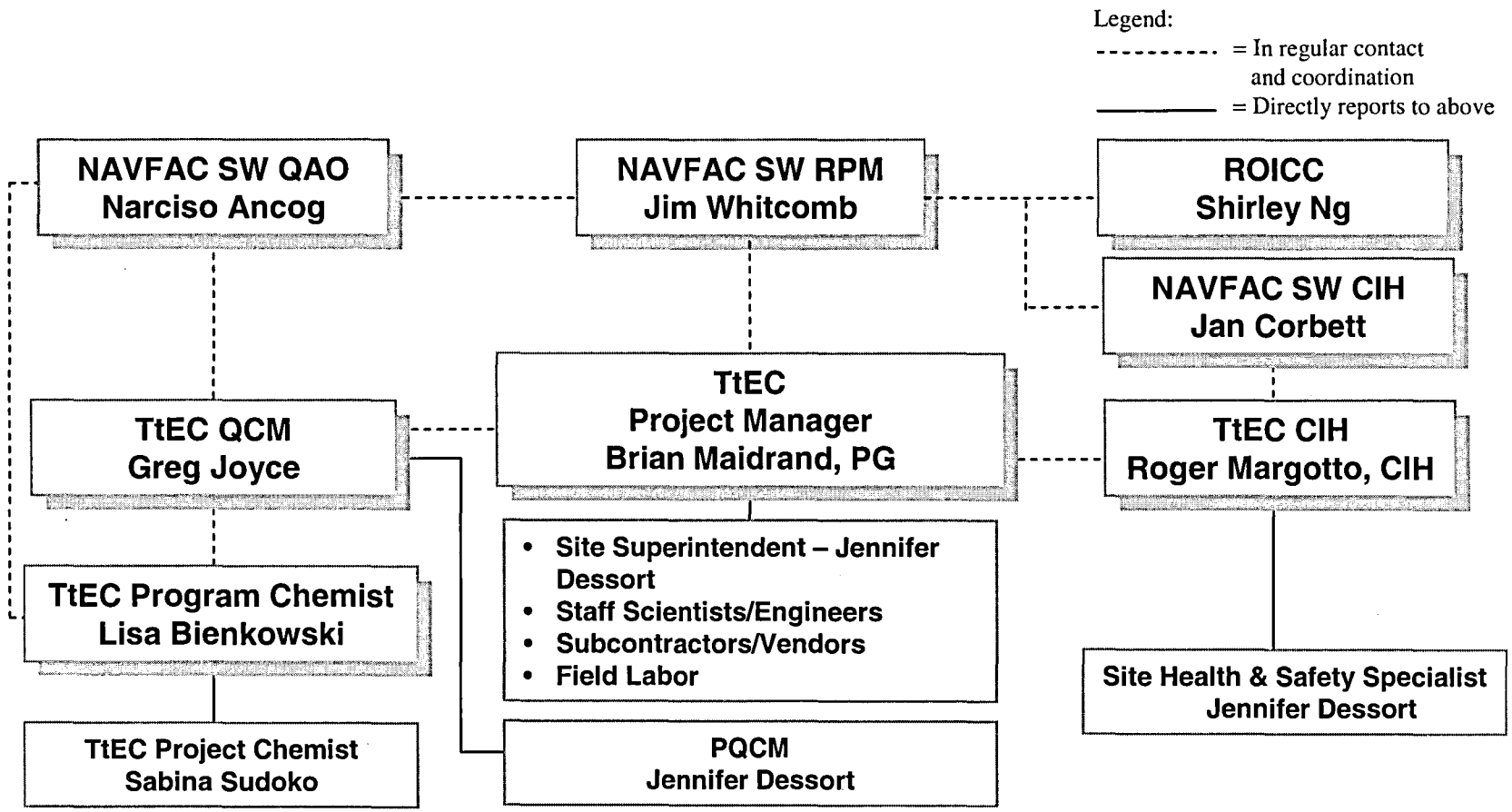
Figure B.2-1

Project Organization Chart



ATTACHMENT 1

PROJECT QUALITY CONTROL OFFICER APPOINTMENT LETTER

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TETRA TECH EC, INC.

August 2, 2007

Ms. Jennifer Dessort
Tetra Tech EC, Inc.
1940 E. Deere Street, Suite 200
Santa Ana, CA 92705

Subject: **Project Quality Control Manager**

Reference: Contract No. N62473-06-D-2201,
Environmental Remediation Contract, Contract Task Order (CTO) No. 0021,
Treasure Island Naval Base Station, San Francisco, California

Dear Ms Dessort:

In accordance with the terms of Tetra Tech EC, Inc. (TtEC) Contract No. N62473-06-D-2201, this letter notifies you of your appointment as the Project Quality Control Manager for CTO No. 0021 at Treasure Island.

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 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: B. Maidrand, Project Manager

SGS

1230 Columbia Street, Suite 750, San Diego, CA 92101
Tel 619.234.8690 Fax 619.234.8591
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ATTACHMENT 2

SUBMITTAL REGISTER

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ATTACHMENT 2

SUBMITTAL REGISTER

TITLE AND LOCATION:	Buildings 343 and 344, and Building 233 Drain Lines Naval Station Treasure Island, San Francisco, CA	CONTRACTOR Tetra Tech EC, Inc.	CONTRACT NO. N62473-06-D-2201, CTO 0021

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH	CLASSIFICATION	CONTRACTOR SCHEDULE DATES: SUBMIT	CONTRACTOR SCHEDULE DATES: APPROVAL NEEDED BY	CONTRACTOR SCHEDULE DATES: MATERIAL NEEDED BY	CONTRACTOR ACTION: ACTION CODE	CONTRACTOR ACTION: DATE OF ACTION	DATE FWD TO APPR AUTH/DATE RCD FROM CONTR	APPROVING AUTHORITY: DATE FWD TO OTHER REVIEWER	APPROVING AUTHORITY: DATE RCD FROM OTH REVIEWER	APPROVING AUTHORITY: ACTION CODE	APPROVING AUTHORITY: DATE OF ACTION	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(r)
			SD-01, PRE-CONSTRUCTION SUBMITTAL													
	21-001		a. List of Contact Personnel		G											
	21-001		b. Construction Schedule		G											
	21-001		c. Submittal Register		G											
	21-001		d. Remedial Work Plan		G											
	21-001		e. Site Health and Safety Plan		G											
	21-001		f. Quality Control (QC) Plan		G											
			g. Environmental Condition Report and Site Restoration Plan													
			h. Explosive Safety Submission Appoval Letter													
			i. Explosive Safety Submission Rev. 2													
			j. Explosive Safety Submission Rev. 3													
			SD-03, Product Data													
			SD-04, SAMPLES													
			SD-06, TEST REPORTS													
			SD-07, CERTIFICATES													
			a. Solid waste disposal manifests		G											
			b. Disposal permit/manifests for hazardous waste		G											
			SD-08, Manufacturers' Installation Instruction													
			SD-11, CLOSEOUT SUBMITTALS													
			a. Submittal Register		G											
			b. As-built drawings													
			e. As-built Field Summary Report													

ATTACHMENT 3

EXAMPLE CONTRACTOR QUALITY CONTROL FORMS

Preparatory Phase Checklist

Initial Phase Checklist

Completion Inspection Checklist

Nonconformance Report

Nonconformance Report Log

Field Change Request Form

Field Change Request Log

Contractor Production Report

Contractor Quality Control Report

Rework Items List

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PREPARATORY PHASE CHECKLIST

(CONTINUED ON SECOND PAGE)

CONTRACT NO	DEFINABLE FEATURE OF WORK	SPEC SECTION	DATE
N62473-06-D-2201		SCHEDULE ACT NO.	INDEX #

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED ____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

SUBMITTALS

REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER. HAVE ALL SUBMITTALS BEEN APPROVED? YES ☐ NO ☐

IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED?

ARE ALL MATERIALS ON HAND? YES ☐ NO ☐

IF NO, WHAT ITEMS ARE MISSING?

CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL. (THIS SHOULD BE DONE AS MATERIAL ARRIVES.)

COMMENTS:

MATERIAL STORAGE

ARE MATERIALS STORED PROPERLY? YES ☐ NO ☐

IF NO, WHAT ACTION IS TAKEN?

SPECIFICATIONS

REVIEW EACH PARAGRAPH OF SPECIFICATIONS.

DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK.

CLARIFY ANY DIFFERENCES.

PRELIMINARY WORK & PERMITS

ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.

IF NOT, WHAT ACTION IS TAKEN?

TESTING	IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM. WHEN REQUIRED? WHERE REQUIRED? REVIEW TESTING PLAN. HAS TEST FACILITIES BEEN APPROVED?
SAFETY	ACTIVITY HAZARD ANALYSIS APPROVED? YES ☐ NO ☐ REVIEW APPLICABLE PORTION OF EM 385-1-1.
MEETING COMMENTS	NAVY/ROICC COMMENTS DURING MEETING.
OTHER ITEMS OR REMARKS	OTHER ITEMS OR REMARKS:

PQCM DATE

INITIAL PHASE CHECKLIST

SPEC SECTION	DATE

CONTRACT NO	DEFINABLE FEATURE OF WORK	SCHEDULE ACT NO.	INDEX #
N62473-06-D-2201			

PERSONNEL PRESENT

GOVERNMENT REP NOTIFIED _____ HOURS IN ADVANCE: YES ☐ NO ☐

NAME	POSITION	COMPANY/GOVERNMENT

PROCEDURE COMPLIANCE

IDENTIFIY FULL COMPLIANCE WITH PROCEDURES IDENTIFIED AT PREPARATORY. COORDINATE PLANS, SPECIFICATIONS, AND SUBMITTALS.

COMMENTS: _____

PRELIMINARY WORK

ENSURE PRELIMINARY WORK IS COMPLETE AND CORRECT. IF NOT, WHAT ACTION IS TAKEN?

WORKMANSHIP

ESTABLISH LEVEL OF WORKMANSHIP.

WHERE IS WORK LOCATED? _____

IS SAMPLE PANEL REQUIRED? YES ☐ NO ☐

WILL THE INIITAL WORK BE CONSIDERED AS A SAMPLE? YES ☐ NO ☐

(IF YES, MAINTAIN IN PRESENT CONDITION AS LONG AS POSSIBLE AND DESCRIBE LOCATION OF SAMPLE) _____

RESOLUTION

RESOLVE ANY DIFFERENCES.

COMMENTS: _____

CHECK SAFETY

REVIEW JOB CONDITIONS USING EM 385-1-1 AND JOB HAZARD ANALYSIS

COMMENTS: _____

OTHER

OTHER ITEMS OR REMARKS

_____

PQCM DATE

COMPLETION INSPECTION CHECKLIST

Date	
Report No.	

Contract No.: N62473-06-D-2201, CTO No. 0021	Contract Title: CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island

Contract Specifications:

Major Definable Features of Work:

A. Open Punchlist Items From Follow-Up Phase Checklist:

	Item	Date of Completion
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

B. New Punchlist Items Noted:

	Item	Date of Completion
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

C. ROICC NOTIFIED? ☐ Yes ☐ No

On behalf of Tetra Tech EC, Inc., I certify this activity is completely in accordance with the Contract Documents, based upon the information available to me.

_____

Project Quality Control Manager

NONCONFORMANCE REPORT

	Report No.
Client or Project: CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island	Drawing No./Spec. No.
Supplier, Construction QC or Contractor	P.O. No.
Description of Component, Part or System	

I. Description of Nonconformance *(Items involved, specification, code or standard to which items do not comply, submit sketch if applicable)*

Name and Signature of Person Reporting Nonconformance	Title/Company	Date

II. Recommended Disposition *(Submit sketch, if applicable)*

Name and Signature of Person Recommending Disposition	Title/Company	Date

III. Evaluation of Disposition by Tetra Tech EC, Inc., Reason for Disposition

IV. Corrective Action ☐ Required ☐ Not Required

V. ☐ Engineering	☐ QA/QC	☐ Construction	☐ Other
Name *(Signature)*	Name *(Signature)*	Name *(Signature)*	Name *(Signature)*
Date	Date	Date	Date
☐ Accepted ☐ Rejected ☐ Accepted with Comments	☐ Accepted ☐ Rejected ☐ Accepted with Comments	☐ Accepted ☐ Rejected ☐ Accepted with Comments	☐ Accepted ☐ Rejected ☐ Accepted with Comments

VI. Verification of Disposition ☐ Required ☐ Not Required

By	Signature	Title	Date

NONCONFORMANCE REPORT LOG

PROJECT TITLE: CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Islar

PROJECT LOCATION: Treasure Island, California

CONTRACTOR: Tetra Tech EC, Inc.

NCR NO.	HOLD TAG NO.	DESCRITION OF CONDITIONS/ ITEM AFFECTED	LOCATION	DATE					REMARKS
				VALIDATION	DISPOSITION/ APPROVAL	RE-INSPECTION	CLOSURE	HOLD TAG REMOVAL	

TETRA TECH EC, INC.

FIELD CHANGE REQUEST FORM

Contract No.	CTO No.	Field Change Request Form No.
N62473-06-D-2201	0021	FCR-
Location Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island		Date

RE: Drawing No. _____ Title _____

Specification Section _____ Title _____

Other _____

Description (items involved, submit sketch, if applicable)

Reason for Change

Recommended Disposition (submit sketch, if applicable)

TETRA TECH EC, INC.

FIELD CHANGE REQUEST FORM

Contract No.	CTO No.	Field Change Request Form No.
N62473-06-D-2201	0021	FCR-

Additional Details

Will this change result in a contract cost or time change? ☐ Yes ☐ No

Estimate of contract cost or time charge (if any) _____

Preparer (signature)	Date	Preparer's Title	Site Superintendent/PQCM (Signature)	Date

Disposition

☐ Approved.

☐ Not approved (give reason). _____

TtEC Engineer (signature) (if engineering related)	Date	TtEC Project Manager (signature)	Date
☐ Comments (attached) ☐ No Comments		☐ Comments (attached) ☐ No Comments	
TtEC PESM (signature)	Date	TtEC Scientist (signature) (if science related)	Date
☐ Comments (attached) ☐ No Comments		☐ Comments (attached) ☐ No Comments	
TtEC QC Program Manager (signature)	Date		
☐ Comments (attached) ☐ No Comments			

Distribution: Original to Project File, Copy to Site File, Project Manager, DON RPM, DON ROICC, PQCM, QCM

TETRA TECH EC. INC

NAVFAC SW REMEDIAL ACTION CONTRACT (RAC IV)

CONTRACT NO. N62473-06-D-2201, CTO 0021

PROJECT NAME: CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island

FIELD CHANGE REQUEST LOG

FCR NUMBER	SUBJECT	DOCUMENTS AFFECTED	DATE CREATED	DATE APPROVED	COMMENTS

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

CONTRACT NO N62473-06-D-2201	TITLE AND LOCATION CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island	DATE REPORT NO
CONTRACTOR Tetra Tech EC, Inc.	SUPERINTENDENT/ PQCM	

AM WEATHER	PM WEATHER	MAX TEMP (F)	MIN TEMP (F)

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

JOB SAFETY			
WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes)	☐ YES	☐ NO	TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CON'T SHEETS
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report)	☐ YES	☐ NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/ HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.)	☐ YES	☐ NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.)	☐ YES	☐ NO	

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED ☐ SAFETY REQUIREMENTS HAVE BEEN MET.

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Submittal #	Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Owner	Description of Construction Equipment Used Today (incl Make and Model)	Arrival	Off Rent Date	Actual Demob Date	Hours Idle	Hours Used	Reason for Idle

REMARKS

CONTRACTOR/SUPERINTENDENT DATE

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

REPORT NO

PHASE	CONTRACT NO. N62473-06-D-2201	CONTRACT TITLE CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island

PREPARATORY

WAS PREPARATORY PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

INITIAL

WAS INITIAL PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.

Schedule Activity No.	Definable Feature of Work	Index #

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)

Schedule Activity No.	Description

REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

Schedule Activity No.	Description

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep On-Site, etc.

Schedule Activity No.	Description

On behalf of the contractor, 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.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

Schedule Activity No.	Description

GOVERNMENT QUALITY ASSURANCE MANAGER DATE

CONTRACTOR QUALITY CONTROL REPORT

(CONTINUATION SHEET)
(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

REPORT NO.

PHASE	CONTRACT NO. N62473-06-D-2201	CONTRACT TITLE CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

REMARKS (Also Explain Any Checklist Item From Above That Was Answered "NO"), Manuf. Rep. On-Site, etc.

Schedule Activity No.	Description

REWORK ITEMS LIST

Contract No. and Title: N62473-06-D-2201, CTO 0021, Buildings 343 and 344, and Building 233 Drain Lines, Treasure Island

Contractor: Tetra Tech EC, Inc.

NUMBER	DATE IDENTIFIED	DESCRIPTION	CONTRACT REQUIREMENT (Spec. Section and Par. No., Drawing No. and Detail No., etc.)	ACTION TAKEN BY QC MANAGER	RESOLUTION	DATE COMPLETED

APPENDIX C

SITE HEALTH AND SAFETY PLAN

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

CONTRACT NO. N62473-06-D-2201
CTO NO. 0021

APPENDIX C

FINAL

SITE HEALTH AND SAFETY PLAN

August 2007

BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

DCN: ECSD-2201-0021-0001

TETRA TECH EC, INC.

1230 Columbia Street, Suite 750
San Diego, CA 92101-8536

Roger N Margotto

Roger Margotto, CIH, CSP, CHMM
Program Health and Safety Manager

Brian Maidrand
Project Manager

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ATTACHMENTS

Attachment 1 Material Safety Data Sheets

Attachment 2 Activity Hazard Analyses

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ABBREVIATIONS AND ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ACO	Administrative Contract Officer
AHA	Activity Hazard Analysis
ALARA	as low as reasonably achievable
Cal-OSHA	California Occupational Health and Safety Administration
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
CSO	Caretaker Site Office
CTO	Contract Task Order
DON	Department of the Navy
EC	Emergency Coordinator
EHS	Environmental Health and Safety
EM	Engineer Manual
ESS	Environmental Safety Supervisor
EZ	exclusion zone
FCR	Field Change Request
FEV10	Forced Expiratory Volume, one second
FSS	Final Status Survey
FVC	Forced Vital Capacity
GFCI	Ground Fault Circuit Interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
MSDS	Material Safety Data Sheet
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSTA TI	Naval Station Treasure Island
NEC	National Electrical Code
OSHA	Occupational Safety and Health Administration
PESM	Project Environmental Safety Manager
PHP	Project Health Physicist

ABBREVIATIONS AND ACRONYMS
(Continued)

PjM	Project Manager
PM	Program Manager
PPE	personal protective equipment
QC	Quality Control
RAC	Remedial Action Contract
RCT	Radiological Control Technician
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RQ	reportable quantity
RSO	Radiation Safety Officer
RWP	Radiation Work Permit
SHSP	Site Health and Safety Plan
SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
TtEC	Tetra Tech EC, Inc.
USACE	United States Army Corps of Engineers
YBI	Yerba Buena Island

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

Tetra Tech EC, Inc. (TtEC) has been contracted by the Department of the Navy (DON) to survey and develop decontamination approaches that will support the radiological release of buildings and drainage systems at Naval Station Treasure Island (NAVSTA TI), San Francisco, California. TtEC has been contracted by the DON to perform these activities at NAVSTA TI for the Base Realignment and Closure Program Management Office West under Naval Facilities Engineering Command, Southwest (NAVFAC SW) Remedial Action Contract N62473-06-D-2201. The TtEC Health and Safety Program for the site consists of this document, the Contract Health and Safety Program, and the TtEC Corporate Health and Safety Program Manual.

1.2 APPLICATION

The Contract Health and Safety Program is applicable to all work conducted by TtEC and TtEC subcontractors under NAVFAC SW Remedial Action Contract (RAC) N62473-06-D-2201 for Contract Task Order (CTO) No. 0021. Essentially equivalent or additional health and safety procedures and practices may be approved by TtEC and implemented by TtEC subcontractors where necessary. All subcontractors are required to follow the TtEC Health and Safety programs and procedures, unless changes are approved by the TtEC Project Environmental Safety Manager (PESM), who is a Certified Industrial Hygienist (CIH), and the DON Contracting Officer. The subcontractor will submit Activity Hazard Analysis (AHA) for their proposed work activities or develop them in coordination with site safety personnel. The TtEC PESM will review TtEC and subcontractor Site Health and Safety Plans (SHSPs) and AHAs prior to the initiation of fieldwork. A copy of the SHSP with all updates will be maintained at the project site.

1.3 APPLICABLE STANDARDS, REGULATIONS, AND GUIDANCE DOCUMENTS

Adherence to applicable portions of federal, local, national consensus organization, and corporate health and safety standards, regulations, and guidance manuals is required during field activities. These include, but may not be limited to, the following:

- 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health Standards, General Industry
- State regulations including Title 8 California Code of Regulations (CCR) (California-Occupational Health and Safety Administration [Cal-OSHA]) and Title 24 CCR (Health and Safety Code)
- 29 CFR, Part 1926, Occupational Safety and Health Standards, Construction Industry 10 CFR, Part 20, Nuclear Regulatory Commission

- Corporate Health and Safety Program Manual (TtEC)
- Project Rules Handbook (TtEC)
- *Navy Environmental Restoration Program Manual* (DON, 2006)
- *Safety and Health Requirements Manual*, Engineer Manual (EM) 385-1-1. (U.S. Army Corps of Engineers [USACE]. 2003)
- *Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices*, American Conference of Governmental Industrial Hygienists (ACGIH), most current publication
- *Occupational Safety and Health Guidance for Hazardous Waste Site Activities* (U.S. Department of Health and Human Services, 1985)

1.4 SUMMARY OF MAJOR RISKS

The specific activities for field implementation of the radiological surveys include:

- Reference (Background) Surveys
- Scoping Surveys
- Final Status Surveys (FSS)
- Media Sampling

These buildings, which have not been used for many years, have been vandalized, have not been maintained, and have no power. Anyone working inside these buildings faces the major hazard of lack of illumination, the trip hazard presented by stairs and flooring, and potential contact with insects, rodents, and snakes. Various areas of the buildings contain potential contaminants that may include asbestos, lead-based paints, and low-level radioactivity. Site access control will be achieved by the existing security fence that surrounds Buildings 343 and 344, which will reduce trespassers. Site access will be controlled at Building 233 using the existing locking entry doors. However, there are indicators that vagrants continue to occupy buildings in the area.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organization chart (Figure C.2-1) shows the key individuals involved in the project. Table 3-1 of the Work Plan has the contact information for key project personnel.

2.1 PROGRAM MANAGER

The Program Manager (PM) has the overall responsibility for the health and safety of site personnel at all projects under this contract. The PM will ensure that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below. The PM will also ensure that fieldwork is scheduled with adequate personnel and equipment resources to complete the job safely.

2.2 PROJECT MANAGER

The Project Manager (PjM) is responsible for managing all technical and business aspects of the project. This includes the development of the best technical approach and budget for the CTO scope, managing technical, cost, schedule, and project issues as work progresses, and subcontractor oversight. The PjM will also ensure that adequate personnel and resources are available to complete the project safely. TtEC Environmental Health and Safety (EHS) Procedure 1-2 specifies that line managers (PjMs, Construction Managers, and Site Superintendents) have the responsibility to integrate loss control principles into all operations and to ensure that:

- All projects are implemented in compliance with all environmental, safety, and health laws and regulations, EHS program requirements, and Environmental Management System requirements
- EHS plans are developed, approved, and implemented in accordance with TtEC requirements
- Personnel understand the requirements of the project EHS plan(s) and each individual understands his/her responsibility for plan implementation
- Personnel have all required training and are capable of performing all assigned tasks
- Facilities and equipment meet TtEC and government regulations
- Work rules are enforced
- Inspections and incident investigations are conducted per program requirements (The PjM or designated manager will conduct monthly health and safety inspections of the job site)
- Effective corrective actions are implemented in a timely manner following inspections, audits, incident investigations, etc.

- Clients are notified of TtEC incident reporting procedures.
- Appropriate disciplinary action is implemented by line supervision when necessary.

2.3 SITE SUPERINTENDENT

Due to the small size of this project and the short duration, one TtEC worker will perform the functions of Site Superintendent, Site Health and Safety Specialist (SHSS), and Project Quality Control Manager. The Site Superintendent coordinates all survey activities. The Site Superintendent will ensure that all work is performed in accordance with the contract requirements in a safe and healthful manner. As line manager, the Site Superintendent has the same responsibilities for health and safety program implementation as the PjM. The Site Superintendent will:

- Ensure that work crews have adequate resources to effectively conduct field activities
- Make certain that proper protective equipment is being used by all personnel
- Ensure that appropriate disciplinary actions are taken when health and safety requirements are not being followed or when unsafe practices occur
- Oversee work practices to verify that they are in accordance with the SHSP
- Understand and be familiar with the SHSP
- Participate in the daily tailgate safety meetings
- Observe project personnel for signs of chemical or physical trauma
- Immediately notify the PESM of any illness, accident, injury or near-miss incident
- Correct any hazards disclosed by project workers or the SHSS
- Perform functions of Emergency Coordinator (EC) as described in Section 12 of this plan.

The Site Superintendent has the authority to suspend field activities if the health and safety of personnel are in danger. The Site Superintendent has the overall responsibility for implementing the plan.

The Site Superintendent will submit to the DON Administrative Contracting Officer (ACO), upon request, copies of the certificates (or acceptable alternative documents) of the most recent health and safety training required by 29 CFR, Part 1910.120 for all the personnel who will be working on site. Copies of the training certificates (or acceptable alternative documents) will also be kept at the work site.

2.4 PROJECT ENVIRONMENTAL SAFETY MANAGER

The PESM is responsible for implementing and overseeing the Contract Health and Safety Program and to develop, implement, and approve all SHSPs. Any changes to the established Contract Health and Safety Program or SHSP must be at the direction of, and approved by the PESM, with concurrence of the DON ACO. The PESM or designee will not necessarily be on site during all remedial activities, but will be readily available for consultation when required.

The PESM or designee is a CIH, certified by the American Board of Industrial Hygiene and directs the activities of the SHSS/Site Superintendent. The PESM has the authority to stop unsafe operations, remove unqualified personnel from the work area, and approve changes to the SHSP. Duties of the PESM include:

- Overseeing all aspects of the SHSP from development to implementation
- Reviewing site-specific plans for completeness and compliance
- Reviewing other site documents as they affect health and safety (Activity Hazard Analyses, Sampling Plans, etc.)
- Reviewing and evaluating all monitoring results
- Establishing and monitoring all related health and safety procedures through site safety inspections and audits
- Ensuring that TtEC employees receive the required EHS regulatory training
- Fulfilling specific responsibilities for project EHS personnel that are identified within each EHS procedure
- Functioning as a technical resource for all environmental compliance, safety, loss control, and industrial hygiene issues

2.5 SITE HEALTH AND SAFETY SPECIALIST

The SHSS will be present on site, as required, during field operations and is responsible for all health and safety activities. The SHSS/Site Superintendent is responsible for the implementation of this SHSP, ensuring that appropriate personal protective equipment (PPE) is used relative to hazards that may be encountered, verifying that communication systems are in place, monitoring conformance with safety and emergency response procedures, giving safety briefings, ensuring safety equipment is maintained, and conducting safety drills and exercises.

The SHSS has stop work authorization, which will be executed upon the determination that an imminent safety hazard or potentially dangerous situation exists. Work cannot restart until clearance has been authorized by the SHSS, who is also responsible for maintaining the site health and safety logbooks.

The SHSS will possess the knowledge and experience necessary to ensure that all elements of the approved SHSP are implemented and enforced on site. Every SHSS will be certified in training in first aid and cardiopulmonary resuscitation (CPR) by a recognized organization such as the American Red Cross Association. TtEC EHS Procedure 1-1, Responsibilities for Program Implementation, states that the SHSS is responsible for:

- Ensuring that TtEC employees understand the requirements of TtEC EHS programs and procedures through training and communication
- Developing or assisting with the development of EHS plans in conjunction with project personnel
- Assisting management with EHS plan implementation
- Performing specific tasks in accordance with EHS plans
- Fulfilling the specific responsibilities for project EHS personnel that are identified within each EHS procedure

Additional responsibilities, as described in the TtEC EHS program, include but are not limited to:

- Investigating all accidents, injuries, illnesses, near-misses, and other incidents
- Ensuring that employees are trained on the risks of hazardous substances used on this project
- Maintaining a Material Safety Data Sheet (MSDS) file to provide easy access to all employees
- Performing inspections to ensure that all containers are labeled
- Ensuring that the SHSP is read, understood, and signed by all field personnel, including subcontractors
- Ensuring that tailgate safety meetings are conducted on days that work is performed and that all meetings and any other additional training is documented
- Assessing employee exposure through specified monitoring protocols and ascertaining that protective measures are appropriate
- Verifying that project safety equipment is inspected, as required by the EHS program
- Immediately reporting to the Resident Officer in Charge of Construction (ROICC/Caretaker Site Office [CSO]), circumstances that result in a fatal injury, where one or more persons are admitted to a hospital, or where property damage to government property occurs
- Notifying the ROICC/CSO within 24 hours of all incidents required to be reported by EM 385-1-1 (USACE, 2003)

- Verifying that all personnel have the necessary training and medical clearance prior to entering exclusion zones or contamination reduction zones (The SHSS will inform the Site Superintendents of any site personnel with medical restrictions)
- Determining and posting routes to medical facilities and emergency phone numbers; arranging for emergency transportation to medical facilities
- Maintaining training records and medical certifications for all on-site personnel including subcontractors
- Serving as the Project Hazard Communication Coordinator

TtEC employs other full-time personnel as Environmental Safety Supervisors (ESSs) and personnel who have been cross-trained as ESSs. (The ESS is the equivalent of the SHSS.) Each TtEC SHSS has a minimum of 6 months work experience with hazardous materials and has completed a minimum of 40 hours additional specialized training in personal and respiratory protective equipment, program implementation, and in the proper use of air monitoring instruments, air sampling methods, and interpretation of results. These SHSSs have had, at a minimum, the Occupational Safety and Health Administration (OSHA) 10-hour Construction Safety course. On this project an ESS is assigned to assist line management with EHS Program implementation. The ESS may have collateral duties.

2.6 SITE PERSONNEL

A list of personnel authorized to have access to the remediation or work site will be compiled and maintained on site by the SHSS. This list will include employees of TtEC, subcontractors, and representatives of governmental agencies that may require access. All authorized personnel will meet the requirements of the SHSP and be approved by the SHSS/Site Superintendent prior to entering any exclusion zone or controlled area when potentially hazardous activities are being conducted.

Although the employer is responsible for providing a safe and healthful workplace, each employee is responsible for their own safety, as well as the safety of those around them. Employees will use all provided equipment in a safe and responsible manner as directed by the Site Superintendent, and will follow the policies set forth in this SHSP, and in the TtEC EHS Program Manual. Each employee is responsible for immediately reporting any injuries, incidents, and safety infractions to a supervisor or the SHSS so that treatment can be obtained and/or corrective action taken. Equipment operators are responsible for the maintenance, inspection, and safe operation of their equipment. They will report any equipment malfunctions or necessary repairs to the Site Superintendent.

2.7 PROJECT QUALITY CONTROL MANAGER

The Project QC Manager inspects the preparatory and initial phases of projects for compliance with health and safety requirements.

2.8 SUBCONTRACTED PERSONNEL AND THIRD PARTIES

All subcontracted personnel are responsible for compliance with this SHSP and other applicable regulations, and they must fulfill the requirements established by this plan. Subcontractor personnel must receive a briefing from the SHSS prior to unescorted access to the project site and they must acknowledge receipt of the plan and the hazard communication briefing. On-site subcontractors are responsible for providing their personnel with appropriate PPE as specified by the plan. Subcontractor and third-party personnel have the authority to request a work area hazard assessment by the SHSS prior to the commencement or continuation of work.

Subcontractors will:

- Provide updated documentation of all training (Hazardous Waste Operations and Emergency Response [HAZWOPER]) refresher training, waste management training, etc., and medical certifications for work in the exclusion zone
- Submits AHAs or develop AHAs in coordination with the SHSS for planned work activity
- Report all incidents and accidents immediately to the SHSS/Site Superintendent
- Maintain a Drug-free Workplace Program in compliance with the Federal Drug-free Workplace Act

2.9 VISITORS

All visitors to TtEC project sites will report to the Site Superintendent and sign the visitor's log. TtEC employees who are not assigned to the Facility or the RAC Program Management Office will contact the Site Superintendent, the PjM or the SHSS before venturing to the project site. Subcontractor visitors will contact their manager on site.

In no case will visitors be allowed onto the project site area until they have acknowledged their site indoctrination, safety training, and understanding of the SHSP after they are provided with a specific briefing regarding the hazards of the area they intend to visit. PPE will be issued as needed to TtEC employees and government employees (as required by the contract). ***Note***: respiratory protection for government employees cannot be provided due to limitations imposed by the respiratory protection program standards of OSHA. No PPE will be issued to subcontractor employees.

Visitors who do not meet the training requirements of 29 CFR Part 1910.120 (8 CCR Section 5192) will not be issued PPE. These visitors will not enter any active work area or exclusion zone on site. If it is necessary for a visitor to enter active work areas or exclusion zones, all work in these areas will be stopped. The visitors can only enter these areas when it is considered safe to do so by the SHSS/Site Superintendent. These visitors will be escorted at all times.

3.0 SITE HISTORY AND PROJECT DESCRIPTION

The project site is comprised of Buildings 343 and 344 and the drain lines of Building 233 at NAVSTA TI.

3.1 SITE DESCRIPTION AND BACKGROUND

NAVSTA TI is located on two islands in San Francisco Bay approximately midway between the City of San Francisco and the City of Oakland (Figure C.3-1). TI is a man-made island of approximately 403 acres. Yerba Buena Island (YBI) is a natural island of approximately 170 acres connected to NAVSTA TI via a man-made causeway. For additional information, see Section 2.0 of the Work Plan.

3.2 PROJECT DESCRIPTION

The major field activities associated with the project include background surveys, scoping surveys to perform contamination assessment, a final status survey, and collection of samples from Buildings 343 and 344 and the drain lines of Building 233 (Figure C.3-2).

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4.0 POTENTIAL HAZARDS

Site-specific hazards associated with this CTO are summarized below.

4.1 CHEMICAL HAZARDS

Very low levels of lead may be associated with lead-based paint used on the buildings. Very low levels of residual radioactive contamination may also be present. The piping under Building 233 may have asbestos containing wrapping. Disturbance of this could cause worker exposure to asbestos fiber. MSDSs for lead and asbestos are included in this plan (Attachment 1). MSDSs for any chemicals brought on site will be acquired. All MSDSs will be reviewed with all personnel during daily safety meetings. The SHSS will ensure that site personnel receive training on all of these chemicals, in accordance with TtEC EHS 4-2, Hazard Communication Procedure. A master file of MSDSs for chemicals at the site and any additional chemicals brought onto the site for use on this project will be kept in the TtEC site trailer. If unknown materials or chemicals are encountered, the SHSS will contact the PESM for additional guidance regarding these materials and to evaluate the need for additional training and protection. Dust-control measures will be implemented to minimize visible dust and potential inhalation exposures for airborne contaminants.

Numerous physical hazards are identified with the site, mostly associated with work inside buildings. Environmental hazards include potential exposure to insects, rodents, and rodent and bird droppings.

TtEC's protective equipment requirements, combined with the requirement to wash arms, face, and hands before eating or smoking, should prevent exposure through these routes. In addition, the SHSS and work supervisors will observe and warn crew members to be aware of the initial symptoms of chemical or contamination exposure. The amount of exposure depends primarily on the specific activities undertaken and the care with which the activities are performed. The SHSS will remove any crew member from the work site and have the worker medically evaluated if the following initial symptoms persist and are unexplained by other causes (such as allergy, common cold, heat stress, and so forth):

- Dizziness or stupor
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Euphoria
- Chest pains and coughing
- Rashes or burns

4.1.1 Hazard Communication Program

The purpose of a Hazard Communication or the Employee Right-To-Know program is to ensure that the hazards of all chemicals located at the project site are communicated (per 29 CFR, Part 1926.59, and/or 8 CCR, Section 5194) to all TtEC personnel and subcontractors. TtEC EHS Procedure 4-2 constitutes the written hazard communication program, which requires:

- ***Container Labeling*** – The SHSS will ensure that all drums and containers are labeled according to contents and include those from manufacturers and those produced on site by operations. All incoming and outgoing labels will be checked for identification, hazard warning, and name and address of responsible party.
- ***MSDSs*** – An MSDS will be located on site for each hazardous chemical used or known to be on site, and a list of chemicals that require an MSDS will also be maintained.
- ***Employee Information and Training*** – Training employees on chemical hazards will be accomplished through formal safety training conducted annually and informal safety meetings. Project-specific chemical hazards are communicated to employees through an initial site orientation meeting and during daily safety meetings held at field project sites.

4.2 ENVIRONMENTAL HAZARDS

The SHSS/Site Superintendent will discuss environmental hazards associated with each site location at the orientation meeting prior to the start of remediation activities.

4.2.1 Weather and Heat Stress

For this project heat stress is not a concern. Most of the work will be performed inside buildings.

4.2.2 Hearing Conservation Program

The project does not require the use of equipment that produces significant noise. If a generator is used to provide power for the work inside the buildings, the generator will be the only source of noise. This noise can be mitigated by following the operating instructions and operating the generator with its engine compartment doors closed.

4.2.3 Biological Hazards

Biological hazards may be encountered on site. Workers should anticipate the increased likelihood of encountering these hazards. Animal bites and insect stings can cause localized swelling, itching, and minor pain that can be handled by first aid treatment. In sensitized individuals, however, effects can be more serious (e.g., anaphylactic shock), and can lead to severe reactions in the circulatory, respiratory, and central nervous system, and in some cases, death. The SHSS will identify personnel with a known reaction to bites and stings at the pre-job safety orientation meeting. Personnel will not attempt to capture or feed any wild or semi-wild

animals such as cats, rats or ground squirrels due to the possibility of a bite or parasitic infestation. Buildings like these in this project can harbor black widow spiders with a bite that can cause painful swelling and irritation to the skin.

Animal and bird droppings often contain mold, fungus, bacteria or viruses that represent a significant respiratory hazard that includes lung diseases and allergies. Personnel will be instructed to avoid all contact with animal droppings and will wear gloves and Tyvek™ protective wear, at a minimum, when entering areas that may have become refuges or nesting areas.

The hantavirus is sometimes transmitted by rodents found in the southwestern United States and causes respiratory distress, sometimes with fatal consequences. Similarly, rats transmit the arenavirus. Transmission of the hantavirus or arenavirus occurs with exposure to rodent droppings. Good hygiene practices such as washing hands and face prior to eating and drinking will help to minimize the potential for exposure to the hantavirus. Avoiding areas with concentrations of mouse droppings (hantavirus) or rat droppings (arenavirus), for example, will minimize exposure to either virus. The virus can be inhaled in the dust from areas where mice or rats have nested or left their droppings. Thorough washing of hands and face after removing PPE will further minimize the potential for exposure. If a building must be entered, workers should be prepared to wear respiratory protection in the event there are animal or bird droppings. The SHSS will contact the PESM for additional guidance. All animal droppings can be sprayed with a 10 per cent bleach solution and the solution allowed to set for 30 minutes prior to work in the building. The bleach will reduce the potential for exposure to the viruses.

Personnel must use extreme caution when walking through an area, around buildings, and near objects such as drums and containers where a snake is likely to rest during the daytime. If a snake is encountered, slowly and quietly back away from the snake and inform all personnel of its location. Do not attempt to move or kill a snake as certain snakes are protected under state and federal laws. In the event of snakebite, do not try to move the affected individual. Wipe off the skin, as the venom will attack intact skin. Do not suck out the venom. Do not cut open the wound. Do not apply ice or ice packs. Do not use a tourniquet. Do not administer alcohol or medications. Call for medical assistance.

4.2.4 Storm Protection

If a warning of gale-force winds or stronger is issued, which is unlikely for the project area, precautions will be taken to minimize danger to personnel and property. Precautions will include closing all openings in buildings and vehicles; removing loose materials, tools, and equipment from exposed locations; and removing or securing other temporary work. The SHSS must assess whether it is safe to remain in the buildings during such storms. The SHSS will monitor daily weather predictions by listening to daily weather forecasts on the radio or television. If particularly ominous weather conditions are predicted, the SHSS will monitor radio broadcasts

regularly. The project SHSS/Site Superintendent will make a decision as to whether work can continue with modifications, or cannot continue at all.

4.3 PHYSICAL HAZARDS

Numerous physical hazards are associated with activities planned for this project that could result in operational problems or cause accidents and/or personal injury to the workforce, if not identified beforehand.

To minimize physical hazards, TtEC has developed standard safety protocols, rules and guidelines that are promulgated in the TtEC Project Rules Handbook. Parts of that safety protocol are described in this SHSP, which will be followed at all times. Failure to follow safety protocols or continued negligence of these policies will constitute a basis for disciplinary action to the offending employee.

All TtEC personnel will follow the requirements specified in the Project Rules Handbook and this SHSP. The Site Superintendent and SHSS will observe the general work practices of each worker and enforce the use of safe procedures to minimize physical hazards. Hard hats, safety glasses, and safety boots are required in all construction areas of the work site, unless specifically exempted by the PESM or SHSS/Site Superintendent.

4.3.1 Trip, Slip, and Fall Hazards

To minimize tripping hazards caused by supplies or equipment, the SHSS/Site Superintendent will ensure that these materials or equipment is removed from work areas and placed in designated storage areas on a daily basis The Site Superintendent will enforce this "housekeeping" effort throughout the day. The SHSS will remind personnel and subcontractors daily to maintain sure footing on all surfaces and will inspect all work areas prior to the start of work.

Where engineering controls (e.g., guardrails) cannot be installed and/or used, personnel working 6 feet above any surface are required to wear safety harnesses and safety lanyards. A fall protection plan will be developed by the SHSS and the PESM will review the plan before these protective measures are implemented. The SHSS will inspect these before use.

4.3.2 Head and Back Injuries

At a minimum, workers will wear hard hats and safety glasses prior to performing any site-investigation activities. This will prevent minor injuries caused by bumping the head while working around structures or equipment and prevent errant materials from entering the eyes.

TTEC procedure EHS 3-1, Ergonomics, requires all site personnel to receive instruction in proper lifting techniques and it requires the assistance of another person to lift heavy items (as perceived by the individual worker) or for objects heavier than 50 pounds and/or uneven weight

distribution. Site personnel will use mechanical lifting equipment whenever possible to minimize worker exposure to lifting hazards.

4.3.3 Traffic

All TtEC personnel will follow all local traffic rules. Company vehicles will yield to all bikes and pedestrians. Personnel working in areas subject to vehicular traffic (streets, parking lots, and so forth) will wear high-visibility safety vests meeting the requirements of EM 385-11, Section 05.A.11. All traffic management issues will be coordinated with the CSO.

4.4 ELECTRICAL HAZARDS

The SHSS will verify if the buildings have any energized power lines and power to inside the buildings. To prevent accidents caused by electric shock, the project SHSS will inspect all electrical connections on a daily basis and will shut down and lock out any equipment found to have frayed or loose connections until repairs are made by a qualified electrician. The equipment will be de-energized and tested before any electrical work is done. All equipment will be properly grounded prior to and during all work, and ground fault circuit interrupters (GFCIs) will be installed on every outdoor circuit between the power source and electric tool. Generators used to supply power on a project site will contain GFCIs.

Requirements for electrical safety include the following:

- All electrical wiring and equipment will be listed by a recognized testing laboratory. In California, the usual recognized testing laboratories are Underwriters Laboratory, Canadian Standards Association, and Factory Mutual. Six other recognized laboratories are rarely ever seen in the certification of electrical equipment. Some equipment manufactured in foreign countries has other listing certifications. Most foreign certifications are not recognized in California.
- Live parts of wiring and equipment will be guarded to protect personnel from electrical shock. Un-insulated live wires must be elevated at various distances from the ground and depending on the voltage carried by those lines. EM 385-1-1, 11E provides height requirements based on line voltages.
- Transformer banks and high-voltage equipment will be protected from unauthorized access.
- A qualified electrician will perform all work on electrical power supplies and lines.
- Flexible cords (extension cords) will contain the number of conductors required for service plus a ground wire. Cords will be rated for hard usage (S, SE, SEO, SO, SOO, ST, STO, STOO). It should be noted that this rating is not required to be listed on the cord itself, so the wrapping or label that comes with the cord should be checked to assure that the cord meets this requirement. Flexible cords will not be passed through doors, windows, or be placed on the ground where they are subject to being run over by vehicles. If flexible cords must pass through walls, the cords will be protected by bushings or fittings.

- Flexible cords must be inspected on each day of use. No splices or fraying are allowed.
- Flexible cords will not be secured with staples, hung from nails or suspended by bare wire. Plastic tie straps, commonly used today, are acceptable.
- All portable lamps must have bulbs protected by a substantial guard attached to the lamp holder handle.
- All circuit breaker panels, electrical transformers, and power supply equipment must be labeled as to the voltage contained therein.
- Every circuit breaker in all circuit breaker panels must be labeled to describe the circuit it controls.
- All breaker panels and electrical panels must have a cover protecting live, exposed wires.
- A minimum 36-inch clearance must be maintained on three sides of all circuit breaker boxes, transformers, and electrical supply equipment to provide unimpeded access to the equipment in the event of an emergency. Note: lower voltages require only a 30-inch clearance; however, TtEC's policy is 36 inches for all voltages.
- Locked circuit breaker boxes or those located in locked rooms must have a key readily available in the event of an emergency.

4.4.1 Portable Generators

Portable generators used on project sites must meet the requirements for grounding specified in the National Electrical Code (NEC), National Fire Protection Association 70. NEC 250-6 has certain exemptions for the grounding of portable and vehicle-mounted generators; refer to EM 385-1-1, Section 11C (USACE, 2003) for additional details. Portable generators will be operated in open air only where sufficient ventilation prevents accumulation of exhaust gases and carbon monoxide. Portable generators will never be operated inside the buildings.

4.4.2 Temporary Wiring and Lighting

The following rules apply to temporary wiring and lighting:

- A qualified electrician will design temporary wiring; a qualified engineer will approve the design and the system will be tested as required by EM 385-1-1, Section 11 (USACE, 2003).
- The bulbs of temporary lighting fixtures will be protected by guards and will not be suspended by the wire.
- Exposed empty light sockets and broken bulbs are not permitted.
- Temporary lighting circuits will be separate from electrical tool circuits and each circuit will be labeled as "LIGHTS ONLY" or "TOOLS ONLY", as appropriate.

4.4.3 Control of Hazardous Energy (Lock-out/Tag-out)

TtEC EHS Procedure 6-4, Lock-out/Tag-out, establishes the TtEC Control of Hazardous Energy Program. This program applies to all TtEC operations, with the following exceptions:

- Work on cord- and plug-connected electrical equipment where the plug is under the control of the employee performing the work
- Hot tap operations
- Work involving minor changes and adjustments to equipment during routine operations (such as small tooling adjustments)

Procedures to prepare for, apply, and release a machine or piece of equipment from lock-out are provided below. These steps will be completed, in order, using the corresponding permit. While work is being performed under the lock-out, a copy of the completed permit will be posted at the equipment controls or work area as appropriate. (The steps below refer to sections of the permit form.)

1. **Complete the general information in *Section A* of the permit.**
2. **Identify isolation points**

   The first step required to isolate a piece of equipment is to identify the sources of hazardous energy present. To identify the sources, the authorized employee will complete the following steps:

   - Survey the equipment and related schematics, blueprints, or as-built drawings, if available, for hazardous energy sources.
   - Identify the isolation points and device positions for controlling each source of hazardous energy.
   - Identify the isolation method to be used on each source.

   The above information will be documented in Section B of the Lock-out/Tag-out Permit as each point is identified.
3. **Notifications**

   Prior to applying a lock-out, the authorized employee will notify affected employees of the equipment to be locked out and sign Section C of the Lock-out/Tag-out Permit on the "Notifier" line.
4. **Equipment shutdown**

   Shut down the equipment or place into the desired configuration using normal operating procedures. The authorized employee will sign Section C of the Lock-out/Tag-out Permit on the "Shutdown by" line.

5. **Equipment isolation**

   To apply a lock-out to a piece of equipment, complete the following steps:

   - Place each energy isolation device into a position that will prevent the transmission of hazardous energy.
   - The authorized employee will lock out devices to each isolation point and control the key for each lock at all times. Only one key is permitted per lock.

   Complete Section D of the permit as each device is placed and sign the "Isolator" line in Section C.

   Notes:

   - Any lock-out device not containing an integral locking mechanism must be used in conjunction with a keyed lock.
   - Any energy isolation point not capable of being locked out must be controlled physically (e.g., removing handles or disconnecting).

6. **Release of stored energy**

   After the equipment has been locked and tagged as required in Section D, all remaining stored energy must be released. Methods for the release of stored energy include, but are not limited to the following:

   - Discharging and grounding capacitors
   - Bleeding pressure from vessels and lines
   - Releasing mechanical sources of energy to engage blocks

   Stored energy has the potential to re-accumulate; therefore, verification of isolation will continue until work is complete. After releasing stored energy, complete Section E of the permit.

7. **Lock-out/Tag-out verification**

   After completing the lock-out of the desired piece of equipment, the effectiveness of the lock-out must be verified by the authorized employee by attempting to operate the machine. After attempting to operate the machine, sign Section C of the permit on the "Verifier" line.

8. **Performance of work**

   After verification and the receipt of the supervisor's approval signature, work may be performed on the locked/tagged equipment.

9. **Lock-out/Tag-out removal**:

   After work has been completed, the following steps will be followed to release equipment from lock-out/tag-out:

   - The area affected by the lock-out will be inspected to ensure that releasing the machine does not present a hazard to people and property.
   - Lock-out devices and tags will be removed.
   - Isolation devices will be returned to their operating positions.
   - The equipment will be started.

- Affected employees will be notified of the release.
- Section F of the permit will be completed as the equipment is returned to service.

4.4.4 Tag-out

The use of tags without locks is prohibited, except in those cases where it is physically impossible to attach a locking device to an isolation point. When it is necessary to use tags without locks, the following procedures will be followed:

- The isolation point will be placed in the correct position to prevent the flow of energy.
- The device will be physically disconnected.
- A tag will be placed on the disconnected device.
- Employees will be warned not to tamper with the tag or isolation point.

4.4.5 Equipment-specific Lock-out/Tag-out Procedures

Because TtEC does not normally perform lock-outs of machinery on a repetitive basis, the lock-out/tag-out permit is designed for initial and unique lock-outs. Should it become necessary to repetitively lock out the same piece of equipment, specific procedures and permits for the equipment will be developed. The procedures will be generated by trained and knowledgeable project personnel and be reviewed and approved by the PESM. Equipment-specific procedures are not required when all of the following conditions are present:

- The machine has no potential for stored energy or the re-accumulation of energy after shutdown.
- The equipment has a single, readily identifiable, and isolated source of energy.
- Isolation and lock-out of the source will completely de-energize and deactivate the equipment.
- The machine is locked out and isolated from that energy source during servicing and maintenance.
- A single lock-out device will achieve a locked-out condition.
- The servicing or maintenance does not create a hazard to other employees.

4.4.6 Shift Changes

If it is necessary to maintain the status of a locked-out machine or device past the end of the shift when the lock-out was initially installed, the following procedures will be adhered to:

- The incoming authorized employee will place their lock on the lock-out point and complete a new permit.
- The outgoing employees will remove their lock(s) after the new lock(s) are applied.

- If multiple shifts are not used, the initial locks may be left in place until the following day or until the equipment is released from lock-out/tag-out.
- The new shift supervisor will sign the permit before work is begun on the new shift. The last supervisor whose name is on the lock-out/tag-out permit is responsible for all activities related to the work activity.

4.4.7 Failure to Clear Locks

If a person should fail to clear a lock-out and their lock remains in place, the supervisor will attempt to contact the person who applied the lock and resolve the issue.

If the person cannot be contacted, the supervisor will investigate the situation and determine if removal of the lock will create a hazard in the work zone. If there is no hazard present, the supervisor will then verify that the work zone is clear, blocking devices have been removed, and the system has been restored to the normal configuration. The supervisor will then cut the lock off and restore energy to the system.

A written incident and investigation report per TtEC EHS Procedure 1-7, Incident Reporting and Investigating, will be prepared by the supervisor stating the reason for cutting the lock, why the lock was not removed, and the procedure used to ensure the safety of personnel in the area. The individual whose lock was cut off must be notified immediately.

4.4.8 Subcontractors

The Site Superintendent will be familiar with the nature of all on-site subcontractor work that may involve hazardous energy and ensure that it conforms to established work practices that are at least as strict as this procedure. For any lock-out/tag-out requirements, the Site Superintendent will review and approve all subcontractor work preparation, apply his/her locks to the configuration, and sign the appropriate lock-out/tag-out procedure checklist.

4.4.9 Periodic Inspections

Periodic inspections, pursuant to EHS 3-3, Inspections, will be completed during the daily, weekly, and monthly surveillance by the SHSS, PESM or other qualified personnel to ensure that the lock-out/tag-out program is being effectively implemented. At a minimum, the following will be done:

- Existing lock-outs will be reviewed for effectiveness.
- Permits for each existing lock-out will be reviewed for adequacy.
- Incident reports and past permits will be reviewed to determine if deficiencies in the program exist.
- Corrections to the system will be made as warranted.
- Results will be logged in the health and safety logbook.

4.4.10 Training

Training requirements for personnel involved with, or affected by lock-out/tag-out are provided as follows:

- Authorized employees will receive training in the following prior to being allowed to use lock-out/tag-out procedures:
  - Recognition of hazardous energy sources
  - Types and magnitudes of energies available at the site
  - Methods and means needed for energy isolation and control
  - The requirements of this procedure and 29 CFR Part 1910.147
- Affected employees will be instructed in the following:
  - Purpose of the lock-out/tag-out program
  - Use and requirements of this procedure and 29 CFR Part 1910.147
  - Prohibitions of restarting or tampering with equipment that has been locked out
  - Prohibitions of tampering with locks and tags installed on equipment

Personnel not employed by TtEC will be briefed in the requirements of this program during site-specific orientations, when applicable. Training records will be maintained in accordance with TtEC EHS Procedure 1-9, Recordkeeping.

4.5 CONFINED SPACE ENTRY

A confined space is any enclosed area having a limited means of egress where ventilation is not adequate to remove a toxic or flammable atmosphere or prevent an oxygen deficiency. Examples of confined spaces include, but are not limited to: tanks, boilers, vessels, bins, manholes, tunnels, pipelines, underground utility vaults; or any open top space more than 4 feet in depth such as pits, tubes, trenches, or vessels. Workers must crawl under a building for one of the surveys. Although this is a confined space, it is not a permit-required confined space. The SHSS must inspect the area prior to a person crawling under the building. The SHSS will check for any obstacles and other hazards. The worker will wear a full body harness with lifeline in the event the worker must be pulled out from under the building.

4.6 FIRE AND EXPLOSION HAZARDS

The SHSS must establish a fire prevention and protection program by ensuring that flammable materials are properly stored and that safe work procedures and rules are followed. Smoking is not permitted anywhere on the project site inside or near any of the buildings.

4.7 RADIOLOGICAL HAZARDS

Radioactive materials may be present in the project site as documented by previous site surveys. If radioactive materials are encountered during radiological surveying, the procedures outlined in this Radiological Work Plan will be followed. At no time will workers directly touch or handle any material that is potentially radioactive without first notifying the Project Health Physicist (PHP). Workers will follow safe work practices described in the radiological work plan. All radioactive work procedures and policies are reviewed and approved by the PHP.

4.7.1 Radiological Health and Safety

The necessary controls for radiologically safe operations will be implemented in accordance with TtEC's Standard Operating Procedures (SOPs), and current health physics practices. Critical requirements include the presence of a TtEC Radiation Safety Officer (RSO) to ensure compliance with the TtEC's SOPs and the radiological controls specified in Section 5.0; and the presence of Radiological Control Technicians (RCTs) at active work areas to ensure compliance with the RWP.

Dose rate, contamination, and air monitoring, including initial baseline sampling to determine radiological background conditions, will be performed in accordance with the requirements specified in the RWP and based on the judgment of the RCT. PPE levels, dictated by radiological considerations and physical and chemical safety issues identified at each work location, will be assigned or modified, according to the approved RWP.

4.7.2 ALARA

The basic concept in radiation protection specifies that exposures to ionizing radiation and releases of radioactive materials should be managed to reduce collective doses to workers and the general public as low as reasonably achievable (ALARA). ALARA will be implemented during the course of the work specified in the Work Plan.

The basic methods used to control radiation exposure will include personnel training, personnel monitoring, evaluation of radiological conditions, use of RWPs, site control procedures, posting of potentially hazardous areas, implementation of engineering controls, and specification/use of PPE.

4.7.3 Radiation Work Permits

An RWP will be prepared that will specify the radiological safety requirements for activities performed at the site. Personnel assigned to site work will be required to understand the requirements and sign the RWP prior to beginning work.

5.0 ACTIVITY HAZARD ANALYSES

An AHA is developed for each planned activity and operation that occurs in each major phase of work and is the focal point for its safe conduct. The AHAs for this project are located in Attachment 2. The AHA identifies the sequence of work, specific hazards anticipated, and the control measures to be implemented to minimize or eliminate each hazard. Since each task is described and evaluated, workers should be better prepared to perform work safely. The AHAs are used to augment daily safety meetings and are intended to heighten safety and hazard awareness on the job. The AHA will be covered during the preparatory phase, and pre-task meetings for all definable tasks in the planned work; and the pre-task briefings will be documented in the Daily Contractor Quality Control Report and may be combined with the daily tailgate meeting.

The SHSS will discuss the risks and precautions associated with each task identified in the Work Plan. Prior to the start of each work shift, daily "tailgate" safety meetings are held to discusses the potential chemical, physical, and environmental hazards, and applicable preventive safety measures. During a work day, if any changes or new conditions develop, the SHSS will ensure that the applicable AHA is updated and that workers review it. Attendance is mandatory for all employees involved in the specific work. Amended AHAs must be reviewed by the PESM. However, if a change must be implemented immediately and the PESM cannot be contacted, the SHSS may implement the change, forward a copy of the change to the PESM as soon as possible, and leave a voicemail phone message for the PESM.

After changes to an AHA are necessary because of changing conditions or requirements, the SHSP may be modified by using the change form attached to the SHSP and approved by the PjM or Site Superintendent, the SHSS, and the PESM.

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6.0 PERSONAL PROTECTIVE EQUIPMENT

PPE for site workers is selected and used based upon the existing and potential hazards anticipated, and the requirements of 29 CFR, Part 1910.120 (8 CCR, Section 5192). Different levels of personal protection will be provided to workers depending on specific work tasks performed. The selection of PPE requires an evaluation of chemical contaminants, their concentrations, and physical hazards that may be encountered.

This SHSP complies with 29 CFR, Part 1910.132 (8 CCR, Sections 3380–3390), which states that all PPE for eyes, face, head, and extremities, protective clothing, respiratory protection devices, and protective shields and barriers will be provided, used, and maintained in a sanitary and reliable condition. PPE is required wherever hazards posed by the work processes, the environment, chemicals, or mechanical irritants may cause injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact.

Respiratory protection is of primary importance in the protection of employee health since inhalation of air contaminants is a potential major route of exposure. The TtEC respiratory protection program is administered pursuant to the requirements established by 29 CFR, Part 1910.134 (8 CCR, Section 5144). The SHSS is assigned responsibility as the Respirator Program Administrator for the project. Selection, use, and maintenance of PPE at the project will be in accordance with EHS Procedure 5-1, PPE; and EHS Procedure 5-2, Respiratory Protection. The SHSS may upgrade or downgrade the level of protection based on observations of the SHSS and the concurrence of the PESM.

The U.S. Environmental Protection Agency Level categories are as follows:

- **Level A:** Used when the greatest level of skin, eye, and respiratory protection is needed, and consists of a totally encapsulated suit with supplied breathing air.
- **Level B:** Used when the highest level of respiratory protection is needed but a lesser level (than Level A encapsulated suit) of skin protection is required.
- **Level C:** Used when criteria for using air-purifying respirators are met and a lesser level of skin protection is required.
- **Level D:** Used only as a work uniform and in an area without respiratory hazards.

6.1 LEVEL C PROTECTION

Level C protection will be used during the work under Building 233 where there is a potential for exposure to asbestos-containing material and other activities where there is a potential for chemical exposure but where that exposure is below permissible exposure levels with the provided PPE. Level C, PPE includes:

- Full face-piece, air-purifying respirator (APR)
- National Institute for Occupational Safety and Health (NIOSH)/Mine Safety and Health Administration (MSHA)-approved air purifying respirator cartridges with P-100 cartridges
- Coveralls (inner), cotton or work uniform
- Coveralls (outer), chemical-resistant, disposable (Tyvek) with attached hood and elastic wrists and anklets
- Gloves (outer), chemical-resistant (nitrile)
- Gloves (inner), nitrile
- Boots, chemical-resistant, rubber, with steel toe and shank, or leather, with steel toe and shank, with pull-over boot, non-slip soles
- Hard hat, not required under the building
- Hearing protection (optional or as required)

6.2 LEVEL D PROTECTION

Level D protection is used during site reconnaissance, mobilization, surveys, and sampling activities that have no potential for exposure to chemical or radiological hazards. PPE for Level D includes:

- Coveralls, cotton and/or disposable
- Boots, leather or rubber, steel-toe and shank, non-slip soles
- Rubber over-boots or disposable booties (as required)
- Safety glasses or goggles, face shield when handling liquids
- Hard hat
- Gloves as required by task (leather work gloves)
- Hearing protection (as required)

It is anticipated that only Level D and level C (under Building 233 due to asbestos) protection will be required for this project.

7.0 AIR, NOISE, AND OTHER MONITORING

Air, noise, and chemical monitoring is not required for this project. Since the project consists of only radiological surveying and collection of radiological samples, these procedures are described in the Radiological Work Plan.

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8.0 SITE CONTROL

To minimize the transfer of potentially hazardous substances from the site, contamination control procedures will be employed. The establishment of regulated areas and designated site work zones will be one method of contamination control. Site control through access control points will reduce the possibility of personnel exposure to site contaminants and contaminant translocation by personnel or equipment from the site.

Methods that will be used to facilitate site access control include:

- Scheduling operations to minimize the numbers of personnel at the site
- Establishing site work zones around each work site location
- Establishing control points to regulate access to and egress from work zones
- Implementing appropriate decontamination procedures

Each building will be an exclusion zone. Control of the work area is specially described in the Work Plan.

8.1 SITE SECURITY

There is no public access to each of the buildings because they have been closed for a number of years. Project equipment will be packed at the end of each day and returned to the project site at Hunters Point Shipyard. Workers should always ensure that their vehicles are in good operating condition and that they have sufficient fuel since the nearest gas station will require travel across long sections of bridges that can have very heavy traffic. The bridges often have long traffic jams especially during rush hours. Before personnel re-enter any area for the day's work, the entire work area is to be re-inspected by the SHSS and the assigned RCT to ensure that it is unchanged from the previous day's work. Inspections of equipment must be performed each day. If workers discover syringes, needles, drugs, unknown containers, and so forth, they will inform the SHSS so that the items can be safely removed. Workers will not attempt to remove these items on their own. Before performing any work inside a building two workers will enter it to ensure that there are no vagrants or other suspicious people inside. Workers will not engage or confront other people encountered inside the building, and will notify the police if appropriate.

8.2 PERSONNEL DECONTAMINATION

At a minimum, site workers will be provided with adequate restroom and hand washing facilities and will be required to wash exposed areas of the skin (that is, hands and face) upon exiting potentially contaminated areas. Personnel leaving an area controlled for radiological hazards will be surveyed by an RCT prior to leaving it. If a worker finds contamination while surveying out

of the controlled area, the RSO or his designee will assist the worker in decontaminating the affected area and then resurvey the worker.

Smoking, eating, or drinking will not be allowed in the work areas. Prior to smoking, eating, or drinking, workers will thoroughly wash their hands and face with soap and water.

General site control measures pertain to the project site(s) overall, and may include the use of perimeter fencing and posting of warning signs. The Site Superintendent and the SHSS will implement control measures as necessary, which will be oriented toward visitors and the general public. No person will be allowed on a particular site without a briefing regarding the hazards of the site. This briefing must be documented and signed by the person receiving the briefing.

Location-specific control measures, in the form of Exclusion Zones (EZ) are designed to limit the number of personnel on the site to only those essential to perform the work, and control worker entrance and exit from individual work areas. Prior to the commencement of any on-site work, the EZ will be established by the SHSS. Each EZ will be clearly identified and delineated by cones, rope, fences, signs, or barricades. The SHSS will maintain a site entry log for each site that documents each person entering a work zone. The logs will be kept in the project files.

9.0 MEDICAL SURVEILLANCE PROCEDURES

TtEC requires that site workers participate in a medical surveillance program that meets the requirements of 29 CFR, Part 1910.120(f) (8 CCR, Section 5192). The medical surveillance program, managed by the TtEC medical consultant (WorkCare®, Dr. Peter Greaney, a Board-Certified Occupational Health Physician), will be instituted for the following employees:

- All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year
- All employees who wear a respirator for 30 days or more a year or as required by 29 CFR, Part 1910.134 (8 CCR, Section 5144)
- All employees who are injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation

9.1 BASELINE PHYSICAL EXAMINATION PROTOCOL

All employees who are expected to participate in on-site activities where they are potentially exposed to health or safety hazards and/or will wear respiratory protection will be required to complete a baseline physical examination. The contents of the baseline physical examination are outlined as follows:

- A completed medical, occupational, and smoking history questionnaire with an emphasis on the following systems: nervous, skin, respiratory, hematopoietic (blood-forming, cardiovascular, gastrointestinal, reproductive, and otolaryngeal (ears, nose, and throat). The examinee is required to fast for 8 hours, abstain from alcohol for 3 days before this examination, and avoid high noise exposure for 14 hours before the examination.
- A complete physical exam, including the following, at a minimum:
  - Height, weight, temperature, pulse, respiration, and blood pressure
  - Head, nose, and throat
  - Eyes (Snellen)
  - Ears (with audiometric testing in accordance with 29 CFR Part 1910.95)
  - Chest (heart and lungs)
  - Peripheral vascular system
  - Abdomen (liver, spleen, kidney)
  - Musculoskeletal system
  - Genitourinary system
  - Nervous system

- Tests that must be completed are provided as follows:
  - Complete blood counts and chemistries including the following:
  - White blood cell, differential cell, and platelet counts
  - Hemoglobin and/or hematocrit
  - Albumin, globulin, total protein, and total bilirubin
  - Serum glutamic oxalacetic transaminase and serum glutamic-pyruvic transaminase
  - Lactic dehydrogenase
  - Alkaline phosphatase and gamma glutamine trans peptidase
  - Calcium
  - Phosphorous
  - Uric acid
  - Creatinine
  - Urea nitrogen
  - Cholesterol and triglycerides
  - Glucose
- Urinalysis (clean catch), including the following:
  - Color and character
  - Specific gravity
  - pH
  - Protein
  - Acetone
  - Glucose
  - Microscopic examination
- Chest x-ray (14- by 17-inch post-anterior and lateral performed for the baseline exam).
- Pulmonary function test to include, at a minimum, the following:
  - Forced Vital Capacity (FVC)
  - Forced Expiratory Volume, one second (FEV10)
  - The FEV10 FVC ratio
  - A minimum of three good tracings
  - 12-lead resting echocardiogram

9.2 MEDICAL CLEARANCE

All workers who must enter exclusion zones or who meet the criteria listed above must provide the SHSS with a written opinion from a licensed physician attesting to the employee's fitness for duty. A physician's written opinion of the employee's ability to wear a respirator will also be

required when there is reasonable possibility that a respirator may be required for site work. The physician's written opinion must be dated within the previous 12-month period, or an alternate time period as determined by the physician, for continued work. Additional medical surveillance requirements specific to the site or site contaminants may be required and will be defined in the SHSP. All workers will be offered a tetanus immunization at their baseline or periodic physical.

9.3 RECORD KEEPING

The SHSS will maintain a file for each person on site which will contain a copy of the physician's statement of the employee's fitness for duty, the employee's ability to wear a respirator, and any work restrictions. The SHSS will ensure that the employee and project supervisors comply with medical work restrictions, if any. The SHSS will also ask each employee to complete a form to indicate any known allergies, prescription medications, and any other medical information that will allow the SHSS to respond to a medical emergency in an appropriate manner. Personnel will notify the SHSS regarding any medications, including over-the-counter drugs that they are using on each day of work. The SHSS, in consultation with the PESM and/or a medical consultant, will determine if any medications may have an effect on a worker that would impair the ability of the worker to perform work safely. At no time will the SHSS maintain the copy of any actual medical records. These records are maintained by the TtEC medical consultant.

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10.0 SAFETY CONSIDERATIONS

All workers must comply with the TtEC Project Rules Handbook, both Volumes I and Volume II. Some of the rules contained in those documents are provided as follows:

10.1 FORBIDDEN PRACTICES

The following practices are expressly forbidden during field operations:

- Entrance onto the site or into designated exclusion zones without formal authorization, compliance with medical monitoring and training requirements, and/or compliance with this SHSP
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material in any area designated as contaminated
- Approach or entries into areas or spaces where toxic or explosive concentrations of gases, vapors, or dusts exist without prior approval of the SHSS and/or use of PPE
- Facial hair, which interferes with the satisfactory fit of the mask-to-face seal of respirators for personnel required to wear respiratory protection equipment
- The use/wearing of personal stereo headphones that may preclude reception of audible warning signals and/or hazard communication
- The use of cell phones during work hours at any time workers are driving in any company vehicle on or off the sites, or operating any equipment or using any tools or mechanical devices, unless an employee is on break or the cell phone is being used for job-related purposes

10.2 REQUIRED PRACTICES

The following practices are required:

- Personnel and equipment in the exclusion zone will be minimized, and limited only to those personnel that are essential for the work.
- Equipment will be bonded and grounded, spark-proof and explosion-resistant, as appropriate to minimize or prevent the ignition of flammable materials in the work zone.
- A minimum of two employees, in constant communication (either visual or voice) with each other, will be required to perform any work within the exclusion zone.

10.3 VEHICLE OPERATIONS

Prior to the use of all vehicles, operators will conduct a safety inspection and record the findings on the Safety Inspection Equipment Checklist. Motor vehicles assigned to this project will conform to the requirements of 29 CFR, Parts 1926.601, and 1926.602 (8 CCR, Sections 1590 through 1596). The drivers of transport vehicles will be responsible for passenger use of the safety belts, and personnel are not allowed to ride in the bed of pickup trucks unless an approved restraint system is installed and used. The Site Superintendent is responsible for maintaining a clean job site free from hazards, and for providing safe access and egress from the site. Traffic cones and/or high-visibility barrier tape will be used, where appropriate, for traffic control into/out of exclusion zones. Personnel will wear reflective, high-visibility safety vests or clothing whenever working in and around vehicles, on all roads and on all sites.

10.4 ADDITIONAL SAFETY CONSIDERATIONS

The following is a list of precautions to minimize the possibility of injury-related accidents from occurring during field operations.

10.4.1 General Information

The following are general information precautions:

- Consider the potential impact of actions on coworkers. If planned activities may be hazardous to other personnel on the site, postpone or amend intentions.
- Ask the SHSS if uncertain or in doubt about the safe way of doing the job.
- Running is not allowed on the project sites except in extreme emergencies.
- Throwing objects at personnel or equipment is prohibited.
- Minimum clothing requirements on construction sites are long pants, a shirt that covers the shoulders, and good work shoes. Torn, ragged, or frayed items should not be worn because they may snag on obstructions or machine parts, or otherwise cause trips or falls.
- Know where emergency exits are, how to gain access to them, and do not block them with material or equipment.

10.4.2 Housekeeping

Some housekeeping measures are provided as follows:

- Maintain clean work and storage areas to encourage better incident prevention and make work easier to complete.
- Dispose of trash and scrap in proper containers and recycle when possible.

- To expedite access and prevent damage, store tools, material, and equipment in their proper locations in an orderly manner.
- Keep stored material, scrap, and other tripping hazards out of roads and walkways and away from emergency equipment.
- To prevent tripping or damage, either cover cords, cables, and hoses crossing roads or walkways to prevent tripping or damage, or ensure that they are supported overhead, at least 7 feet above walkways and 14 feet above roads.

10.4.3 Fire Prevention

Fire prevention precautions are provided as follows:

- Control "open flame" tools and equipment.
- Protect nearby combustible materials from heat, flames, sparks, and slag by moving or covering them.
- Keep flammables in closed containers or safety cans.
- Ensure that all site workers have training on the use of portable fire extinguishers.

10.4.4 Personal Protective Equipment

PPE guidelines are provided as follows:

- **Head** – Hard hats are required on construction sites at all times, and are also required at other locations where overhead hazards exist. Bump hats are not permitted.
- **Eyes and Face** – Spectacle-type safety glasses are required when striking steel on steel, grinding, drilling, sawing, or vibrating concrete, etc., or when working near someone else who is creating flying particles.
- **Boots** – Minimally, workers will wear steel-toe boots (not shoes). Boots must be at least ankle-height, with steel-shank and non-slip soles and constructed of leather or other chemically resistive material. Suede, cloth, and rubber are not acceptable.
- **Safety Vests** – For their protection and to make them more visible, workers must wear safety orange or lime green vests as required by code. During hours of darkness, these vests must have reflective tape.
- **Fall Protection** – Safety harnesses and a fall restraint system, (e.g., lanyards attached to an approved support point) are required when working from any support or surface where the possibility of falls 6 feet or greater exists, or where guardrails are not installed. Lanyards must be tied off as short as possible (less than 36 inches of fall) to a solid, approved support.

10.4.5 Hand Tools

Hand tool precautions are provided as follows:

- Every tool is designed for a specific use. Do not misuse them, and inspect them daily for defects.
- Keep tools in proper working condition—clean, sharp, oiled, dressed, and adjusted.
- Mushroomed chisel and drills cause dangerous flying objects. Keep them dressed.
- Never hit hardened steel with hardened steel, such as hitting a hatchet with a hammer.
- Do not use "cheaters" to increase capacity; rather, obtain a larger-sized tool.
- Carry tools in proper sheath, belt bag, or box with points down.
- Do not carry pointed or sharp tools in pockets.
- Require eye protection for protection from flying particles.
- Do not use damaged tools. Mark them, tag them as out of service, and give them to the SHSS/Site Superintendent.

10.4.6 Power Tools

Power tool precautions are provided as follows:

- Know how to shut off the power tool being used before turning it on. Prohibit power tools with "locked on" switches.
- Require eye protection to shield flying fragments.
- Inspect power-activated tools daily before use for proper operation of their safety devices.
- Do not operate power equipment without SHSS authorization.
- Install and ensure functioning guards on all power tools designed to accommodate guards prior to use.
- Ensure that power supplies are properly attached both to the tool and to the source and that electric tools are grounded or double-insulated.
- Check the immediate area for other people before operating a power tool. Warn people nearby that the tool will be used.
- Be prepared for the jamming of rotating tools by maintaining good footing and balance, and watch out for nearby obstructions. Instruct all personnel to check themselves for loose clothing.
- Shut off and bleed down air hoses before disconnecting air tools. Never point an air hose toward another person or oneself.
- GFCI-protect or double-insulate power tools.
- Avoid using power tools in wet locations (air-powered tools may be used).

- Protect all cords and plugs from damage. Ensure that the power cord is well away from the operating portion of the power tool.
- Turn off all power tools before disconnecting from power source. If a circuit breaker is tripped or the tool stops operating, turn off the power switch before disconnecting the power source.
- Disconnect power cords from the source before coiling. Never leave a power cord plugged in.
- Refer to Section 4.4 regarding the use of extension cords.
- Store in a safe place when not in use. Protect from weather, dirt, and water.

10.4.7 Manual Material Handling

Manual material handling precautions are provided as follows:

- Leg muscles are stronger than back muscles; ergo, lift with the legs not the back. Bend the knees, keep the back straight, tighten the abdomen, and use the legs to make a smooth, controlled lift.
- Plan before lifting; consider the weight, size, shape, path of travel, and placement location; and get help if necessary.
- Protect the hands and fingers from rough edges, sharp corners, and metal straps. Keep hands and fingers out of pinch points between the load and other objects.

10.4.8 Portable Ladders

Portable ladder precautions are provided as follows:

- General – All Portable Ladders
  - Inspect for defects; if and when they are found, immediately withdraw the ladder from use.
  - Set ladder feet on a solid foundation.
  - Allow only one person on a ladder at one time.
  - Use ladders for climbing; not for material skids, walkways, or work benches.
  - Face the ladder while climbing up or down and while working from it. Use safety harness or fall protection when falls are possible.
  - Use both hands for climbing, and a hand line for material.
  - Do not use metal ladders.
  - Store ladders safely to prevent damage from vehicles, materials, etc.
- Straight and Extension Ladders
  - Ensure the correct slope for ladder use at 1:4.
  - Secure the ladder from slipping. Use non-slip feet on the bottom and tie off with a rope at the top.

- Extend the ladder 3 feet above the top landing if it is to be used for access to the landing.
- Do not use extension ladders that exceed 30 feet.
- Do not take extension ladders apart to make two ladders.
- Keep hands off rungs while extending or lowering the extension section. Be sure that latches are in place before climbing.

- Stepladders
  - Open fully and lock the spreaders.
  - Do not use as a straight ladder.
  - Do not stand or step on the top platform.
  - Keep loose tools off steps and top platform.
  - Tie off the stepladder if it is longer than 12 feet.
  - Do not use stepladders that exceed 20 feet in height.

10.4.9 Electricity

Electricity precautions are provided as follows:

- Refer to Section 4.4 for additional details on electrical safety.
- Ensure that qualified electricians familiar with the NEC and other applicable codes perform all electrical work.
- Require guards over the bulbs of temporary lighting circuits. Ground metal guards.
- Keep extension cords out of water and at least 7 feet above walkways.
- Require labeling on disconnect switches to show the equipment or service they feed, and inspect before operation.
- Always shut down electrical equipment before servicing, repairing, or investigating questionable functioning.

10.4.10 Illumination

All scheduled outdoor work should be planned to occur during daylight hours only, if possible (a half hour after sunrise to a half hour before sunset). For work performed inside buildings, the project will ensure that additional lighting is provided to meet the requirements of 29 CFR, Part 1910.120 (8 CCR, Section 5192).

10.5 ERGONOMIC CONSIDERATIONS

Routine activities may involve tasks that, by their nature, may subject personnel to unexpected ergonomic stresses. Examples of ergonomic stresses include:

- Muscular sprains and strains
- Musculoskeletal trauma from impacts or vibrations
- Fatigue due to extended work schedules

Caution and workload awareness should be exercised by all site personnel during project activities. Tasks should be rotated among the workers to minimize the effects of repetitive trauma.

TtEC procedure EHS 3-1, Ergonomics, provides an in-depth discussion of factors and conditions affecting ergonomics.

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11.0 DISPOSAL PROCEDURES

This project will most likely generate wastewater from the drain lines at Building 233. The wastewater will be sampled and analyzed (See Section 5.2 of the Sampling and Analysis Plan). The method of disposal will be determined based on the sample results. Disposable PPE is expected to have no contamination and will be discarded as ordinary trash after the worker has been screened for radioactive contamination upon leaving the work sites.

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12.0 EMERGENCY RESPONSE PLAN

There is a fire department on the island and a police station is located in Building 1 at the main gate. The nearest services are located in the city of San Francisco. This plan describes response activities as they apply to the project.

12.1 RESPONSIBILITIES

The Site Superintendent is the primary emergency coordinator for the project on site and may be assisted by the PjM when notified of the need for emergency assistance. The emergency coordinator will assume the lead and direct and/or delegate personnel and resources necessary to manage the emergency. Key responsibilities of the emergency coordinator include:

- Initiate evacuation, if needed.
- Initiate emergency response agency notification.
- Evaluate and assess emergency situation to ensure that response activities are commensurate with the level of the emergency and are implemented pursuant to this plan.
- Interface and coordinate with outside agencies responding to on-site emergencies.

12.2 COMMUNICATIONS

Site personnel will continually maintain verbal communication during the course of the project. The following communication systems will be available during site activities:

- Cellular telephones or access to a land phone for emergency purposes
- Hand-held radios, as needed
- Compressed air horn (signals emergency evacuation only) at the site
- Diagrammed and posted hand signals, if used
- Posted location of evacuation assembly area(s)
- Posted route to the nearest hospital for the project site
- Posted emergency phone numbers

12.3 ACCIDENT/INCIDENT REPORT

After the emergency event is over, or during the course of the emergency when possible, the SHSS will notify the PESM by telephone. Accidents or incidents require the SHSS/Site Superintendent to immediately investigate the cause, notify the PESM, and promptly complete the following:

- **TtEC Incident Report Form**. Details of the incident will be documented within 24 hours and copies of the report forwarded to the DON Remedial Project Manager (RPM) and the PESM. Reports of serious incidents will also be faxed to the RPM by the Site Superintendent or PjM.
- **Incident Investigation Report**. The Incident Investigation Report will have the same distribution as the Incident Report Form and will be completed within 3 days of the incident.

Any recommended additional hazard-control measures must be discussed with, and approved by the SHSS/Site Superintendent and PESM prior to implementation. Any occupational injuries and illnesses will be recorded, if applicable, on an OSHA Form No. 300. The SHSS will immediately (meaning as soon as practically possible, but not longer than 8 hours after the incident) report any serious injury or illness, or death, of an employee (occurring in a place of employment or in connection with any employment) by telephone to the nearest District Office of Cal-OSHA. Records of all site accidents and first-aid treatments will be maintained by the SHSS. Also, the Navy representative will be notified for any injury that is more than first aid or for any incident where property damages are $2,000 or more.

12.4 PRE-EMERGENCY PLANNING

Prior to performing any work, the Site Superintendent or PjM and the SHSS will verify all emergency action plans by ensuring that planned support facilities are available and that emergency contact numbers are valid. As work proceeds, the SHSS will make certain that plans specified in this section of the SHSP remain valid, that they can be implemented at all times, and that plans are modified as necessary to accommodate changes. The SHSS will coordinate all changes with the PESM and upon arrival at the site, ensure that the following actions are taken or conditions exist:

- Ensure that all personnel know the system(s) for communicating during emergency situations, and how to use a radio or phone to summon emergency assistance.
- Make available a vehicle to transport personnel to safe locations or hospitals.
- Ensure that all personnel on this project know how to use a portable fire extinguisher.
- Make certain that all personnel know the location of all emergency equipment and supplies.
- Ensure that emergency equipment is available in work areas and that the equipment is inspected as required by regulations and TtEC policies as follows:
  - Fire extinguishers—monthly, annual refill and servicing, and hydrotested every 7 years
  - First aid kits—weekly (per EM 385-1-1)

- Eyewashes—weekly; if preservative is used, eyewash water may be changed every 4 months; otherwise, water must be changed weekly. Only potable water may be used for eyewashes. Eyewashes must meet the American National Standards Institute Z358-1 standard that requires a 15-minute eyewash that provides 0.4 gallons per minute.

- Upon establishing site, the EC will hold a practice evacuation drill to ensure that all workers are familiar with procedures, evacuation routes, and assembly points. At the end of the drill, it will be evaluated and critiqued to ensure that the plan works. If the plan does not work, the SHSP will be modified. The drill will be documented in the safety logbook.

12.5 EMERGENCY MEDICAL TREATMENT

Observe the following four procedures if an accident with injury occurs.

12.5.1 First Aid

Only qualified personnel will provide first aid to stabilize individual(s) needing assistance. Top priority will be given to life-support techniques that include CPR and the treatment of life-threatening problems (e.g., airway obstruction, shock). At least two persons certified in first aid techniques and CPR will be on each work site at all times, and TtEC EHS Procedure 4-1, Bloodborne Pathogens, will be followed when first aid/CPR are administered. The SHSS will be current in first aid and CPR and has had training in the requirement of the Bloodborne Pathogens standard. Professional medical assistance will be obtained at the earliest possible opportunity. The nearest hospital and clinic to the project site are shown in Figures C.12-1 and C.12-2.

12.5.2 Minor Injury

The procedures for minor injuries are provided as follows:

- Contact a supervisor or co-worker.
- Have a person qualified in first aid treat the injury.
- Record the injury and include the name of the injured person, the nature of the injury, and the treatment given.
- Contact Work Care for case management and to determine if additional first aid procedures are necessary.

12.5.3 Medical Emergency

In the event of a medical emergency where an actual or suspected serious injury has occurred, implement the following procedures:

- Survey the scene and evaluate whether the area is safe for entry.
- Remove the exposed or injured person(s) from immediate danger.
- Render first aid if necessary. Decontaminate affected personnel after critical first aid is given, if required.
- Call 911 from a land line or **(415) 984-0645**, San Francisco Police Department, from a cellular phone. Request assistance from Emergency Medical Service and/or additional assistance. Identify the location by the number of the nearest road, request medical assistance, and provide the name and telephone number.
- Obtain paramedic services or ambulance transport to the local hospital. Follow this procedure even if there is no visible injury.
- Evacuate other personnel in the work area to a safe location until the Site Superintendent determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, do not commence work until all hazard control issues are resolved.
- Notify the ROICC of the incident and fill out accident reporting forms and associated documents.

12.5.4 Fatal Injury

If a fatal injury occurs, perform the following additional steps:

- Notify the Site Superintendent, PjM, and PESM immediately.
- The PESM will initiate contact with Cal-OSHA and other appropriate agencies.
- Notify the ROICC.
- Stop all work activities on the project for 24 hours.
- Assist Cal-OSHA as directed.

12.6 EMERGENCY SITE EVACUATION PROCEDURES

In the event of an emergency situation such as fire or explosion, the SHSS or Site Superintendent will activate an air horn for approximately 15 seconds indicating the initiation of evacuation procedures, which include the following actions:

- All personnel will evacuate and assemble near the designated evacuation assembly point as identified by the SHSS (Figure C.12-3). The evacuation assembly point should be upwind of the site, based on prevalent wind direction. The SHSS will brief site personnel each day as to the location of the evacuation assembly point, if it changes.
- For efficient and safe site evacuation and assessment of the emergency situation, the Site Superintendent or SHSS will have authority to initiate proper response actions if outside services are required.

- Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given.
- The SHSS must ensure that access for emergency equipment is provided and that all equipment that may cause combustion has been shut down once the alarm has been sounded.
- As soon as possible, and while the safety of all personnel is confirmed, emergency agency notification will commence.
- After assembly at the local evacuation assembly point, depending on the nature of the emergency, workers may be instructed to re-assemble at another location.

Prior to commencing work at each project work site, the SHSS will establish safe egress routes from each site to the evacuation assembly point, prepare a drawing or map that identifies the egress routes, and post them. A map that shows the route to the nearest hospital will also be prepared and posted.

12.7 FIRE PREVENTION AND PROTECTION

Fire prevention and protection measures require pre-planning, and the minimum requirements for the project are provided as follows:

- Ensure that at least one 20-pound dry chemical ABC fire extinguisher is located at each project site.
- Require a fire extinguisher in every vehicle.
  - Fire extinguishers inside the cab of pickup trucks will be 2 ½ -pound dry chemical ABC.
  - Fire extinguishers in the cabs of all vehicles must be mounted or secured.
- Direct employees to follow safe work practices to include proper storage of flammable and combustible materials.
- Permit smoking only in those areas designated specifically by the PjM, Site Superintendent/SHSS.
- In the event of a fire or explosion, summon the Fire Department immediately, take a head count, and implement evacuation procedures.

12.8 SPILL CONTROL AND RESPONSE

This project should not be using any chemicals except fuels. All spills, leaks, and fires involving oil or hazardous substances must be reported to the RPM and the PESM. The person reporting the leak or spill is required to provide the following information:

- His/her name
- Location of spill and address, if known

- Number of injured personnel and nature of injuries, if known
- Substance spilled
- Amount spilled (estimate)
- Extent of spill
- Rate that substance is currently being released (estimate)
- Time spill occurred (estimate)
- Any other pertinent information

The RPM, in coordination with the PjM, will manage notifications to regulatory agencies, if the reportable quantity (RQ) threshold is breached. Additionally, all spills will be reported to the TtEC Environmental Compliance Manager or the PESM. Project personnel will not report spills directly to any agency, unless specifically requested by the RPM or the Contracting Officer.

A minor spill does not pose an immediate threat to human health or the environment, does not cause minimal property damage, and does not exceed the RQ for that material. In the event of a minor spill, the appropriate response actions are:

- Notify the Site Superintendent
- Notify the RPM and the PjM and supply the responders with as much information as possible.
- Identify protective clothing or equipment required to respond
- Contain the spill
- Neutralize and/or solidify any product
- Transfer material into 55-gallon drums
- Document the incident

12.8.1 Release Prevention and Minimization Measures

Procedures to prevent and/or minimize releases of hazardous materials are provided as follows:

- Ensure that personnel involved with hazardous materials are trained in the proper procedures and precautions for their handling, storing, transportation, and disposal.
- Do not conduct operations involving hazardous materials when weather is forecasted that could cause significant risk to the surrounding area if a spill should occur.
- Transfer all materials in or over a bermed or "protected" area. A protected area is one covered with an impermeable material, such as polyethylene.
- Erect dikes around temporary storage tanks containing hazardous wastes or potentially hazardous wastes to contain releases.

- Maintain a supply of basic spill-response materials and protective equipment on site to include:
  - Absorbent sheets, pillows, booms, or absorbent material
  - Open top 55-gallon drums or other containers with lids
  - Booms, shovels, and other tools such as squeegees

12.9 SIGNIFICANT VAPOR RELEASE

Any project activity that releases significant amounts of vapor must be reported immediately, as described in the spill-release procedure. Every attempt to mitigate the release must be taken if it can be safely performed. Downwind evacuation procedures, if required, will be coordinated by the project emergency coordinator(s).

12.10 EARTHQUAKE RESPONSE

Actions to take if an earthquake should occur during the course of site activities are provided as follows:

- Stop working, remain calm, and do not panic.
- Do not use or do anything that could be a source of ignition (smoking, cutting, or welding).
- Avoid power lines, power poles, and windows.
- If in a vehicle, stay inside it until the earthquake is over.
- If in a building, leave it if possible.

Actions to take after the earthquake are:

- Prepare for aftershocks. Stay out of severely damaged buildings.
- Meet for a head count at the evacuation assembly point.
- Check for injuries. Do not move seriously injured personnel, unless remaining where they are would create danger of further injury.
- Check vehicles, equipment, and buildings for any obvious damage. Do not enter any buildings until their structural integrity has been evaluated.
- Switch off power, water, and gas until a utility official has inspected the buildings and operational area and determined that it is safe.
- If driving, watch carefully for hazards created by the earthquake (undermined roads, weak bridges, or overpasses, fallen power lines or poles, etc.).

12.11 EMERGENCY EQUIPMENT

The following emergency equipment will be brought onto the site or will be stationed near each work site in a designated area:

- Fire extinguisher, minimum one 20-pound dry chemical ABC type
- Industrial first aid kit
- Air horn
- Spill-control material consisting of absorbent pillows or absorbent material and shovels, plastic sheeting, and 55-gallon drum(s)

The following equipment will be available at the site for use in an emergency situation:

- Industrial first aid kit, inspected weekly
- Blanket

12.12 EMERGENCY INFORMATION POSTINGS

Due to the nature of the site, posting emergency information is not practical. Emergency contact names and phone numbers (Table C.12-1), a map showing egress routes, the evacuation assembly point, and the route to the hospital will be placed on the dashboard of every vehicle.

13.0 TRAINING

In accordance with TtEC corporate policy and pursuant to 29 CFR, Part 1910.120 (8 CCR, Section 5192), hazardous waste site workers will, at the time of job assignment, have received a minimum of 40 hours of initial health and safety training for HAZWOPER, unless excepted by the above reference. At a minimum, the training will have consisted of instruction in the topics outlined in the aforementioned reference. Personnel who have not met the requirements for initial training will not be allowed to perform any site activities that may expose them to chemical or physical hazards.

An employee's prior experience and/or training for equivalency may be considered to meet the training described above. The PESM will make the determination if previous experience and/or training meet the initial training requirements.

The Site Superintendent will provide the DON Contracting Officer or designee with written certification of completion of the required training and maintain copies of required training records at the worksite.

13.1 MANAGER/SUPERVISOR TRAINING

In accordance with 29 CFR, Part 1910.120 (8 CCR, Section 5192), on-site managers and supervisors directly responsible for, or who supervise employees engaged in HAZWOPER, will receive the training discussed above, and at least 8 additional hours of specialized training on managing hazardous materials operations by the time of job assignment.

13.2 ANNUAL 8-HOUR REFRESHER TRAINING

Annual 8-hour refresher training will be required of all site field personnel to maintain their qualifications for fieldwork. The following topics will be reviewed during the refresher training:

- Toxicology
- Respiratory protection – including air purifying devices and self-contained breathing apparatus
- Medical surveillance
- Personal protective clothing
- Additional topics deemed necessary by the SHSS or PESM

13.3 SITE-SPECIFIC TRAINING

Prior to commencement of field activities, the SHSS will provide site-specific training to all personnel assigned to the site. This training will specifically address the activities, procedures, monitoring, and equipment for site operations, and will also include site and facility layout, specific hazards, emergency services, hazard communication, and all provisions contained within the SHSP. This training will also allow project personnel to clarify anything they do not understand about the project and to reinforce their responsibilities regarding safety and health for their particular activity. Additional training, if required for the completion of field tasks, will be identified and provided for personnel as the work progresses.

13.4 ASBESTOS AND LEAD AWARENESS TRAINING

The potential exists to encounter asbestos and material containing asbestos or lead while working around the buildings. Do not disturb any areas marked as containing asbestos. All workers on this project must receive asbestos- and lead-awareness training prior to performing any work activity on the project. The training will be prepared by TtEC SHSS. Documentation of this training must be in each employee's training record.

13.5 RADIATION SAFETY AWARENESS

All personnel on site will receive training as required by the RWP.

13.6 ON-SITE SAFETY BRIEFINGS

Project personnel and visitors will be given daily, on-site health and safety briefings by the SHSS to assist site personnel in safely conducting their work activities. This training will be conducted prior to the start of new work activities, it will use AHAs applicable to the planned work, and it will include information on new operations to be conducted, changes in work practices, or changes in the site's environmental conditions. The briefings will also provide a forum to facilitate conformance with safety requirements and identify performance deficiencies related to safety during daily activities or as a result of safety inspections.

13.7 FIRST AID AND CPR

The SHSS will identify individuals that require first aid and CPR training. At a minimum, the SHSS will have received first aid and CPR training, and at least two persons trained and current in certification of first aid and CPR will be present at every work site. The training will be consistent with the requirements of the American Red Cross Association.

14.0 LOGS, REPORTS, AND RECORDKEEPING

The following is a summary of required health and safety logs, reports, and recordkeeping for this contract.

14.1 SITE HEALTH AND SAFETY PLAN CHANGE APPROVAL FORM

A Site Health and Safety Plan Change Approval Form will be completed for all changes to the SHSP. This form requires the signatures of the PjM or Site Superintendent, SHSS, and the PESM. Upon request, the PESM will send a copy of this form to the DON CIH for review within 5 work days if the change is substantive, and in the opinion of the CIH, requires additional review by the DON CIH. Substantial changes to the SHSP may require a Field Change Request (FCR) according to the Project Contractor Quality Control Plan (Appendix B) to initiate a significant change to the SHSP. PESM approval of each FCR is required. Copies of the FCR affecting the SHSP are sent to the DON CIH.

14.2 MEDICAL AND TRAINING RECORDS

Full medical and training records are normally kept by the employer. Proof of the most recent training and medical qualification must be provided to the SHSS by the employee. The SHSS will keep a file containing appropriate training and medical qualifications for site workers. Medical records will be maintained in accordance with 29 CFR, Part 1910.20 (8 CCR, Section 3204). The examining physician retains custody of the complete medical record. Employee records have only the physician statement of medical qualification for duty and the employee's fitness to wear a respirator, if required.

14.3 ON-SITE LOG

A log of personnel (including job title, level of protection, and work location) will be updated on site each day by the SHSS or designee. Originals will be kept in the project file.

14.4 EXPOSURE RECORDS

Any personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept in accordance with 29 CFR, Part 1910.20 (8 CCR, Section 3204). For TtEC employees, the originals will be sent to the medical records coordinator and a copy kept in the project file. For subcontractor employees, the originals will be sent to the subcontractor employer and a copy kept in the project file. The site SHSS sends a letter to each employee within 5 days of the receipt of laboratory results. This letter explains the result and the meaning of the result. A copy of this letter as well as radiological monitoring results are also reviewed by a CIH.

14.5 ACCIDENT/INCIDENT REPORTS

A TtEC accident/incident report must be completed following any event involving emergency first aid, lost time, or property damage in accordance with EHS Procedure 1-7, Incident Reporting and Investigation. The originals will be sent to the TtEC records coordinator for maintenance and distribution by TtEC. Copies will be distributed to the PESM, Site Superintendent, subcontractor employees, if appropriate, and the DON Contracting Officer. A copy of the completed forms will be kept in the project file.

14.6 OSHA FORM 300

An OSHA Form 300 (Log of Occupational Injuries and Illnesses) will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the TtEC records coordinator to be filed. Subcontractor employers must also meet the requirements of maintaining an OSHA Form 300. The TtEC accident/incident report meets the requirements of the OSHA Form 301 (Supplemental Record) and must be maintained with the OSHA Form 300 for all recordable injuries or illnesses.

14.7 HEALTH AND SAFETY FIELD LOGBOOKS

The SHSS will complete and maintain a daily logbook at the site and will document important events as they occur. Information required to be entered into the logbook on a daily basis is provided as follows:

- Initials of persons making entry
- Date
- Time of each entry (military time)
- Location
- General weather description
- Names and job titles of all personnel in the work group
- Level of protection
- Health and safety monitoring equipment used
- Weather conditions
- Work/rest schedule (if appropriate)
- A description of the activities as they are occurring
- Any pertinent health and safety observations
- Sample number (if appropriate)

The logbook will be signed at the end of each day or work shift and all entries will be made in black ink. No pages will be removed from the logbook and each page will be numbered. Any corrections will be made with a single line through the entry, and initialed.

Copies of the logbooks will be submitted to the Site Superintendent as necessary. The original logbooks will become part of the exposure records file and will be maintained by the TtEC records coordinator.

14.8 MATERIAL SAFETY DATA SHEETS

MSDSs for each hazardous chemical used or stored at the site will be obtained and kept on file at the project site by the SHSS. An MSDS for each contaminant will also be maintained.

14.9 CLOSEOUT SAFETY REPORT

A final closeout safety report, included as part of the Post Construction Closeout Report, will be provided to the PESM summarizing the safety performance achieved during the site work. Specific elements of the report will include the following:

- A description of significant events, exposures, accidents, illnesses, and actions taken to prevent their occurrence
- A summary of monitoring results including air, noise, radiation, and heat stress samples
- A description of any state or federal inspections involving the health and safety of site workers (accompanied by the applicable EHS 1-10 form)

14.10 REQUIRED POSTINGS

Due to the nature of this project, these postings will be maintained on site by the Site Superintendent/SHSS. They will be available for review by employee's request.

- Department of Labor
    1. Minimum Wage
    2. Polygraph Protection Act
    3. Equal Employment Opportunity
    4. Job Safety and Health
    5. Family Leave
    6. Uniformed Services Employment and Reemployment Rights Act

- Cal-OSHA/California Department of Industrial Relations

    1. Safety and Health Protection on the Job
    2. Discrimination in Employment
    3. California Workers Compensation (Sign begins: "If a work injury occurs...")
    4. Emergency Phone Numbers
    5. Notice of Unemployment and Disability Insurance
    6. Access to Medical and Exposure Records
    7. Hearing Protection Standard
    8. A posting of what day is payday and a multi-page document regarding minimum wage (California law)
    9. Operating Rules for Forklifts (if forklifts are used on project)
    10. California's Accident and Injury Illness Prevention Program: a management policy on Health and Safety
    11. Whistleblower Act

- Contract Requirements

    1. Posting of HOTLINE POSTER
    2. Drug Policy Poster
    3. Posting of Prevailing Wages

- Company (TtEC) Required Postings

    1. Policy on Sexual Harassment
    2. Policy on Equal Employment Opportunity
    3. Accident/Injury Reporting
    4. Environmental Safety and Quality Poster (ISO 14001)
    5. Recycling and "Use Double-Sides" Posters
    6. TtEC ZIP Poster
    7. TtEC Work Rules

15.0 FIELD PERSONNEL REVIEW

All personnel are required to be trained on the contents of this SHSP. Upon completion of this training and review, all project personnel will acknowledge this training by signing a review form acknowledging training.

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16.0 REFERENCES

American Conference of Governmental Industrial Hygienists (ACGIH). Most current publication. *Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices.*

Department of the Navy (DON)/Marine Corps. 2006. *Department of the Navy Environmental Restoration Program Manual.* August.

Tetra Tech EC, Inc. (TtEC). *Corporate Health and Safety Program Manual.*

_____. *Project Rules Handbook, Volumes I and II.*

U.S. Army Corps of Engineers (USACE). 2003. *Safety – Safety and Health Requirements.* EM 385-1-1. 3 November.

U.S. Department of Health and Human Services. 1985. *Occupational Safety and Health Guidance for Hazardous Waste Site Activities.*

Note:

Where no date is given in the references above, it is assumed that the reference used will be the most recent publication.

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TABLES

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TABLE C.12-1

EMERGENCY INFORMATION

REPORT ALL FIRES, SERIOUS INJURY, OR UNCONTROLLED SPILLS IMMEDIATELY: 911

Clinic:	Concentra Medical Center (415) 648-9501 Occupational Health Clinic 728 20th Street San Francisco, CA 94107 Hours of Operation: 7:30 a.m. - 5:00 p.m. (Monday – Friday) From the project sites take Avenue M to California St. Turn left onto Treasure Island Road. Proceed to I-80 West. Take I-80 West to the 5th St. exit toward US 101 North/Golden gate Bridge. Turn left on Harrison St., go 0.2 miles, then left on 6th St. Then go right onto I-280 South. Proceed on I-280 South for 0.8 miles and exit onto Mariposa St. toward 18th St. Turn left on 18th St. for 0.2 miles and then turn right on 3rd St. Proceed for 0.2 miles and turn right on 20th Street.
Hospital:	Saint Francis Memorial Hospital (415) 353-6000 900 Hyde Street San Francisco, CA 94109 From the project sites take Avenue M to California St. Turn left onto Treasure Island Road. Proceed to I-80 West. Take I-80 West to Fremont exit. Turn left on Fremont St. Street becomes Front Street. Turn left on Pine Street, proceed for 1 mile. Turn left on Hyde Street.
Fire/EMS/ San Francisco Police:	**911** ***911 calls from a cell phone do not go directly to San Francisco emergency services, but through the California State Highway Patrol.***
San Francisco Police	**(415) 984-0645 Building 1, Main Gate**
San Francisco Fire Dept.	**(415) 558-3248 Building 157**

All site workers contact a superintendent or a manager in an emergency.

DON RPM	Mr. Jim Whitcomb (619) 532-0936	**BRAC Caretaker Support Office**	Mr. Mike Mentink (415) 743-4729
DON ROICC	Ms. Shirley Ng (510) 749-5939		
TtEC Project Manager	Brian Maidrand, P.G. (619) 471-3570 office (619) 606-2544 cell	**TtEC Site Superintendent**	Jennifer Dessort (949) 756-7541 (949) 466-7573 cell
TtEC Radiation Safety	Mr. Cliff Stephan (RSO) (509) 371-0140 office (509) 430-4655 cell	**TtEC Safety, SHSS**	Jennifer Dessort (949) 756-7541 (949) 466-7573 cell
TtEC Program Managers Andrew Bolt P.E., Program Manager (619) 471-3511 office	Mr. Greg Joyce (QCM) (360) 598-8117 office (360) 780-0371	Roger Margotto, CIH, PESM (619) 471-3503 office (619) 988-0520 cell	Ms. Greta Neuman (Env.) (671) 784-6283

TABLE C.12-1

EMERGENCY INFORMATION

Poison Control Center:	California Poison Control System, Central Office Emergency Phone: (800) 876-4766–all of California
CHEMTREC:	(800) 424-9300
National Response Center:	(800) 424-8802
RCRA Hotline:	(800) 424-9346

Abbreviations and Aconyms:

BRAC – Base Realignment and Closure
CHEMTREC – Chemical Transportation Emergency Center
CIH – Certified Industrial Hygienist
DON – Department of the Navy
EMS – Emergency Medical Services
Env – Environmental
PESM – Project Environmental and Safety Manager
QCM – Quality Control Manager
RCRA – Resource Conservation and Recovery Act
ROICC – Resident Officer in Charge of Construction
RPM – Remedial Project Manager
SHSS – Site Health and Safety Specialist
TtEC – Tetra Tech EC, Inc.

FIGURES

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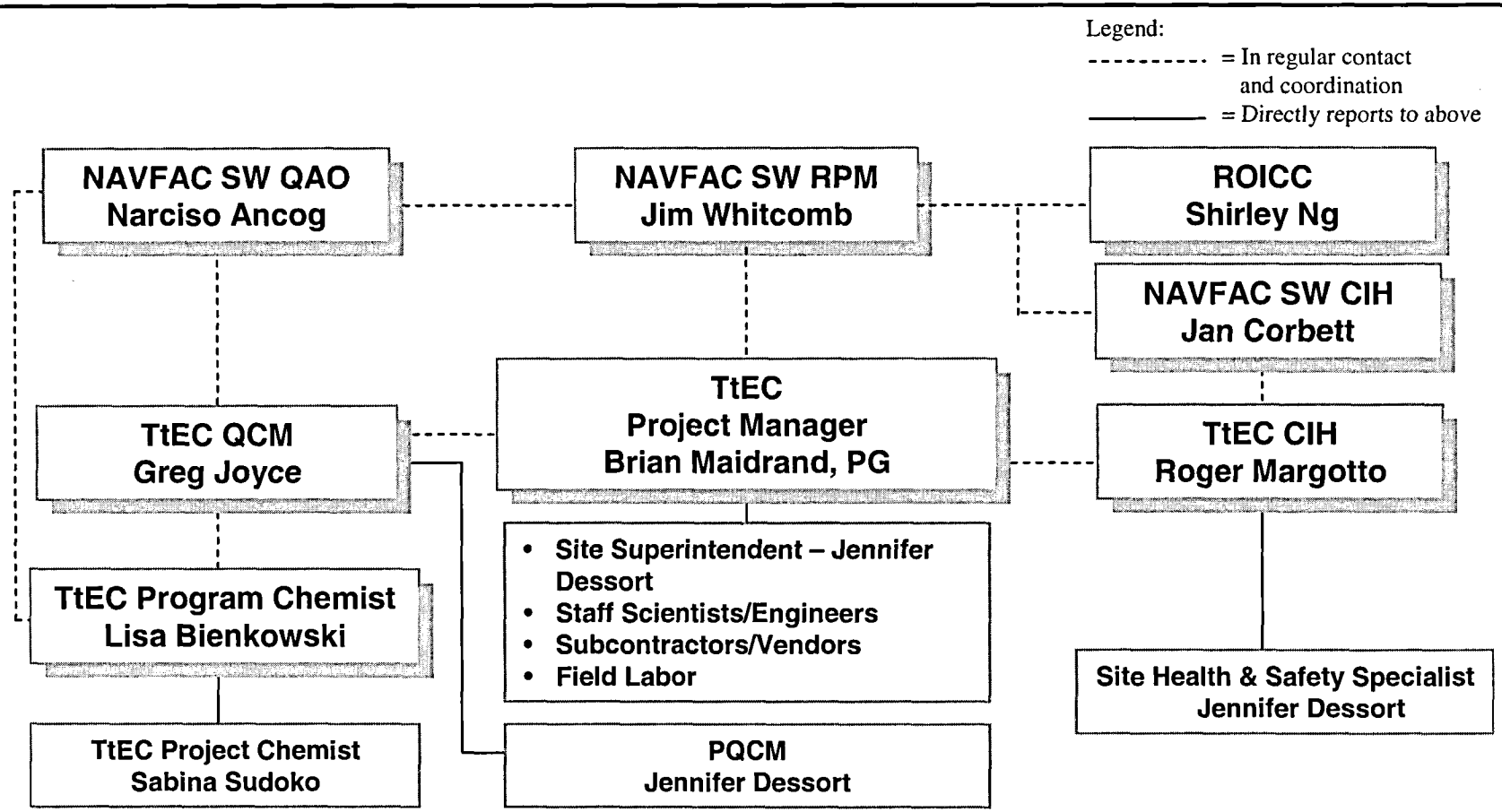
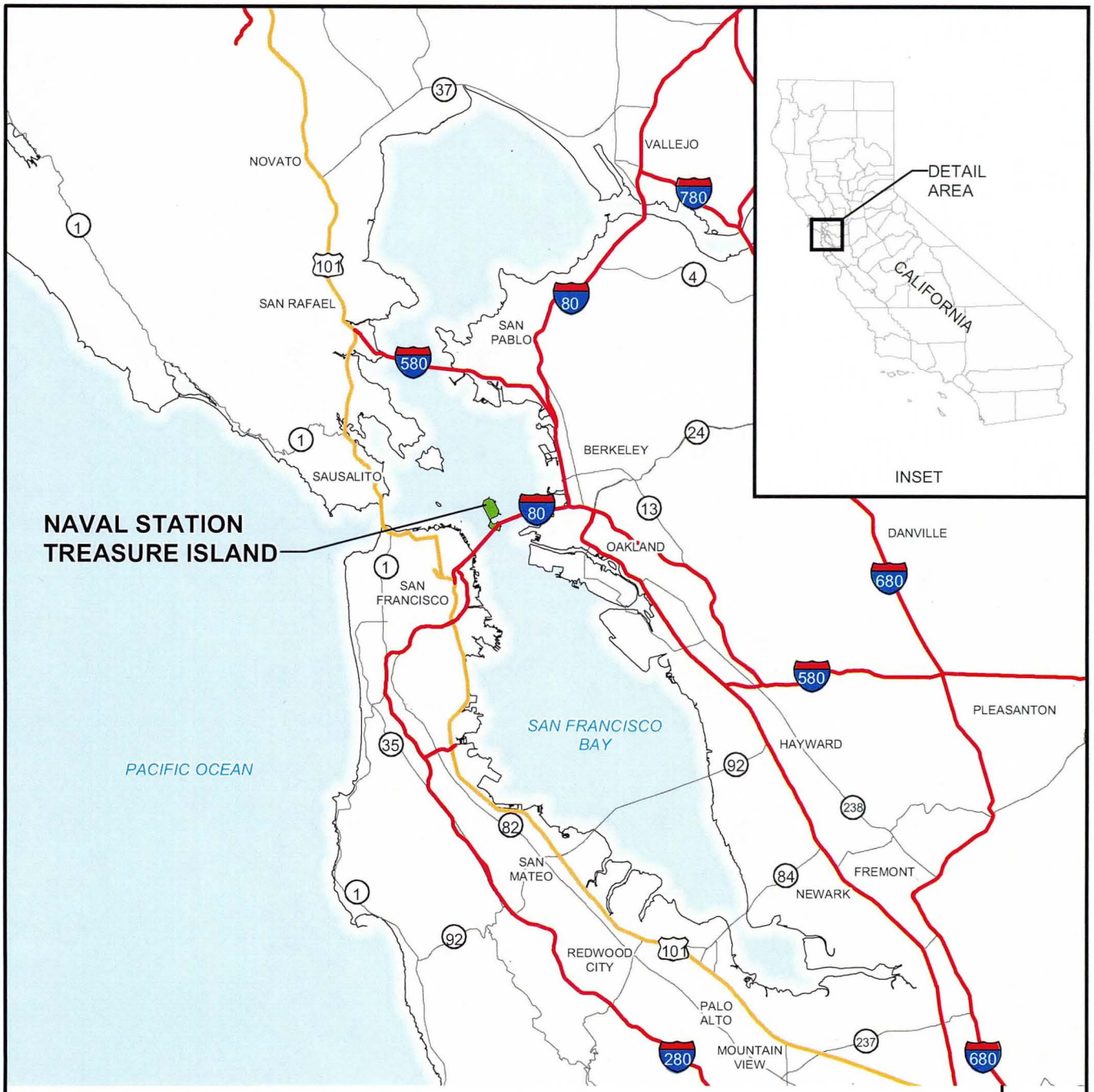
Figure C.2-1

Project Organization Chart





LEGEND

- STATE HIGHWAY
- US HIGHWAY
- INTERSTATE HIGHWAY
- TREASURE ISLAND
- WATER

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

FINAL HEALTH AND SAFETY PLAN

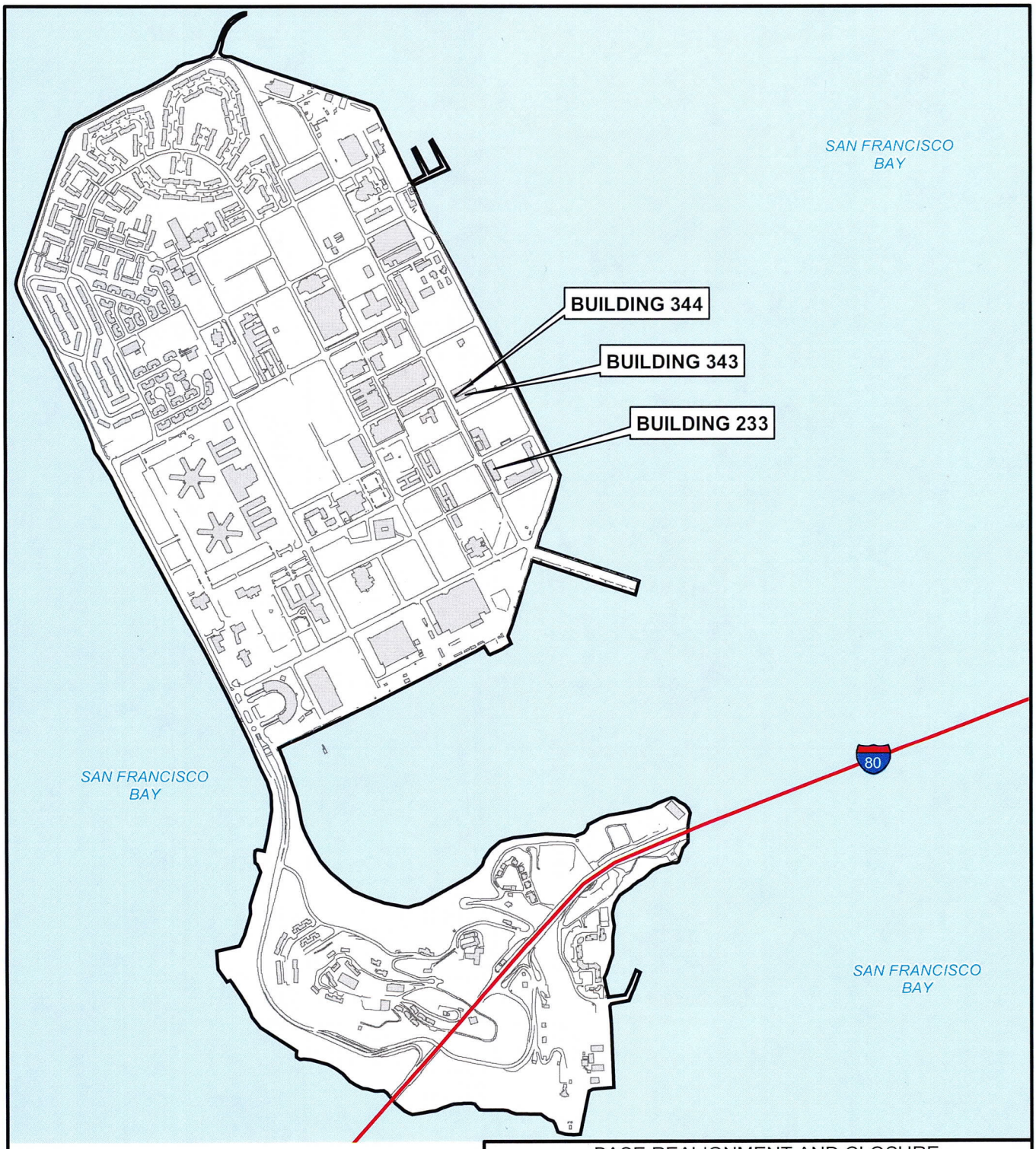
FIGURE C.3-1

REGIONAL LOCATION MAP

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183R1908.mxd

TETRA TECH EC, INC.



LEGEND

80 INTERSTATE HIGHWAY

NAVAL STATION TREASURE ISLAND BASE BOUNDARY

600 0 600 1,200 Feet

Scale: 1" = 1200'

N

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

FINAL HEALTH AND SAFETY PLAN

FIGURE C.3-2

SITE LOCATION MAP

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183S1909.mxd

TETRA TECH EC, INC.

LEGEND

- HOSPITAL ROUTE
- ROAD
- INTERSTATE HIGHWAY
- RAILROAD
- FORMER NAVAL STATION TREASURE ISLAND BOUNDARY
- BUILDING
- PARK
- WATER

DIRECTIONS:

FROM THE PROJECT SITES TAKE AVENUE M TO CALIFORNIA STREET. TURN LEFT ONTO TREASURE ISLAND ROAD. PROCEED TO I-80 WEST. TAKE I-80 WEST TO FREMONT STREET EXIT. TURN LEFT ON FREMONT STREET, WHICH BECOMES FRONT STREET. TURN LEFT ON PINE STREET, PROCEED FOR ONE MILE. TURN LEFT ON HYDE STREET.

1,000 0 1,000 2,000 Feet

Scale: 1" = 2000'

N

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

FINAL HEALTH AND SAFETY PLAN

FIGURE C.12-1

HOSPITAL ROUTE MAP

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: RKH
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1910.mxd

TETRA TECH EC, INC.

LEGEND

- CLINIC ROUTE
- ROAD
- INTERSTATE HIGHWAY
- U.S. HIGHWAY
- RAILROAD
- NAVAL STATION TREASURE ISLAND BOUNDARY
- BUILDING
- PARK
- WATER

DIRECTIONS:

FROM THE PROJECT SITES TAKE AVENUE M TO CALIFORNIA AVENUE. TURN LEFT ON TREASURE ISLAND ROAD. PROCEED TO I-80 WEST. TAKE I-80 WEST TO THE 5TH STREET EXIT TOWARD US 101 NORTH/GOLDEN GATE BRIDGE. TURN LEFT ON HARRISON STREET, GO 0.2 MILES, THEN LEFT ON 6TH STREET. THEN GO RIGHT ONTO I-280 SOUTH. PROCEED ON I-280 SOUTH FOR 0.8 MILES AND EXIT ONTO MARIPOSA STREET TOWARD 18TH STREET. TURN LEFT ON 18TH STREET, GO .02 MILES, THEN RIGHT ON 3RD STREET. PROCEED FOR 0.2 MILES AND TURN RIGHT ON 20TH STREET.

1,000 0 1,000 2,000 Feet

Scale: 1" = 2000'

N

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

FINAL HEALTH AND SAFETY PLAN

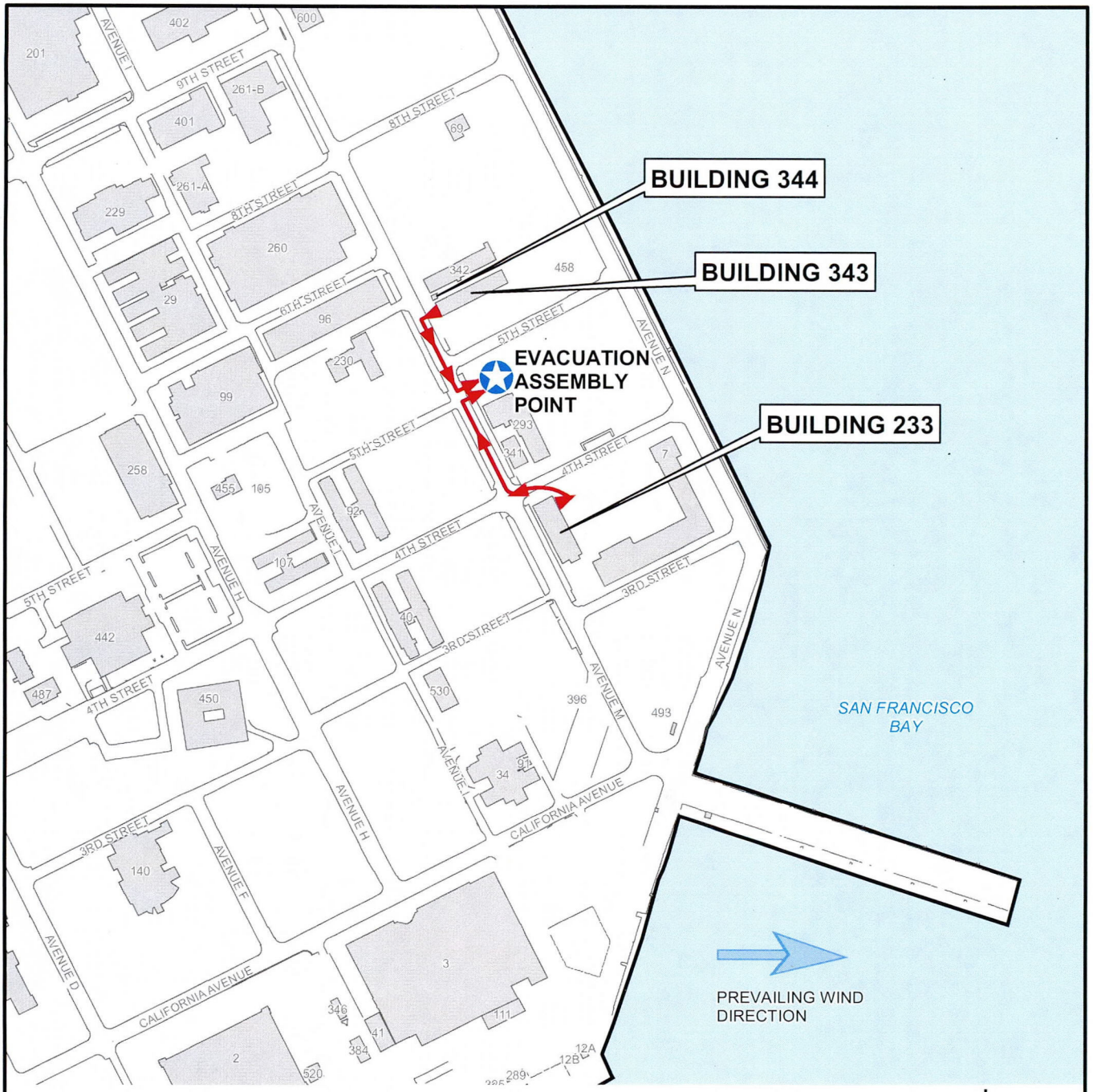
FIGURE C.12-2

CLINIC ROUTE

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: RKH
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1912.mxd

TETRA TECH EC, INC.



LEGEND

- ROAD
- EVACUATION ROUTE
- BUILDING
- NAVAL STATION TREASURE ISLAND BASE BOUNDARY
- WATER

200 0 200 400 Feet

Scale: 1" = 400'

N

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

FINAL HEALTH AND SAFETY PLAN

FIGURE C.12-3

EMERGENCY EVACUATION ROUTE

NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

REVISION: 2
AUTHOR: GFG
DCN: ECSD-2201-0021-0001
FILE NUMBER: 071183L1911.mxd

TETRA TECH EC, INC.

ATTACHMENT 1

MATERIAL SAFETY DATA SHEETS

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Section 1. Material Identification

Asbestos and Asbestos-containing Materials Description: Asbestos is a generic term applied to many naturally occurring, hydrated silicates (minerals) found in rock which separate into flexible fibers when crushed or processed. Commercially important forms are amosite, anthrophyllite (mined and used only in Finland), chrysotile, and crocidolite. Other types include tremolite and actinolite. Most widely used in US industry is chrysotile, a fibrous form of serpentine. Since asbestos is insensitive to chemical attack and incombustible, there are over 2000 uses as processed fiber. It is added to such diverse materials as cement, vinyl, plaster, asphalt, and cotton, although due to its health hazards other materials are now replacing it wherever possible. Its use is now limited to products that bind fibers within the product. The largest use of asbestos is in asbestos cement for pipes in water supply, sewage disposal, and irrigation systems; ducts; and flat and corrugated sheets for a wide variety of construction applications. Other uses include fire-resistant textiles, floor tiles, underlayment and roofing papers, friction materials (brake linings), reinforcing filler in elastomers for packing and gaskets, reinforcing pigment in surface coatings and sealants, thermal and electrical insulation media, as a component of taping compound and industrial talcs, and as filler in industrial greases. About 98% of crocidolite is used in production of asbestos cement pipe. Between 1950 and 1972 asbestos was used as spray insulation in buildings, but OSHA now prohibits spray application of actinolite, anthophyllite, asbestos, or tremolite (29 CFR 1910.1001).
Other Designations: CAS No. 12172-73-5, amosite, brown asbestos; CAS No. 1332-21-4, asbestos; CAS No. 12001-29-5, chrysotile, white asbestos; CAS No. 12001-28-4, crocidolite, blue asbestos; Ascarite; earth flax; mountain cork; stone flax.
Molecular Formulas: Amosite, $(FeMg)SiO_3$; anthophyllite, $(MgFe)_7Si_8O_{22}(OH)_2$; chrysotile, $3MgO{\cdot}2SiO_2{\cdot}H_2O$; crocidolite, $NaFe(SiO_3)_2{\cdot}FeSiO_3{\cdot}H_2O$; tremolite, $Ca_2Mg_5Si_8O_{22}(OH)_2$.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*[73] for a suppliers list.
Cautions: Asbestos causes three specific diseases: asbestosis (fibrous lung scarring), lung cancer, and mesothelioma (cancer of the chest lining and abdominal cavities). Prevent or maintain exposures at the lowest feasible level.

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R 0
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

	1989 OSHA PELs*			1990-91 ACGIH TLVs	1988 NIOSH REL
Asbestos	**TWA:** 0.2 f/cc†	**Action Level TWA:** 0.1 f/cc	**Excursion Limit:** 1.0 f/cc‡	**TWA:** 2.0 f/cc§	0.1 f/cc
Amosite	0.2 f/cc	0.1 f/cc	1.0 f/cc	0.5 f/cc	0.1 f/cc
Chrysotile	0.2 f/cc	0.1 f/cc	1.0 f/cc	2.0 f/cc	0.1 f/cc
Crocidolite	0.2 f/cc	0.1 f/cc	1.0 f/cc	0.2 f/cc	0.1 f/cc

1985-86 Toxicity Data for Asbestos (CAS No. 1332-21-4)**
Human, inhalation, TC_{Lo}: 1.2 fb/cc, continuous exposure over 19 years. Toxic to lungs.
* OSHA has proposed a lower asbestos exposure limit of 0.1 f/cc as an 8-hr TWA (*Industrial Safety and Hygiene News*, 8/90).
† Fiber/cm³
‡ Average over a 30-min sampling period.
§ As determined by membrane filter method at 400 to 450X magnification (4-mm objective) phase contrast illumination. Fibers longer than 5 µg and with an aspect ratio ≥ 3:1 (ACGIH).
** See NIOSH, *RTECS* (CI6475000), for additional toxicity data.

Section 3. Physical Data

Melting Point: Decomposes
Water Solubility: Insoluble (breaks down slowly in hot water)
Molecular Weight: Varies with asbestos form (Sec. 1)
Appearance and Odor: White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite) fibrous, odorless solids.

Section 4. Fire and Explosion Data

Flash Point: None reported	**Autoignition Temperature:** None reported	**LEL:** None rpeorted	**UEL:** None reported

Extinguishing Media: Asbestos is nonflammable. Use dry chemcial, CO_2, water spray, or regular foam. Do not scatter spilled material with high-pressure water streams. **Special Fire-fighting Procedures:** Isolate hazard area and deny entry. Since there may be airborne asbestos fibers, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode; structural firefighter's protective clothing provides limited protection. If feasible, remove containers from fire area. Avoid dust generation. Be aware of runoff from fire control methods. Do not release to sewers or waterways. Develop decontamination procedures for protective clothing and equipment.

Section 5. Reactivity Data

Stability/Polymerization: Asbestos is inert under ordinary room temperature and heated use conditions. It is heat resistant, but decomposes and alters its microscopic fiber structure above 600 °C (1112 °F). Chrysotile dehydroxylates at 1112 to 1436 °F (600 to 780 °C); the "asbestos anhydride" in turn breaks down to a mixture of silica (SiO_2) and fosterite (Mg_2SiO_4) at 1472 to 1562 °F (800 to 850 °C). Above 1832 °F (1000 °C) magnesium pyroxenes form and melt at ~2642 °F (1450 °C). **Chemical Incompatibilities:** Strong acids can attack chrysotile and rapidly extract its MgO and H_2O content; glacial acetic acid can decompose it. Hot water slowly breaks down chrysotile. Like other asbestos forms, it resists strong alkali (5M NaOH at least up to 100 °C).

Section 6. Health Hazard Data

Carcinogenicity: The NTP, IARC, OSHA, and ACGIH list asbestos as a human carcinogen. **Summary of Risks**: Asbestos may cause 1) asbestosis, 2) lung cancer, 3) mesothelioma, 4) pleural plaques, and 5) several other forms of cancer. *Asbestosis* is fibrosis (scarring) of lung tissue after many years of high-level occupational exposure. Scarring may be progressive even after exposure ceases. Even though detectable in lungs of a high proportion of adults in industrialized areas, asbestosis does not result from lower level environmental exposure. Its symptoms range from mild shortness of breath and dry cough to severe disabling breathlessness, heart failure, and ultimately death. Lung scarring can be seen on X-ray and alterations in lung function can be detected with spirometry (a medical test). Examination typically detects rales (crackling sounds in lungs). Severe cases may have cyanosis (bluish skin discoloration) and clubbing of fingertips. *Lung cancer* can result from lower exposure levels than asbestosis, but also takes many years to develop. Smokers exposed to asbestos are at 5 to 10X higher risk than exposed nonsmokers. *Mesothelioma* is a very aggressive cancer of the pleura (lining around the lungs) or peritoneum (lining of the abdomen), and develops after decades of (sometimes low level) exposure. Symptoms may include chest and abdominal pain, weight loss, and/or shortness of breath, with death within 2 years of diagnosis. *Pleural plaques* are thickenings, sometimes with calcium deposits, of the lungs's lining and may be seen on X-ray. While not associated specifically with health effects, they indicate significant exposure. *Other sites of cancer* include larnyx (vocal cords), portions of digestive tract, and possibly the kidney. Asbestos's toxicity depends on fiber type (crocidolite > amosite > chrysotile), size (longer > shorter), shape (long, thin needle-like > curly), and solubility. Health effects depend on dose (exposure concentration and duration), smoking habits, and individual susceptibility. Prevent or maintain exposures at lowest feasible level.

Continue on next page

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Section 6. Health Hazard Data, *continued*

Medical Conditions Aggravated by Long-Term Exposure: Long-term, high-level exposure may aggravate any chronic lung (asthma, emphysema, bronchitis) or heart condition. **Target Organs:** Respiratory system; possibly digestive system. **Primary Entry Routes:** Inhalation, ingestion, dermal contact. **Acute Effects:** Nose, throat, skin and eye irritation are possible with high exposure. **Chronic Effects:** Asbestosis, lung cancer, and mesothelioma typically develop decades (20 to 40 years) after exposure begins, but may occur sooner. **FIRST AID** *Emergency personnel should protect against asbestos exposure.* **Eyes:** Do not rub. Gently lift eyelids and flush with flooding amounts of water. **Skin:** Shower with water and soap. Wet contaminated clothing prior to removal and seal in a plastic bag for disposal as hazardous waste. If rash develops, consult physician. **Inhalation:** Remove to fresh air. Clean any fibers from nose and mouth. Encourage victim to cough, spit, and blow nose to remove fibers. **Ingestion:** Induce vomiting *only* if awake and alert. Consult a physician. **After first aid, consult medical care provider. Note to Physicians:** Asbestos diagnosis is based on chest X-ray with an abnormal ILO "B" reading (small irregular opacities), rales, restrictive pattern spirometry, adequate exposure history, and symptoms. Consider pneumovax, annual flu shot, and other supportive treatment as needed.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel and evacuate all unnecessary personnel. Cleanup personnel should protect against dust inhalation and skin or eye contact. Avoid dust generation, blowing, dry brushing, and dry mopping. Provide HEPA-filtered (high-efficiency particulate air) portable ventilation systems. Use wet cleaning methods or approved HEPA vacuum cleaning system to pick up spills. The techniques used must collect particulate without dispersing dust into air. Place waste in *properly labeled* dust-tight containers or sealed, heavy-gauge, impervious plastic bags for disposal. Follow applicable OSHA regulations (29 CFR 1910.120). **Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
Listed as CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [* per Clean Water Act, Sec. 307(a); Clean Air Act, Sec. 112]
Listed as a SARA Toxic Chemical (40 CFR 372.65)
SARA Extremeley Hazardous Substance (40 CFR 355): Not listed

OSHA Designations
Listed as Air Contaminant (29 CFR 1910.1000, Table Z-1-A, Z-3)

Section 8. Special Protection Data

Note: *Do not substitute personal protective clothing or equipment for proper handling and engineering controls.* **Goggles:** Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals not in excess of 2 f/cc (10 X PEL), use a half-mask air-purifying respirator, other than a disposable respirator, equipped with high-efficiency filters; not in excess of 10 f/cc (50 X PEL), a full facepiece air-purifying respirator equipped with high-efficiency filters; not in excess of 20 f/cc (100 X PEL), any powered air-purifying respirator equipped with high-efficiency filters or any supplied-air respirator operated in continuous flow mode; not in excess of 200 f/cc (1000 X PEL), a full facepiece supplied-air respirator operated in pressure-demand mode; greater than 200 f/cc (>1,000 X PEL) or unknown concentration, a full facepiece supplied-air respirator operated in pressure-demand mode and equipped with an auxillary positive-pressure self-contained breathing apparatus (29 CFR 1910.1001). *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* **Other:** Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. **Ventilation:** Provide general and local exhaust ventilation and dust collection systems to maintain airborne concentrations below OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into work area by controlling it at its source.[103] **Safety Stations:** Make available in work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Never enter lunchroom facilities or leave workplace wearing clothing or equipment worn during workshift. Separate contaminated work clothes from street clothes. *If proper hygiene is not rigorously followed, family members can be exposed to asbestos fibers.* Place contaminated protective devices or work clothing in labeled, impermeable, and sealed containers or bags. Do not remove asbestos from clothing by blowing or shaking. Launder contaminated clothing before wearing. Inform laundering service of asbestos-contaminated clothing and of asbestos' potential harmful effects (29 CFR 1910.1001). **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using asbestos, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in closed (dust-tight) containers or heavy-gauge impervious plastic bags in a clean, secure area protected from physical damage. Do not open containers that can release asbestos dust without providing proper enclosure or control measure. **Engineering Controls:** Educate workers about asbestos's and asbestos-containing materials' hazards. Inform employees of asbestos standard (29 CFR 1910.1001). Exposure to asbestos, tremolite, anthophyllite, and actinolite in construction work is covered by 29 CFR 1926.58. ["OSHA is proposing an expanded requirement for a trained 'competent person' to ensure compliance with the standard on all construction operations involving asbestos, and requiring more stringent housekeeping to remove asbestos in general industry." (*Industrial Safety and Hygiene News*, 8/90).] Instruct employees in proper practices for handling asbestos-containing materials and correct use of protective equipment. Prevent or minimize asbestos exposure. Regulate areas where exposure in excess of the PEL is likely. Post warning signs in all regulated areas (see legend below). Work with asbestos only in a sufficient wet state to prevent emission of airborne fibers. Practice good personal hygiene and housekeeping procedures. Do not substitute personal protective equipment for proper handling and engineering controls. If exposures exceed the PEL, ensure employees wear appropriate protective clothing. Inhaling or ingesting asbestos fibers from contamined clothing or skin can be hazardous. Do not allow dusts and asbestos-containing wastes to accumulate. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Monitor work areas that expose employees to airborne concentrations at or above the action level (Sec. 2). Whenever production, process, control equipment, personnel, or work practices change, institute new monitoring. **Other Precautions:** Medical surveillance is required for all employees possibly exposed at or above the action level. Provide preplacement medical examination that includes complete medical and work history, complete physical examination that emphasizes respiratory and cardiovascular systems and digestive tract, the respiratory disease standardized questionnaire, a posterior-anterior 14" x 17" chest roentgenogram, and pulmonary function tests [FVC and FEV(1)]. Annual periodic medical examinations shall include all these elements and an abbreviated questionnaire. If it is 10+ years since first asbestos exposure, an individual should have a chest roentogram: every 5 years (ages 15 to 35), every 2 years (ages 35 to 45), every year (age 45+). Within 30 days of employment termination, an individual should receive a periodic medical examination with the elements listed above. Keep medical surveillance records for duration of employment, plus 30 years.

Transportation Data (49 CFR 172.101, .102)
DOT Shipping Name: Asbestos
DOT Hazard Class: ORM-C
ID No.: -
DOT Label: None
DOT Packaging Exceptions: 173.1090
DOT Packaging Requirements: 173.1090
Other Requirements: Stow and handle to avoid airborne particle
IMO Shipping Name: Asbestos, blue; asbestos, white
IMO Hazard Class: 9
ID No.: UN2212, UN2590
IMO Label: None
IMDG Packaging Group: II, III

DANGER
ASBESTOS
CANCER AND LUNG DISEASE HAZARD
AUTHORIZED PERSONNEL ONLY
RESPIRATORS AND PROTECTIVE CLOTHING ARE REQUIRED IN THIS AREA

MSDS Collection **References:** 2-4, 6, 12, 14, 20, 26, 32, 38, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 138-140, 142, 143, 146, 148, 152, 153, 156-158
Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

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Section 1. Material Identification

32

Lead (Inorganic) (Pb) Description: Exists widely throughout the world in a number of ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, drossing, or electrolytic refining. Lead is used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyllead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a constuction material for the tank linings, piping, and equipment used to handle the corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection.
Other Designations: CAS No. 7439-92-1, lead oxide; lead salts, inorganic; metallic lead; plumbum.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

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* Sec. 8

Cautions: *Inorganic lead is a potent systemic poison.* Organic lead (for example, tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is due to inhalation of dust and fumes. Major affected organ systems are the nervous, blood, and reproductive systems, and kidneys. Health impairment or disease may result from a severe acute short- or long-term exposure.

Section 2. Ingredients and Occupational Exposure Limits

Lead (inorganic) fumes and dusts, as Pb, ca 100%

1989 OSHA PELs (Lead, inorganic compounds)
8-hr TWA: 50 μg/m³
Action Level TWA*: 30 μg/m³

29 CFR 1910.1025 Lead Standard
Blood Lead Level: 40 μg/100 g

1989-90 ACGIH TLV (Lead, inorganic, fumes and dusts)
TLV-TWA: 150 μg/m³

1988 NIOSH REL
10-hr TWA: <100 μg/m³

1985-86 Toxicity Data†
Human, inhalation, TC_{Lo}: 10 μg/m³ affects gastrointestinal tract and liver
Human, oral, TD_{Lo}: 450 mg/kg ingested over 6 yr affects peripheral and central nervous systems
Rat, oral, TD_{Lo}: 790 mg/kg affects multigeneration reproduction

* Action level applies to employee exposure without regard to respirator use.
† See NIOSH, *RTECS* (OF7525000), for additional mutative, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 3164 °F (1740 °C)
Melting Point: 621.3 °F (327.4 °C)
Vapor Pressure: 1.77 mm Hg at 1832 °F (1000 °C)
Viscosity: 3.2 cp at 621.3 °F (327.4 °C)
Molecular Weight: 207.20
Specific Gravity (20 °C/4 °C): 11.34
Water Solubility: Relatively insoluble in hot or cold water*
Appearance and Odor: Bluish-white, silvery, gray, very soft metal.

* Lead dissolves more easily at a low pH.

Section 4. Fire and Explosion Data

Flash Point: None reported	**Autoignition Temperature:** None reported	**LEL:** None reported	**UEL:** None reported

Extinguishing Media: Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.
Unusual Fire or Explosion Hazards: Flammable and moderately explosive in the form of dust when exposed to heat or flame.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Lead is stable at room temperature in closed containers under normal storage and handling conditions. It tarnishes on exposure to air. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Mixtures of hydrogen peroxide + trioxane explode on contact with lead. Lead is incompatible with sodium azide, zirconium, disodium acetylide, and oxidants. A violent reaction on ignition may occur with concentrated hydrogen peroxide, chlorine trifluoride, sodium acetylide (with powdered lead), ammonium nitrate (below 200 °C with powdered lead). Lead is attacked by pure water and weak organic acids in the presence of oxygen. Lead is resistant to tap water, hydrofluoric acid, brine, and solvents.
Conditions to Avoid: Rubber gloves containing lead may ignite in nitric acid.
Hazardous Products of Decomposition: Thermal oxidative decomposition of lead can produce highly toxic fumes of lead.

Section 6. Health Hazard Data

Carcinogenicity: Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, the literature reports instances of lead-induced neoplasms, both benign and malignant, of the kidney and other organs in laboratory rodents. Excessive exposure to lead has resulted in neurologic disorders in infants. Experimental studies show lead has reproductive and teratogenic effects in laboratory animals. Human male and female reproductive effects are also documented.
Summary of Risks: Lead is a potent, systemic poison that affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal (GI) system. The most important way lead enters the body is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Much of ingested lead passes through feces without absorption into the body. Adults may absorb only 5 to 15% of ingested lead; children may absorb a much larger fraction. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).
Medical Conditions Aggravated by Exposure: Lead may aggravate nervous system disorders (e.g., epilepsy, neuropathies), kidney diseases, high blood pressure (hypertension), infertility, and anemia. Lead-induced anemia and its effect on blood presssure can aggravate cardiovascular disease.

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Section 6. Health Hazard Data, *continued*

Target Organs: Blood, central and peripheral nervous systems, kidneys, and gastrointestinal (GI) tract.
Primary Entry Routes: Inhalation, ingestion.
Acute Effects: An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are rare. Reversible kidney damage can occur from acute exposure, as well as anemia.
Chronic Effects: Symptoms of chronic long-term overexposure include appetite loss, nausea, metallic taste in the mouth, lead line on gingival (gum) tissue, constipation, anxiety, anemia, pallor of the face and the eye grounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, ankle extensor muscles may occur after years of increased lead absorption. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Reproductive damage is characterized by decreased sex drive, impotence, and sterility in men; and decreased fertility, abnormal menstrual cycles, and miscarriages in women. Unborn children may suffer neurologic damage or developmental problems due to excessive lead exposure in pregnant women. Lead poisoning's severest result is encephalopathy manifested by severe headache, convulsions, coma, delirium, and possibly death.
FIRST AID
Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Consult a physician if any health complaints develop.
Inhalation: Remove exposed person to fresh air and support breathing as needed. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If large amounts of lead were ingested, induce vomiting with Ipecac syrup. Consult a physician immediately.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: For diagnosis, obtain blood pressure, blood lead level (PbB), zinc protoporphyrin (ZPP), complete blood count for microcytic anemia and basophilic stippling, urinalysis, and blood urea nitrogen (BUN) of creatinine. Examine peripheral motor neuropathy, pallor, and gingival lead line. Use Ca-EDTA to treat poison, but *never* chelate prophylactically. Consult an occupational physician or toxicologist.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel and evacuate all unnecessary personnel immediately. Cleanup personnel should protect against inhalation of dusts or fume and contact with skin or eyes. Avoid creating dusty conditions. Water sprays may be used in large quantities to prevent the formation of dust. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Scoop the spilled material into closed containers for disposal or reclamation. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
EPA Designations
Listed as a RCRA Hazardous Waste (40 CFR 261.33, Appendix II—EP Toxicity Test Procedures)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [* per Clean Water Act, Sec. 307(a)]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact. Protective clothing made of man-made fibers and lacking turn-ups, pleats, or pockets retain less dust from lead.
Ventilation: Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially washing hands before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all incompatible materials, direct sunlight, and heat and ignition sources.
Engineering Controls: Educate worker about lead's hazards. Follow and inform employees of the lead standard (29 CFR 1910.1025). Avoid inhalation of lead dust and fumes and ingestion of lead. Use only with appropriate personal protective gear and adequate ventilation. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Avoid creating dusty conditions. Segregate and launder contaminated clothing. Take precautions to protect laundry personnel. Practice good personal hygiene and housekeeping procedures. For a variety of reasons, the lead concentration in workroom air may not correlate with the blood lead levels in individuals.
Other Precautions: Provide preplacement and periodic medical examinations which emphasize blood, nervous system, gastrointestinal tract, and kidneys, including a complete blood count and urinalysis. Receive a complete history including previous surgeries and hospitalization, allergies, smoking history, alcohol consumption, proprietary drug intake, and occupational and nonoccupational lead exposure. Maintain records for medical surveillance, airborne exposure monitoring, employee complaints, and physician's written opinions for at least 40 years or duration of employment plus 20 years. Measurement of blood lead level (PbB) and zinc protoporphyrin (ZPP) are useful indicators of your body's lead absorption level. Maintain worker PbBs at or below 40 µg/100 g of whole blood. To minimize adverse reproductive health effects to parents and developing fetus, maintain the PbBs of workers intending to have children below 30 µg/100 g. Elevated PbBs increase your risk of disease, and the longer you have elevated PbBs, the greater your chance of substantial permanent damage.

Transportation Data (49 CFR 172.102)
IMO Shipping Name: Lead compounds, soluble, n.o.s.
IMO Hazard Class: 6.1
ID No.: UN2291
IMO Label: St. Andrews Cross (X, Stow away from foodstuffs)
IMDG Packaging Group: III

MSDS Collection **References:** 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132, 133, 134, 136, 138, 139, 142, 143
Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

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ATTACHMENT 2

ACTIVITY HAZARD ANALYSES

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ACTIVITY HAZARD ANALYSIS (AHA) #1

Mobilization and Site Setup at Treasure Island

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
1. Load truck with supplies and instruments.	Strains could occur from manually moving materials and equipment.	Direct personnel to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Encourage use of a hand truck. Direct employees not to lift more than 50 pounds. Obtain assistance from another worker or use a mechanical device. Refer to EHS Procedure 3-1, Ergonomics.
2. Drive pickup trucks.	Workers could be injured while driving vehicles.	Follow all driving rules and regulations. Always wear seatbelts whenever the vehicle is in motion. Allow only licensed drivers to drive vehicles.
	High traffic on the Bay Bridge could present hazards.	Be aware of traffic conditions. Ensure that the vehicle has enough fuel before going out to Treasure Island for the return trip to the city. Try to plan travel to avoid rush hours.
3. Unload the truck and set up the work area.	Workers could be exposed to chemical hazards.	Delineate exclusion zones. Identify all chemical hazards and receive training (MSDSs) regarding safe handling of chemicals brought onto the site, if any. The SHSS will file copies of all MSDSs on site.
	Slip, trip, and fall hazards could be present.	Visually inspect work areas and mark, barricade, or eliminate slip, trip, and fall hazards, if feasible. Keep work area neat and orderly. Always place supplies in areas away from normal foot traffic and equipment and tools in a safe location so that they will not present a trip hazard to nearby workers. Maintain proper illumination in all work areas. Work is authorized normally during daylight hours only. Refer to EHS Procedure 3-8, Fall Protection.
	Sharp objects could cause punctures.	Wear cut-resistant work gloves when sharp edges or other objects may cause the possibility of lacerations or other injury. When possible, blunt sharp edges. Direct workers not to stand or walk on equipment or supplies.

ACTIVITY HAZARD ANALYSIS (AHA) #1

Mobilization and Site Setup at Treasure Island

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
	Strains could occur from manually moving materials and equipment.	Direct personnel to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Encourage use of a hand truck. Direct employees not to lift more than 50 pounds. Obtain assistance from another worker or use a mechanical device. Refer to EHS Procedure 3-1, Ergonomics.
	Workers could be exposed to extreme temperatures.	Monitor for heat stress in accordance with EHS Procedure 4-6, Temperature Extremes. Provide fluids and rest breaks during warm weather and while wearing impermeable protective clothing.
	Eye hazards could be present.	Safety glasses are the minimum required eye protection for all work areas.
	Electrocution could occur from the generator used to power lights or power tools.	Allow only qualified electricians to hook up or disconnect electrical circuits on the mains of the generator. Follow lock-out/tag-out protocols. Inspect all extension cords daily for structural integrity, ground continuity, and damaged areas. Extension cords must be rated for hard usage or extra hard usage (Table 400-4, National Electrical Code). Inspect extension cord connections. Use GFCIs on all outdoor 115- to 120-volt, 20-ampere or less circuits. Elevate or cover electric wire or flexible cord passing through the work area to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching (cover only in accordance with National Electrical Code requirements). Keep plugs and receptacles out of the water, unless they are approved, submersible types. Ground all electrical circuits in accordance with the National Electrical Code or other applicable standards and regulations. If a generator is used, be sure it is a type that does not require grounding. If it requires grounding, follow the manufacturer's directions. National Electrical Code 250-6 lists the exceptions for grounding portable and vehicle-mounted generators.

ACTIVITY HAZARD ANALYSIS (AHA) #1

Mobilization and Site Setup at Treasure Island

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
	Lack of communication in widely dispersed areas could lead to delayed response in an emergency.	Ensure that each work team has a telephone or access to a telephone for communication. In addition, workers must have a 2-way radio that can contact someone who has access to a phone if they are not in the line of sight of other workers. If more than one team at a time is working, ensure that there is communication between the work teams and project management. Use the buddy system.
4. Install barricades and or fencing.	Improper use of power and hand tools could cause injury or damage tools.	Inspect all tools before each use. Personnel will be trained in the proper use of hand tools. Ground, protect by GFCI, or double-insulate all power tools.
	Material handling could cause injury.	Identify and avoid pinch points. Maintain communication with others involved in material handling. Use appropriate PPE.
	Strains could occur from handling materials.	Direct personnel to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Encourage use of hand trucks. Direct personnel to work at a steady pace. Refer to EHS Procedure 3-1, Ergonomics.

Equipment to be Used	Inspection Requirements	Training Requirements
Pickup trucks	Daily and before use. Use a vehicle inspection checklist.	Only DMV-licensed personnel will operate trucks.
Hand tools and power tools	Daily and before use. Discard tools that are not in good condition.	Specific training for power tools, hand tools, and electrical safety is required.
Generator	Daily and before each use.	Training in operation of unit. Review operator's manual.

Abbreviations and Acronyms:

DMV – Department of Motor Vehicles
EHS – Environmental Health and Safety
GFCI – ground fault circuit interrupter
MSDS – Material Safety Data Sheet
PPE – personal protective equipment
SHSS – Site Health and Safety Supervisor

ACTIVITY HAZARD ANALYSIS (AHA) #2

Radiological Surveys Treasure Island Buildings 343 and 344 and Building 233 Drain Lines

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
1. Enter buildings to inspect areas before surveys are actually conducted.	Workers could potentially encounter vagrants and biological and animal hazards. Unknown chemicals, syringes and needles, etc. may be inside buildings.	Ensure that the entire building is inspected inside, not just the areas to be surveyed. Be aware of insects such as biting spiders. Avoid areas that contain obvious animal droppings. These areas may need to be sprayed with a bleach solution. Identify all hazards and mark them. Do not touch or remove syringes or needles. Mark their locations. All entries require the use of the "buddy system." No worker will work alone inside a building.
2. Set up lighting inside the building, if needed.	Inadequate lighting may cause workers to fail to identify slip, trip, and other hazards that pose a threat.	On initial survey carry high-power lanterns or flashlights. If lighting is inadequate (at least 5 foot-candles), it may be necessary to install portable lighting.
3. Brief workers on building setup.	Workers could be exposed to chemical hazards.	Delineate exclusion zones. Identify all chemical hazards and receive training (MSDSs) regarding safe handling of chemicals brought on to the site, if any. The SHSS will file copies of all MSDSs on site.
	Slip, trip, and fall hazards could be present.	Visually inspect work areas and mark, barricade, or eliminate slip, trip, and fall hazards, if feasible. Keep work area neat and orderly. Always place supplies in areas away from normal foot traffic. Always place equipment and tools in a safe location so that they do not present a trip hazard to nearby workers. Maintain proper illumination in all work areas. Work is authorized normally during daylight hours only. Refer to EHS Procedure 3-8, Fall Protection.
	Sharp objects could cause punctures.	Wear cut-resistant work gloves when sharp edges or other objects may cause the possibility of lacerations or other injury. When possible, blunt sharp edges. Direct workers not to stand or walk on equipment or supplies.
	Strains could occur from manually moving materials and equipment.	Direct personnel to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Encourage use of hand truck. Direct employees not to lift more than 50 pounds. Obtain assistance from another worker or use a mechanical device. Refer to EHS Procedure 3-1, Ergonomics.

ACTIVITY HAZARD ANALYSIS (AHA) #2

Radiological Surveys Treasure Island Buildings 343 and 344 and Building 233 Drain Lines

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
	Workers could be exposed to extreme temperatures.	Monitor for heat stress in accordance with EHS Procedure 4-6, Temperature Extremes. Provide fluids and rest breaks during warm weather and while wearing impermeable protective clothing.
	Eye hazards could be present.	Safety glasses are the minimum required eye protection for all work areas.
	Electrocution could occur from the generator used to power lights or power tools.	Only qualified electricians are allowed to hook up or disconnect electrical circuits on the mains of the generator. Follow lock-out/tag-out protocols. Inspect all extension cords daily for structural integrity, ground continuity, and damaged areas. Extension cords must be rated for hard usage or extra hard usage (Table 400-4, National Electrical Code). Inspect extension cord connections. Use GFCIs on all outdoor 115- to 120-volt, 20-ampere or less circuits. Elevate or cover electric wire or flexible cord passing through work area to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching (cover only in accordance with National Electrical Code requirements). Keep plugs and receptacles out of water, unless they are approved, submersible types. Ground all electrical circuits in accordance with the National Electrical Code or other applicable standards and regulations. If a generator is used, be sure it is a type that does not require grounding. If it requires grounding, follow manufacturer's directions. National Electrical Code 250-6 lists the exceptions for grounding portable and vehicle-mounted generators.
	Lack of communication in widely dispersed areas could lead to delayed response in an emergency.	Ensure that each work team has a telephone or access to a telephone for communication. In addition, workers must have a 2-way radio that can contact someone who has access to a phone if they are not in the line of sight of other workers. If more than one team at a time is working, ensure that there is communication between the work teams and project management. Use the buddy system.

ACTIVITY HAZARD ANALYSIS (AHA) #2

Radiological Surveys Treasure Island Buildings 343 and 344 and Building 233 Drain Lines

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
4. Enter buildings to conduct survey and collect samples.	Workers carrying survey instruments or tools to collect samples could be injured.	Carry instruments with straps so that they do not fall. Only carry enough equipment for the task. Do not carry equipment and supplies that interfere with the ability to safely move throughout the building.
	Inadequate lighting and doors that could close behind workers could expose workers to injury.	Ensure that there is adequate light. Even if power is supplied for portable lighting, always have a spare flashlight. Ensure that doors are stopped in an open position while working in a room. Always use the buddy system.
5. Remove shelving from buildings and carry to outside.	Strains could occur from handling materials.	Direct personnel to use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Encourage the use of hand trucks. Direct personnel to work at a steady pace. Refer to EHS Procedure 3-1, Ergonomics.
	Improper use of power and hand tools could cause injury or damage tools.	Inspect all tools before each use. Train personnel in the proper use of hand tools. Ground, protect by GFCI, or double-insulate all power tools. Always remove from the top down. Be sure that the upper sections do not fall on top of the worker.
	Material handling could cause injury.	Identify and avoid pinch points. Maintain communication with others involved in material handling. Wear cut-resistant work gloves when sharp edges or splinters may cause the possibility of lacerations or other injury. When possible, blunt sharp edges.
	Construction of a fenced area to store shelving until it is removed could cause injury.	Ensure that shelving is stored in a secured area. Once it has been "cleared" arrange for transportation and disposal. Use adequate signs to warn others of hazards.
6. Crawl under Building 233 to survey drain lines and collect samples if needed.	Biological and physical hazards could be present under the building.	Inspect the workspace and around the building foundation for any indicators of animal or insect activity. Be especially cautious of animal and bird droppings. After skirting is removed inspect the planned path for crawlspace under the building to ensure that there are no obstacles that would impede the path and the worker.
	Removal of skirting from the building could present hazards.	Avoid nails, sharp edges, and splinters. Wear leather work gloves when handling the skirting.

ACTIVITY HAZARD ANALYSIS (AHA) #2

Radiological Surveys Treasure Island Buildings 343 and 344 and Building 233 Drain Lines

Analyzed By/Date: R. Margotto 11/20/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
	Piping under the building wrapped with asbestos containing insulation may expose workers to asbestos.	Direct workers to wear Tyvek™ coveralls with attached hood, elastic sleeves and legs, two pair of nitrile gloves, PVC steel-toe boots, and full-face respirator with P-100 cartridges. Ensure that an inner pair of gloves is taped to the coveralls and that boots are taped to the coveralls. After crawling out from under the building, the worker will remove the outer pair of gloves, then the boots and the coveralls, and then the respirator and the inner pair of gloves. This will be done on a plastic sheet outside of the building so that any potential contamination spreads no further.
	Low height in crawl space could make it difficult for workers to move around or to be rescued.	Remind workers to be mindful of overhead clearance. Direct workers to wear a full body harness with an attached lifeline with a double-locking "D" hook, with the other end of the lifeline placed outside the crawl space.
	Low lighting under the building could make it difficult to see.	Provide additional lighting.

Equipment to be Used	Inspection Requirements	Training Requirements
Pickup trucks	Daily and before use. Use a vehicle inspection checklist.	Only DMV-licensed personnel will operate trucks.
Hand tools and power tools	Daily and before use. Discard tools that are not in good condition.	Specific training for power tools, hand tools, and electrical safety are required.
Survey equipment	Daily and before each use. Ensure that instruments have been calibrated and are within their specified time limits for date since last calibration.	Specific training on the use of each instrument and probe. Training is documented in employee record.
Generator	Daily and before each use.	Training in operation of unit. Review operator's manual.

Abbreviations and Acronyms:

DMV – Department of Motor Vehicles
EHS – Environmental Health and Safety
GFCI – ground fault circuit interrupter
MSDS – Material Safety Data Sheet
PVC – polyvinyl chloride
SHSS – Site Health and Safety Supervisor

ACTIVITY HAZARD ANALYSIS (AHA) #3

Demobilization and Site Restoration at Treasure Island

Analyzed By/Date: R. Margotto 11/13/06

Principal Steps	Potential Safety/Health Hazards	Recommended Controls
Demobilize and restore the site.	Area traffic could expose workers to injury.	Wear high-visibility reflective vests when exposed to vehicle traffic. Use traffic barricades, signs, flags, and backup spotters during demobilization.
	Electrocution could occur.	Allow only qualified electricians to disconnect electrical circuits from generator mains, if used. Follow lockout, tag-out protocols. Inspect all extension cords daily for structural integrity, ground continuity, and damaged areas. Document extension cord inspection. Use GFCIs on all outdoor 115- to 120-volt, 20-ampere or less circuits. Cover or elevate electric wire or flexible cord passing through the work area to protect these conduits from damage by foot traffic, vehicles, sharp corners, projections, or pinching. Keep plugs and receptacles out of water unless they are approved submersible types. Ground all electrical circuits in accordance with the National Electrical Code or other applicable regulations or standards. Temporary wiring is not allowed to pass through walls, doors, or windows (extension cords are one type of temporary wiring). If a generator is used, be sure it is a type that does not require grounding. If it requires grounding, follow the manufacturer's directions. NEC 250-6 lists the exceptions for grounding portable and vehicle-mounted generators.
	Strains could occur from manually moving materials and equipment.	Use proper lifting techniques such as keeping the back straight, lifting with the legs, limiting twisting, and getting help when moving bulky/heavy materials and equipment. Use lifting devices whenever possible. Do not lift more than 50 pounds without assistance.
	Leaving removed components behind and failure to ensure that no equipment is left behind could result in loss.	Inspect all areas before closing buildings. Ensure that all trash, supplies, and survey equipment are removed. Ensure that shelving has been properly cleared and disposed of.

ACTIVITY HAZARD ANALYSIS (AHA) #3

Demobilization and Site Restoration

Analyzed By/Date: R. Margotto 11/13/06

Equipment to be Used	Inspection Requirements	Training Requirements
Pickup trucks, hand tools, and power tools	Daily or before use.	Only DMV-licensed personnel will operate trucks. Specific training for power tools, hand tools, and electrical safety.

Abbreviations and Acronyms:

DMV – Department of Motor Vehicles
GFCI – ground fault circuit interrupter
NEC – National Electrical Code

APPENDIX D

RESPONSE TO COMMENTS ON DRAFT WORK PLAN

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CALIFORNIA DEPARTMENT OF HEALTH SERVICES
COMMENTS ON DRAFT
RADIOLOGICAL WORK PLAN
DATED FEBRUARY 20, 2007
BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

Comments dated: April 5, 2007

Comments by: Ms. Deirdre Dement, Associate Health Physicist
California Department of Health Services (CDHS)
Environmental Management Branch

GENERAL COMMENTS

Comment 1: *It appears that the Navy is still in the process of selecting/acquiring an outside laboratory for radioanalysis of sediment and other environmental samples.*

Response 1: Eberline Services has been procured as the laboratory for this project.

Comment 2: *CDHS could not find a reference to the use of the Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) manual. The web link to this document is www.epa.gov/radiation/marlap/manual.htm. This manual is more appropriate for determining the quality of the data from radioanalysis.*

Response 2: A reference to the MARLAP manual will be included in Section 1.1, fourth paragraph and in Section 11.0, References of the SAP.

Comment 3: *Standard Operating Procedures (SOP) should be submitted for review as well as the "EPA's Method 901.1 M for soil analysis" to be used for radioanalysis of other environmental media using gamma spectroscopy. These should include sample size requirements, counting times, required method uncertainties, preparation of samples for specific radionuclides (e.g., radium 226), etc.*

Response 3: The laboratory's SOPs have been included as Attachment 2 to the SAP.

EPA method 901.1 M is contained in *Radiochemical Analytical Procedures for Analysis of Environmental Samples*, March 1979, Environmental Monitoring Systems Laboratory at Las Vegas (EMSL LV) available from National Technical Information Service (NTIS),

Order No. 053917. EPA method 901.1 does not contain specifics asked for by CDHS. The sample size, counting times, and method uncertainties are dependent on the sample density, other radioactive elements in the sample, the shape of the sample container, and the available counting time. There is no unique sample preparation for specific radionuclides for analyzing soil or water. For soil, the general preparation is removing twigs, rocks, etc. to ensure that the media of interest is soil with uniform density. Radium-226 can be analyzed by sealing the sample container (at the laboratory), counting after 21 days to insure daughter product equilibrium, and quantifying the radium using the daughter peaks.

Comment 4: *It appears that the design of the final status survey (FSS) will be submitted after the scoping survey and that the Figures 2-2, 2-3, and 2-4 will be used to determine the size of each survey unit for each MARSSIM survey classification.*

Response 4 Two new figures (Figures 8-1 and 8-2) have been generated for Buildings 343 and 344 that will be included in the Final Work Plan. The figures depict the survey areas and show systematic and bias sample locations.

Comment 5: *For the drain lines to be surveyed in Building 233, are these only to be surveyed or sampled from the drain openings that presently exist in the building or are the drain lines to be removed? Also, is Building 233 the building the Navy plans to demolish and remove from Treasure Island?*

Response 5: Section 5.1 of the Sampling and Analysis Plan states that: "A sediment sample will be collected from each access point within and around the outside of the building that is accessible."

The drain lines will not be removed as part of this fieldwork.

The Navy plans to put restrictions on Building 233 in future transfer or deed documents that will stipulate that Building 233 shall not be re-inhabited. There are no plans by the Navy to demolish Building 233, but the Navy is planning to do an FSS and remediate any contamination found greater than the building debris disposal requirements. The Navy intends to address the drain lines in the FSS, if necessary, based on the results of this field work.

It appears from the present Treasure Island Development Authority reuse plans that Building 233 will eventually be removed.

The Navy will be sampling the soil beneath the building during the FSS. When the building is demolished, the owner may be required to do an additional soil survey. Questions concerning demolition and the FSS of Building 233 are beyond the scope of this Work Plan and will be addressed in the Work Plan for the FSS of Building 233.

Comment 6: *CDHS was unable to find Standard Operating Procedures (SOP) discussed in the text. Please provide the SOPs and methodologies (e.g. EPA's "Method 901.1 for soil analysis") to be used for collection, preparation, processing and radioanalysis of the samples for detection of Ra-226 and other radionuclides.*

Response 6: See the response to General Comment 3.

SPECIFIC COMMENTS

Comment 1: ***Page 2-3, Section 2.2.2.*** *This states that after a routine swipe survey for beta-gamma contamination in a storage vault in Building 344, low levels of contamination were found. The source of the contamination was attributed to a mini-generator kit. Please provide the radionuclides associated with this contamination.*

Response 1: The radionuclide of concern at Building 344 is ^{137}Cs. The minigenerator kit contained an exempt quantity of ^{137}Cs, i.e., a small quantity that did not require a license. The NRC reviews decommissioning actions during their periodic inspection of the Navy's Master Materials License and is aware of this decommissioning action.

Comment 2: ***Page 5-7, Section 5.4:*** *CDHS will require a dose assessment calculated using the average residual activity above average background. This dose will be used to determine unrestricted release of the survey unit or building.*

Response 2: At the conclusion of FSS activities the survey data will be used to model the dose resulting from the residual radioactivity using the most current versions of RESRAD and/or RESRAD Build as appropriate. The results of the dose model will be included in the FSS report.

Comment 3: ***Page 7-13, Section 7.3.3, Gamma Spectroscopy:*** *Which sample media will be analyzed by gamma spectroscopy? Will there be enough sediment to analyze for Ra-226?*

Response 3: Section 8.10 states, "Sediment samples may be collected from the drainage systems in Building 233 for radiological analysis." It is unknown whether or not there will be sufficient sediment to collect a sample for ^{226}Ra analysis; however, the Navy intends to collect sediment samples for analysis whenever sufficient quantities of sediment are available.

Comment 4: *Pages A.7-4, Section 7.2 and Table A.7-3: How will the Quality Control Acceptance Criteria, (e.g., percent recovery, relative percent difference) be used to ensure the quality of each radiological sample to be used to determine whether a survey unit can be released for unrestricted use? How will the Quality Control Acceptance Criteria listed be used to evaluate radioanalysis of Ra-226 in samples using gamma spectroscopy?relative percent difference*

Response 4: The two areas that will have FSSs performed under this scope of work, the Building 344 vault and Room 101 in Building 343, are structures. The results of direct measurements of the building surfaces will be used to determine whether a survey unit can be released for unrestricted use. Therefore, the quality-control acceptance criteria for laboratories presented in the Sampling and Analysis Plan will have no bearing on the evaluation of FSS data collected under this scope of work.

Comment 5: *Section 7.2 and Table A.7-3: Will individual sample results be evaluated using their uncertainties? Please provide a "required method uncertainty". See MARLAP regarding "required method uncertainties".*

Response 5: During this project no decisions will be made about survey units based on samples. Therefore, the "required method uncertainty" that would be based on the width of the gray region for a particular analyte is not applicable. However, the contracted laboratory will provide individual sample results and their associated uncertainties in the laboratory analytical reports for samples obtained during the Building 233 investigation survey, which can be evaluated for compliance with the recommendations presented in MARLAP.

Comment 6: *Table A.7-1: For the radium 226 and radium progeny listed, how will the samples be prepared for sample analysis using gamma spectroscopy? Please provide the method and SOP to be used for this sample preparation and analysis.*

Response 6: See the response to General Comment 3.

Comment 7: *Table A.7-1: "Units" should be presented as "pCi/g ± 1 or 2 sigma uncertainties". See MARLAP regarding "required method uncertainties".*

Response 7: The only value presented in Table A.7-1 is 1 pCi/g above background for ^{226}Ra. This limit was previously negotiated with the EPA. At the time of the negotiated agreement, no method uncertainty was specified. Therefore, a method uncertainty cannot be presented without further negotiations with and concurrence from the EPA.

Comment 8: *EPA's "Method 901.1 M" was listed as the gamma method to be used for soil and sediment analysis. Please provide this drinking water method to be used for analysis of soil and sediment, including any modifications to it.*

Response 8: See the response to General Comment 3. EPA method 901.1 M is contained in *Radiochemical Analytical Procedures for Analysis of Environmental Samples*, March 1979, EMSL LV available from NTIS, Order No. 053917.

Comment 9: *Appendix A, Draft Sampling and Analysis Plan, Field Sampling Plan and Quality Assurance Project Plan, Page 2 and 3 of 4 of "Elements of the UFP-QAPP and EPA QA/R-5 in Relationship to this SAP: # 23, #25 and #30 indicate that a laboratory has not been identified for radioanalysis of Ra-226 in sediment samples or swipe samples.*

Response 9: Eberline Services has been procured as the laboratory for this project. The SAP will be updated accordingly.

Comment 10: ***Page A.3-1, Section 3.1.1:*** *There is no indication of what or how Building 233 drain lines are going to be monitored or sampled.*

Response 10: Section 3.0 is a background section. The sampling strategy is provided in Section 5.0.

Comment 11: ***Appendix A, Draft Sampling and Analysis Plan, Table A.5-1:*** *There appears to be no plan for the sampling and analysis of sediment from Building 233 drain lines. Is the final plan for the drain lines from Building 233 to be removed and disposed of when the building is demolished?*

Response 11: See the response to General Comment 5.

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TREASURE ISLAND DEVELOPMENT AUTHORITY
COMMENTS ON DRAFT
RADIOLOGICAL WORK PLAN
DATED FEBRUARY 20, 2007
BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

Comments dated: March 17, 2007

Comments by: Mr. Thomas Widner, M.S., C.H.P., C.I.H.
Principal Health Scientist
ChemRisk®

SPECIFIC COMMENTS

Comment 1: *The Work Plan, Sampling and Analysis Plan, Project Contractor Quality Control Plan, and Site Health and Safety Plan appear to have been prepared in a thorough and technically defensible manner.*

Response 1: Comment noted, thank you.

Comment 2: *During review of the plans for the radiological assessment of Building 233, Naval Station Treasure Island, I was told that surveys and/or sampling would include floors, sanitary drains, and soil in the crawl spaces under the building into which contamination could have been washed during the 1950 decontamination activities. I saw no indication in the December 2006 draft radiological assessment of Building 233 that surveys or sampling of soil under the building was conducted in any areas. I asked that clarification be requested from the Navy regarding whether or not the soil under the building was addressed in the radiological assessment. The planned work will apparently address potential contamination in sanitary drains from sinks, drain traps, low points in the sanitary drainage system, and the first sanitary sewer manhole downstream of the building.*

Response 2: See the response to CDHS General Comment 5 above.

Comment 3: *Will the Building 233 surveys include soil in the crawl spaces under the building into which contamination could have been washed during the 1950 decontamination activities?*

Response 3: See the response to CDHS General Comment 5 above.

Comment 4: *Section 8.10 of the Draft Work Plan states that "Sediment samples may be collected from the drainage systems in Building 233 for radiological analysis [emphasis added]." What will determine if sediment samples are taken or are not taken?*

Response 4: The Navy intends to collect sediment samples for laboratory analysis if sufficient quantities of sediment are available.

Comment 5: *Section 5.1 of the Sampling and Analysis Plan states that "A sediment sample will be collected from each access point within and around the outside of the Building that is accessible." What do the referenced "access points" provide access to– the building, the crawl space, and/or the sanitary drainage system? Footnote "b" of Table A.5-1 implies that the term includes points of access to drain lines, but it is not clear if those are the only access points of interest.*

Response 5: See the response to CDHS General Comment 5. For clarification the text will be modified as follows:

> A sediment sample will be collected from each access point **to the drain lines** within and around the outside of the Building 233 up **to and including the first downstream sanitary sewer manhole** that is accessible.

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
COMMENTS ON DRAFT
RADIOLOGICAL WORK PLAN
DATED FEBRUARY 20, 2007
BUILDINGS 343 AND 344
AND BUILDING 233 DRAIN LINES
NAVAL STATION TREASURE ISLAND
SAN FRANCISCO, CALIFORNIA

Comments dated: July 25, 2007

Comments by: Ms. Deirdre Dement, Associate Health Physicist
California Department of Health Services (CDHS)
Environmental Management Branch

SPECIFIC COMMENTS

Comment 1: *The final status survey would not apply to Building 233 drain lines.*

Response 1: Comment noted.

Comment 2: *It appears that the soil and sediment sampling would only apply to Building 233 of this work plan, and the work specified for Building 233 would more likely be considered as a scoping or characterization survey/sampling.*

Response 2: Comment noted.

Comment 3: *CDHS' General Comments 1, 2, 3, 5 and 6 and the Navy's subsequent responses were specifically regarding soil and sediment sampling, processing and radioanalysis for Building 233.*

Response 3: Comment noted.

Comment 4: *CDHS/CDPH's Comments 3, 4, 5, 6, 7, 8, 9, 10 and 11 and the subsequent responses from the Navy dated July 17, 2007 also address Building 233 drain lines, rather that applying to Buildings 343 and 344 final status surveys.*

Response 4: Comment noted.

Comment 5: *At this time, CDPH will only address the final status surveys of Buildings 343 and 344, which would include CDHS/CDPH's General Comment 4 and Specific Comments 1 and 2.*

Response 5: Comment noted.

The following address comments and responses regarding Buildings 343 and 344:

Comment 1: *CDHS/ CDPH's General Comment 4 and the Navy's response indicated that the 2 new figures that were sent with these response to comments will be added to the earlier figures. These should be numbered and/or given figure numbers. When these sample locations are presented in the final status survey report, the calculations for determining the number of samples required, and the spacing between the sample points should be shown.*

Response 1: Comment noted.

Comment 2: *Please clarify/verify that the $DCLG_w$ or $DCGL_{EMC}$ for gross alpha (representing radium) would be 100 dpm per 100 cm^2.*

Response 2: The $DCGL_w$ will be 100 dpm per 100 cm^2.