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HUNTERS POINT
SSIC NO. 5090.3.A

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

FINAL
PROJECT WORK PLAN
Revision 0
November 10, 2005

PCB HOT SPOT SOIL EXCAVATION SITE
PARCELS E AND E-2, HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

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

CONTRACT NO. N68711-98-D-5713
CTO NO. 0084

FINAL

PROJECT WORK PLAN

Revision 0

November 10, 2005

PCB HOT SPOT SOIL EXCAVATION SITE
PARCELS E AND E-2, HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: FWSD-RAC-05-1442

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Southwest
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San Diego, CA 92132-5190

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Neil Hart, Program Manager

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Replacement Pages for the Final Project Work Plan
PCB Hot Spot Soil Excavation Site Parcels E and E-2 Hunters Point

Section	Replace	
Work Plan		
Signature Page	page	
Table of Contents	entire section (pgs i/xii)	
1.0 Introduction	page 1-4	
5.0 Planned Removal Activities	entire section (pgs 5-1/5-31)	
8.0 Environmental Protection Plan	page 8-6	
9.0 Project Management Plan	entire section (pgs 9-1/9-5)	
11.0 references	page 11-1	
Figure 2-1	figure	(1 page)
Figure 5-5	figure	(1 page)
Appendix A - Sampling and Analysis Plan		
Signature Page	page	
Table of Contents	entire section (A.i/A.x)	
1.0 Introduction	entire section (pgs A.1-1/A.1-3	
2.0 Background	entire section (pg A.2-1)	
4.0 Sampling Strategy	entire section (A.4-1/A.4-9)	
5.0 Request of Analysis	entire section (A.5-1/A.5-4)	
6.0 Field Methods and Sampling Procedures	entire section (A.6-1/A.6-14)	
7.0 Project Organization	entire section (A.7-1/A.7-3)	
8.0 Quality Assurance Objectives	page A.8-3	
Table A.4-2	table	(1 page)
Table A.5-1	table	(4 pages)
Table A.6-2	table	(2 pages)
Table A.7-1	table	(3 pages)
Table A.8-2	table	(10 pages)
Table A.8-3	table	(3 pages)
Figure A.4-2	figure	(1 page)
Figure A.4-3	figure	(1 page)
Figure A.7-1	figure	(1 page)
Appendix B - Project Contractor Quality Control Plan Addendum		
Signature Page	page	
Figure B.2-1	figure	(1page)
Appendix D - Response To Comments		
Fly Sheet	sheet	
Response to EPA Comments	entire section(pgs 1/7)	

TETRA TECH EC, INC.

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Southwest
Ms. Beatrice Appling, AQE.BA
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San Diego, CA 92132-5190

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FROM: Edwin Neil Hart

Neil Hart, Program Manager

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Replacement Pages for the Final Project Work Plan
PCB Hot Spot Soil Excavation Site Parcels E and E-2 Hunters Point

Section	Replace
Work Plan	
ES Executive Summary	Page ES-3/ES-4
1.0 Introduction	Page 1-3/1-4
2.0 Site Conditions and Background	Page 2-1/2-2
8.0 Environmental Protection Plan	Page 8-5/8-6 & 8-7/8-8
9.0 Project Management Plan	Page 9-1/9-2
Figure 1-1	Entire Figure (Was Previously Sent)
Figure 5-1	Entire Figure (Was Previously Sent)
Figure 5-2	Entire Figure (Was Previously Sent)
Figure 5-3	Entire Figure (Was Previously Sent)
Figure 5-4	Entire Figure (Was Previously Sent)
Figure 6-1	Entire Figure (Was Previously Sent)
Appendix A - Sampling and Analysis Plan	
Figure A.3-2	Entire Figure (Was Previously Sent)
Appendix C - Stormwater Pollution Prevention Plan	
Signature Page	Page (Was Previously Sent)
Figure C.1-1	Entire Figure (Was Previously Sent)
Figure C.2-1	Entire Figure (Was Previously Sent)

TETRA TECH FW, INC.

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	J. Baldwin	P. Stroganoff - SF ROICC
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*P. Brooks - 1C/1E	D. Delong	
*K. Forman - 1C/1E	L. Bienkowski	Date/Time Received
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TABLE OF CONTENTS

PAGE

LIST OF TABLES vii

LIST OF FIGURES vii

ABBREVIATIONS AND ACRONYMS ..... viii~~ix~~

EXECUTIVE SUMMARY ES-1

1.0 INTRODUCTION 1-1
- 1.1 SCOPE OF WORK 1-2
- 1.2 PROJECT WORK PLAN ORGANIZATION 1-3
- 1.3 SITE SAFETY 1-3
- 1.4 RADIOLOGICAL CONTROL PRACTICES 1-4

2.0 SITE CONDITIONS AND BACKGROUND 2-1
- 2.1 SITE DESCRIPTION AND HISTORY 2-1
- 2.2 PHYSICAL CHARACTERISTICS 2-2
  - 2.2.1 Geologic Setting 2-2
  - 2.2.2 Hydrogeologic Setting 2-3
- 2.3 CHEMICAL AND RADIOLOGICAL CHARACTERISTICS 2-3
  - 2.3.1 Chemical Characterization 2-3
  - 2.3.2 Radiological Characterization 2-4
- 2.4 FUTURE SITE USE 2-4

3.0 REGULATORY FRAMEWORK 3-1
- 3.1 REGULATORY PROCESS 3-1
- 3.2 REMOVAL ACTION OBJECTIVES 3-2
- 3.3 ANTICIPATED WASTE STREAMS 3-2
- 3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS 3-2
- 3.5 CHEMICAL CLEANUP GOALS AND RADIOLOGICAL REMEDIAL OBJECTIVES 3-4

4.0 RADIOLOGICAL CONTROLS 4-1
- 4.1 RADIOLOGICAL HEALTH AND SAFETY 4-1
- 4.2 ALARA 4-1
- 4.3 TRAINING 4-1
- 4.4 WHOLE-BODY EXTERNAL DOSE MONITORING 4-2
- 4.5 RADIATION WORK PERMITS 4-2
  - 4.5.1 Purpose of the Radiation Work Permit 4-2
  - 4.5.2 Development of the Radiation Work Permit 4-2
  - 4.5.3 Review and Approval of the Radiation Work Permit 4-3

TABLE OF CONTENTS
(Continued)

PAGE

4.5.4 Implementation of the Radiation Work Permit 4-3
4.5.5 Changes to the Radiation Work Permit 4-3
4.6 RADIOLOGICAL REMEDIAL OBJECTIVES 4-4
4.7 INVESTIGATION LEVELS 4-4
4.7.1 Investigation Levels for Gamma Radiation Surveys 4-4
4.7.2 Investigation Levels for Alpha and Beta Radiation Surveys 4-4
4.8 RADIATION DETECTION INSTRUMENTATION 4-4
4.8.1 Calibration 4-5
4.8.2 Daily Performance 4-5
4.8.3 Alpha/Beta Survey Instrumentation 4-6
4.8.4 Gamma Survey Instrumentation 4-6
4.8.5 Initial Land Surface Scan Instrumentation 4-6
4.8.6 Instruments for Direct Measurement Surveys for Beta Gamma Activity 4-7
4.8.7 Conveyor Belt Survey Instrumentation 4-7
4.8.8 Exposure Rate Survey Instrumentation 4-7
4.9 INSTRUMENTATION EQUATIONS 4-7
4.9.1 Instrument Efficiency 4-7
4.9.2 Count Detection Probability for Alpha Scans ($\leq$126-cm^2 Probe) 4-9
4.9.3 Minimum Detectable Count Rate and Minimum Detectable Concentration for Beta and Gamma Scans 4-10
4.9.4 Minimum Detectable Concentration for Static Alpha and Beta Counts 4-11
4.9.5 Surface Efficiency (ε_s) for Surface Activity Measurements 4-12
4.9.6 MDC for Gamma Scans of Surface Areas (2-inch by 2-inch NaI Probe) 4-13
4.9.7 Minimum Detectable Count Rate for Static Gamma Counts 4-15
4.10 LABORATORY INSTRUMENTS 4-16
4.10.1 Quality Assurance Checks 4-16
4.10.2 Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys 4-16
4.10.3 Gamma Spectroscopy 4-16
4.11 SURVEY IMPLEMENTATION 4-16
4.11.1 Reference (Background) Areas 4-17
4.11.2 Scan Surveys 4-17
4.11.2.1 Scan Surveys for Alpha/Beta Radiation 4-17
4.11.2.2 Scan Surveys for Gamma Radiation 4-17
4.11.3 Static Surveys 4-18
4.11.3.1 Static Surveys for Alpha/Beta Surface Activity 4-18
4.11.3.2 Static Surveys for Gamma Radiation 4-18
4.11.4 Exposure Rate Measurements 4-18
4.11.5 Swipe Sample Measurements 4-18
4.11.6 Equipment and Material Surveys 4-18
4.11.7 Personnel Surveys 4-18

TABLE OF CONTENTS
(Continued)

PAGE

4.11.8 Media Sampling 4-19
4.11.9 Air Sampling 4-19
4.12 SAMPLING PROTOCOL 4-19
4.13 POST-WORK AREA SURVEILLANCE 4-19
4.14 DECONTAMINATION PROCEDURES 4-20

5.0 PLANNED REMOVAL ACTIVITIES 5-1
5.1 PERMITTING AND NOTIFICATIONS 5-2
5.2 PREPARATORY ACTIVITIES AND MEETINGS 5-2
5.3 ENVIRONMENTAL RESOURCES SURVEYING 5-2
5.4 CLEARING OF VEGETATION 5-3
5.5 TOPOGRAPHICAL SURVEYING 5-3
5.6 GEOPHYSICAL SURVEYING 5-3
5.7 RADIOLOGICAL SURFACE SURVEYING 5-4
5.8 IDENTIFICATION AND REMOVAL OF RADIOACTIVE MATERIAL 5-4
5.9 MOBILIZATION 5-6
5.10 PRE-EXCAVATION PCB CHARACTERIZATION SAMPLING 5-7
5.11 EXISTING UTILITIES AND STRUCTURES 5-8
5.12 EXISTING WELLS AND PIEZOMETERS 5-9
5.13 PCB HOT SPOT SOIL EXCAVATION AND REMOVAL OF ADDITIONAL RADIOACTIVE MATERIALS 5-10
5.13.1 Excavating Around Sheet Pile Barrier 5-13
5.13.2 Dewatering of Excavated Materials 5-13
5.13.3 Secondary Screening Conveyor System 5-14
5.13.4 Secondary Screening Conveyor System Surveying 5-14
5.13.4.1 Conveyor System Radioactive Material Removal 5-15
5.13.4.2 Conveyor System Soil Sampling ..... 5-15~~5-16~~
5.13.5 Soil Stockpiles 5-16
5.14 BURIED DRUMS, BOTTLES, JARS AND CONTAINERS WITH UNKNOWN CONTENT ..... 5-16~~5-17~~
5.14.1 Excavation of Containers and Soil ..... 5-18~~5-19~~
5.14.2 Mass Excavation ..... 5-19~~5-20~~
5.14.3 Container Identification Numbers 5-20
5.14.4 Handling and Staging of Containers ..... 5-20~~5-21~~
5.14.5 Special Handling ..... 5-21~~5-22~~
5.14.5.1 Leaking of Deteriorated Containers ..... 5-21~~5-22~~
5.14.5.2 Bulging Containers ..... 5-21~~5-22~~
5.14.5.3 Containers Containing Explosive of Shock-sensitive Waste 5-22~~5-23~~
5.14.5.4 Containers Containing Radioactive Waste ..... 5-22~~5-23~~
5.14.5.5 Packaged Laboratory Wastes 5-23
5.14.5.6 Air Reactive Wastes ..... 5-23~~5-24~~
5.14.6 Over-packing of Drums ..... 5-23~~5-24~~

TABLE OF CONTENTS
(Continued)

PAGE

5.14.7 Container Sample Collection Procedures ..... 5-24~~5-25~~
5.14.7.1 Container Sampling for Waste Compatibility Screening/HazCating ..... 5-24~~5-25~~
5.14.7.2 Sampling of Intact Excavated Drums and Large Containers 5-26~~5-27~~
5.14.7.3 Resealing Containers ..... 5-26~~5-27~~
5.14.7.4 Staging ..... 5-27~~5-28~~
5.15 POST-EXCAVATION SAMPLING ..... 5-27~~5-28~~
5.16 BACKFILL PLACEMENT AND COMPACTION ..... 5-29~~5-30~~
5.17 SITE RESTORATION ..... 5-29~~5-30~~
5.18 DECONTAMINATION OF EQUIPMENT AND FREE-RELEASE SURVEYING ..... 5-30~~5-31~~
5.19 WASTE CLASSIFICATION, STORAGE, AND DISPOSAL ..... 5-30~~5-31~~
5.20 DEMOBILIZATION ..... 5-31~~5-32~~

6.0 TRAFFIC CONTROL PLAN 6-1
6.1 ANALYSIS OF POTENTIAL IMPACTS 6-1
6.2 TRAFFIC SAFETY MEASURES 6-2
6.3 TRAFFIC CONTROLS 6-2

7.0 WASTE MANAGEMENT PLAN 7-1
7.1 PROJECT WASTE DESCRIPTIONS 7-1
7.2 WASTE MANAGEMENT FOR HAZARDOUS/NON-HAZARDOUS WASTES 7-3
7.2.1 Waste Classification 7-3
7.2.2 Waste Accumulation and Storage 7-3
7.2.3 Soil 7-4
7.2.4 Debris/Material 7-4
7.2.5 Wastewater and Waste Fluids 7-4
7.2.6 Container Labeling 7-5
7.2.7 Waste Accumulation Areas 7-5
7.2.8 Waste Disposal 7-6
7.2.9 Waste Transportation 7-6
7.2.10 Waste Minimization 7-7
7.2.11 Inspections 7-7
7.2.12 Documentation 7-8
7.2.13 Hazardous Waste Manifests and LDR Certification 7-8
7.3 WASTE MANAGEMENT FOR RADIOACTIVE WASTES 7-9
7.3.1 Waste Classification 7-9
7.3.2 Waste Accumulation and Storage 7-10
7.3.3 Soil, Debris, and Materials 7-11
7.3.4 Wastewater and Waste Fluids 7-11
7.3.5 Labeling and Posting of Containers Containing Radioactive Waste 7-11
7.3.6 Waste Accumulation Areas 7-12

TABLE OF CONTENTS
(Continued)

PAGE

7.3.7 Waste Disposal 7-12
7.3.8 Waste Transportation 7-13
7.3.9 Waste Minimization 7-13
7.3.10 Inspections 7-13
7.3.11 Documentation 7-14
7.3.12 Radioactive Waste Manifests 7-14
7.4 UPDATING THE WASTE MANAGEMENT PLAN 7-14

8.0 ENVIRONMENTAL PROTECTION PLAN 8-1
8.1 EXISTING NATURAL RESOURCES 8-1
8.2 DESCRIPTION OF HABITAT AND SENSITIVE SPECIES 8-1
8.3 RUN-ON AND RUNOFF CONTROL PROVISIONS 8-2
8.4 REGULATORY REQUIREMENTS 8-2
8.4.1 Specific Environmental/Regulatory Requirements 8-3
8.4.1.1 Hazardous Waste Management 8-3
8.4.1.2 Air Emissions 8-3
8.4.1.3 SWPPP 8-3
8.4.1.4 Base Approvals 8-3
8.4.2 Excavation Activities 8-3
8.4.2.1 Excavation Management Plan 8-4
8.4.2.2 Fugitive Dust 8-4
8.4.2.3 Floodplains and Wetlands 8-4
8.4.2.4 Endangered Species and Migratory Birds 8-4
8.4.2.5 Worker Health and Safety 8-5
8.5 RELEASE PREVENTION, RESPONSE, AND REPORTING 8-5
8.5.1 Spill Prevention 8-5
8.5.2 Spill Response 8-5
8.5.3 Spill/Release Reporting 8-6
8.6 PROJECT AND PERSONNEL REQUIREMENTS 8-7
8.6.1 Personnel Training/Certification Requirements 8-7
8.6.2 Inspection and Audit Procedures 8-8
8.6.2.1 Inspections by TtEC Personnel 8-8
8.6.2.2 Inspections by Regulatory Agencies 8-8
8.6.2.3 Designated Representative for Inspections by Regulatory Agencies 8-8
8.6.3 Inspections by Non-regulatory Third Parties 8-8
8.7 DOCUMENTATION AND RECORDS RETENTION ..... 8-8~~8-9~~
8.8 UPDATING THE EPP 8-9

9.0 PROJECT MANAGEMENT PLAN 9-1
9.1 PROJECT SCHEDULE 9-1
9.2 PROJECT RESPONSIBILITIES 9-1

TABLE OF CONTENTS
(Continued)

PAGE

9.3 DATA MANAGEMENT 9-4
9.4 DOCUMENT CONTROL ..... 9-4~~9-5~~
9.5 MEETINGS AND REPORTS 9-5

10.0 COMMUNITY RELATIONS ACTIVITY 10-1
10.1 PUBLIC INFORMATION 10-1
10.2 PUBLIC PARTICIPATION 10-1

11.0 REFERENCES 11-1

APPENDICES

Appendix A Sampling and Analysis Plan

Appendix B Project Contractor Quality Control Plan Addendum

Appendix C Stormwater Pollution Prevention Plan

Appendix D Response to Comments on Draft Project Work Plan
Revision 0, February 25, 2005
PCB Hot Spot Soil Excavation Site

LIST OF TABLES

Table 3-1	Chemical Cleanup Goals
Table 3-2	Radiological Remedial Objectives
Table 4-1	Materials and Equipment Surface Contamination Limits
Table 4-2	Instrumentation for Radiological Surveys
Table 4-3	On-site Laboratory Instrumentation
Table 4-4	Derived Airborne Concentration
Table 8-1	Threatened and Endangered Species at or Near HPS

LIST OF FIGURES

Figure 1-1	Hunters Point Shipyard and PCB Hot Spot Soil Excavation Site – Location Map
Figure 2-1	PCB Hot Spot Soil Excavation, PCB, TPH, Metals and Sandblast Grit Historical Data Location Map
Figure 5-1	PCB Hot Spot – Existing Conditions Site Plan
Figure 5-2	PCB Hot Spot Pre-excavation Characterization Sampling Plan
Figure 5-3	PCB Hot Spot – Site Layout
Figure 5-4	PCB Hot Spots within the IR-02 Northwest and Central Excavation Site
Figure 5-5	Decision Flow Chart, Buried Drums, Bottles, Jars and Containers with Unknown Content
Figure 6-1	PCB Hot Spot – Truck Traffic Route Map
Figure 9-1	Project Schedule
Figure 9-2	Project Organization Chart

ABBREVIATIONS AND ACRONYMS

μCi/mL	microcuries per milliter
μR/hr	microroentgen per hour
α	alpha
β	beta
γ	gamma
AEC	Atomic Energy Commission
AHA	Activity Hazard Analysis
ALARA	as low as reasonably achievable
AM	Action Memorandum
ARAR	applicable or relevant and appropriate requirement
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
bgs	below ground surface
BMP	Best Management Practice
Cal/EPA	California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
CalTrans	California Department of Transportation
CCR	California Code of Regulations
CDFG	California Department of Fish and Game
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CHP	Certified Health Physicist
cm	centimeter
cm^2	square centimeters
cm/s	centimeters per second
COC	chemical of concern
cpm	counts per minute
CQC	Contractor Quality Control
^{137}Cs	cesium-137
CSO	Caretaker Site Office
CTO	Contract Task Order
Cu	copper

ABBREVIATIONS AND ACRONYMS
(Continued)

DAC	derived airborne concentration
DCGL	derived concentration guideline level
DoD	Department of Defense
DON	Department of the Navy
DOT	Department of Transportation
DPH	Department of Public Health
dpm	disintegrations per minute
DTSC	Department of Toxic Substances Control
DWR	Department of Water Resources
EMI	electromagnetic instrument
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
ESA	Endangered Species Act
FID	flame ionization detector
g/cm^3	grams per cubic centimeters
GM	Geiger-Mueller
GPR	ground-penetrating radar
GPS	global positioning system
HazCat	Hazardous Categorization
HDPE	high-density polyethylene
Hg	mercury
HPS	Hunters Point Shipyard
HRA	Historical Radiological Assessment
HSP	Base-wide Health and Safety Plan
IR	Installation Restoration
IRP	Installation Restoration Program
ISO	International Organization for Standardization
IT	International Technology Corporation
keV	kilo-electron volts
LDR	land disposal restriction
LLMW	low-level mixed waste
LLRW	Low-level Radioactive Waste

ABBREVIATIONS AND ACRONYMS
(Continued)

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
MDER	minimum detectable exposure rate
MeV	mega-electron volts
mg/kg	milligrams per kilogram
min	minute
mL	milliters
mR/hr	milliroentgen per hour
msl	mean sea level
N/A	not applicable
NaI	sodium iodide
NVLAP	National Voluntary Laboratory Accreditation Program
NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSEA	Naval Sea Systems Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NIOSH	National Institute for Occupational Safety and Health
NIST	National Institute of Standards and Technology
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
NWT	New World Technology, Inc.
OSHA	Occupational Safety and Health Administration
PAH	polynuclear aromatic hydrocarbon
Pb	lead
PCB	polychlorinated biphenyl
PCB Hot Spot	PCB Hot Spot Soil Excavation Site
pCi/g	picocuries per gram
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million

ABBREVIATIONS AND ACRONYMS
(Continued)

PQCM	Project Quality Control Manager
PRG	Preliminary Remediation Goal
psi	pounds per square inch
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
^{226}Ra	radium-226
RAB	Restoration Advisory Board
RAO	Removal Action Objective
RASO	Radiological Affairs Support Office
RCRA	Resource Conservation and Recovery Act
RCT	Radiological Control Technician
RI	Remedial Investigation
ROC	radionuclide of concern
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RRO	radiological remedial objective
RSO	Radiation Safety Officer
RSOR	Radiation Safety Office Representative
RTM	Radiological Task Manager
RWP	Radiation Work Permit
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCA	single-channel analyzer
SDGI	Standard Data Gaps Investigation
SHSP	Site-Specific Health and Safety Plan
SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
^{90}Sr	strontium-90
STLC	Soluble Threshold Limit Concentration
SVOC	semivolatile organic compound

ABBREVIATIONS AND ACRONYMS
(Continued)

SWPPP	Stormwater Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TCP	Traffic Control Plan
TCRA	time-critical removal action
TPH	total petroleum hydrocarbons
Triple A	Triple A Machine Shop, Inc.
TSCA	Toxic Substances Control Act
TSDF	treatment, storage, and disposal facility
TtEMI	Tetra Tech EM, Inc.
TtEC	Tetra Tech EC, Inc.
TtFW	Tetra Tech FW, Inc.
TTLC	Total Threshold Limit Concentration
USC	United States Code
UXO	unexploded ordnance
VOC	volatile organic compound
WB	California Water Board
WET	Waste Extraction Test
WMP	Waste Management Plan
Zn	zinc
ZOI	zone of interest

EXECUTIVE SUMMARY

This Project Work Plan describes the scope of a time-critical removal action for the Polychlorinated Biphenyl Hot Spot Soil Excavation Site, located primarily within Parcel E-2, with a small section of the excavation in Parcel E, at Hunters Point Shipyard, San Francisco, California. The Department of the Navy, Southwest Division, Naval Facilities Engineering Command, is directing this removal action in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and the National Oil and Hazardous Substances Pollution Contingency Plan. Upon review of the site's operational history, the *Final Historical Radiological Assessment, Volume II* (Naval Sea Systems Command, 2004), and the results gathered during the sediment and soil data gaps investigation (Tetra Tech EM, Inc., 2005), the Department of the Navy has determined that this site contains polychlorinated biphenyl and petroleum hydrocarbons requiring a response action. The site is located within a radiologically impacted area and may also contain radioactive contamination in soils and debris. The decision to undertake a time-critical removal action is documented in the *Draft Action Memorandum Time-Critical Removal Action for the PCB Hotspot Area at Parcels E and E-2* (Department of the Navy, 2005) and the *Final Basewide Radiological Removal Action, Action Memorandum for Hunters Point Shipyard* (Department of the Navy, 2001a).

The Department of the Navy has initiated this time-critical removal action with the following Removal Action Objectives:

- To limit human and ecological (terrestrial and aquatic) receptor exposure to polychlorinated biphenyl contamination that poses a potential risk by breaking the potential pathway from contaminants in the soil to the receptor
- To excavate soils containing polychlorinated biphenyl concentrations greater than 1 milligram per kilogram, total petroleum hydrocarbons concentrations greater than 3,500 milligrams per kilogram, or radioactive contaminants above the radiological remedial objectives within the proposed lateral excavation boundary to a depth of 3 feet below ground surface, as stated in the *Draft Action Memorandum Time-Critical Removal Action for the PCB Hotspot Area at Parcels E and E-2* (Department of the Navy, 2005)
- To remove free-phase total petroleum hydrocarbons to the extent practical
- To continue excavating the excavation bottom within the proposed lateral excavation boundary to an estimated maximum depth of 10 feet below ground surface, if post-excavation samples indicate polychlorinated biphenyl concentrations greater than 100 milligrams per kilogram, total petroleum hydrocarbon concentrations greater than 3,500 milligrams per kilogram, visual petroleum hydrocarbon-contaminated soil is found or radiological screening identifies an area with radioactive materials above the radiological remedial objectives

- To continue excavating the excavation sidewalls if post-excavation samples indicate polychlorinated biphenyl concentrations greater than 1 milligram per kilogram, total petroleum hydrocarbon concentrations greater than 3,500 milligrams per kilogram, visual petroleum hydrocarbon-contaminated soil is found or radiological screening identifies an area with radioactive materials above the radiological remedial objectives

In addition, to meet the Remedial Action Objectives above, the excavation will be extended deeper if historical data from previous borings indicates that polychlorinated biphenyl concentrations or total petroleum hydrocarbon concentrations are above the cleanup goal and/or sandblast grit is present at depth.

The *Final Historical Radiological Assessment Volume II* (Naval Sea Systems Command, 2004) listed cesium-137, radium-226 and strontium-90 as radionuclides of concern for these sites. All radioactive materials encountered during the removal action will be remediated for disposal as radioactive waste. The radiological surveying and characterization sampling under this time-critical removal action will be conducted in accordance with the *Base-wide Radiological Work Plan* (Tetra Tech FW, Inc., 2005a) following guidance from the *Multi-Agency Radiation Survey and Site Investigation Manual, NUREG-1575* (Department of Defense et al., 2000).

The Department of the Navy will submit all necessary notifications prior to mobilization. Because this removal action is being performed in accordance with Section 121(e) of the Comprehensive Environmental Response, Compensation, and Liability Act and to support a time-critical removal action, no local permits are necessary. However, all substantive requirements will be met.

Before field activities start, a qualified Wildlife Biologist will conduct an environmental resources survey to ensure that no special-status species are residing within the boundary of the project site.

Mobilization activities will include site preparation, moving equipment and materials to the site, establishing a laydown area, installing security fencing and stormwater runoff controls, and protection or proper destruction of groundwater monitoring wells and piezometers within the excavation footprint. Vegetation in the Polychlorinated Biphenyl Hot Spot Soil Excavation Area will be cleared and grubbed. A pre-excavation topographical survey will be conducted after the vegetation is cleared to establish a grid system at the site. A geophysical survey will be performed over the entire footprint of the excavation site prior to performing intrusive work to identify any existing subsurface utilities. Prior to mobilizing the excavation equipment, a radiological surface survey will be conducted within the fenced area of the excavation site. Radioactive materials located during the surface survey within the excavation area will be removed. Pre-excavation characterization activities will further delineate the lateral boundary of the excavation. The proposed excavation boundary for the Polychlorinated Biphenyl Hot Spot

Soil Excavation Site will encompass an area of approximately 3.01 acres. Soil samples (via hand-augering) at zero to 6 inches and at 30 to 36 inches below ground surface will be analyzed for polychlorinated biphenyls, total petroleum hydrocarbons and radionuclides of concern at pre-selected locations to determine the lateral extent of contamination.

The approach for remediating the site is to excavate unsaturated soil in 12-inch lifts. Prior to removing each 12-inch lift, successive radiological surface surveys will be conducted followed by removal of radioactive materials to the extent practical. Saturated materials will not be surveyed in situ.

If free-phase product is encountered during excavation activities, absorbent booms and/or pads will be used to collect the majority of the free-phase product to the extent practical. Contaminated groundwater will not be collected. Large-size debris will be segregated from the soil, moved to a screening pad, and screened for radiological contamination to ensure proper disposal. Removed soil will be placed on dewatering pads, spread out in 12-inch lifts, and allowed to dewater. Once dewatered, the soil will be processed through a conveyor system equipped with an array of beta/gamma detectors, which will allow for identification of any subsurface radiological contaminants not detected during the in situ radiological surveys. Soil determined to be free of radiological contaminants will be placed into stockpiles. The total in-place volume of soil processed using this approach is expected to be approximately 31,000 cubic yards. Stockpiles containing Toxic Substances Control Act and Resource Conservation and Recovery Act hazardous waste will be segregated if hazardous waste is identified during soil stockpile characterization activities.

Radioactively contaminated material (debris, excavated soils including mixed wastes) exhibiting concentrations above the radiological remediation objectives will be processed as radioactive or mixed waste and separated out in clearly labeled containers. Radioactive and mixed waste will be properly stored on site pending packaging, transportation, and disposal by an Army contractor in compliance with the Department of the Navy Low-level Radioactive Waste Disposal Program. Sampled and surveyed soils that do not exhibit radioactivity at concentrations greater than the radiological remediation objectives will be stockpiled and characterized for disposal.

Following completion of excavation activities, the excavation's bottom and sidewalls will be sampled and analyzed for polychlorinated biphenyls, total petroleum hydrocarbons and radionuclides of concern. In addition, soil samples collected along the perimeter will also be analyzed for pesticides, Title 22 metals and polynuclear aromatic hydrocarbons. Polynuclear aromatic hydrocarbons will be analyzed only if total petroleum hydrocarbons are confirmed in the sample. If post-excavation samples from the excavation bottom indicate polychlorinated biphenyl concentrations greater than 100 milligrams per kilogram, radioactive material exceeding the radiological remedial objectives, and/or total petroleum hydrocarbon

concentrations greater than 3,500 milligrams per kilogram, additional excavation will be performed up to an estimated maximum depth of 10 feet below ground surface.

If post-excavation samples from the excavation sidewalls indicate polychlorinated biphenyl concentrations greater than 1 milligram per kilogram, radiological materials exceeding the radiological remedial objectives, and/or total petroleum hydrocarbon concentrations exceeding 3,500 milligrams per kilogram, additional lateral excavation will be performed.

Prior to backfilling, a topographical survey of the sidewalls and excavation bottom will be conducted. In addition, the excavated area will be lined with a geotextile fabric to demarcate the removal limits. Fill imported from the existing Bay Area Rapid Transit pile or clean import fill will be used to create the required 3-foot barrier and bring the site to final grade.

The results of the removal action will be documented in a Removal Action Completion Report and provided to the responsible regulatory agencies and the Restoration Advisory Board.

1.0 INTRODUCTION

This Project Work Plan (Work Plan) describes the scope of a time-critical removal action (TCRA) for the Polychlorinated Biphenyl (PCB) Hot Spot Soil Excavation Site (PCB Hot Spot), located primarily in Parcel E-2, with a portion of the excavation in Parcel E, at Hunters Point Shipyard (HPS), San Francisco, California (Figure 1-1). The Department of the Navy (DON), Southwest Division, Naval Facilities Engineering Command (NFECSW), including the Radiological Affairs Support Office (RASO), is directing this removal action. The removal action is being performed under Contract No. N68711-93-D5713 and Contract Task Order (CTO) No. 0084.

This removal action is being conducted in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The DON will submit all necessary notifications prior to mobilization. Because this removal action is being performed in accordance with Section 121(e) of the CERCLA and to support a TCRA, no local permits are necessary. However, all substantive requirements will be met.

Based on the results gathered during the sediment and soil data gaps investigation [Tetra Tech EM, Inc. (TtEMI), 2005], the DON has determined that this site contains PCBs and petroleum hydrocarbons requiring a response action. *The Final Historical Radiological Assessment, Volume II* (HRA) also identifies that the site is radiologically impacted [Naval Sea Systems Command (NAVSEA), 2004].

The DON has initiated a TCRA for the extraction of soils containing PCB concentrations greater than 1 milligram per kilogram (mg/kg) in the upper 3 feet of soil or greater than 100 mg/kg below 3 feet, total petroleum hydrocarbons (TPH) greater than 3,500 mg/kg, or any radioactive contaminants above radiological remedial objectives (RROs) that may be present in the PCB Hot Spot. This TCRA will serve to eliminate the potential threat posed by future migration and/or off-site release of these contaminants. Currently, such a release could occur as a result of erosion, weathering, seismic events, or biological activity. The planned removal action at PCB Hot Spot incorporates a series of preliminary surveys, in situ radiological surveys, pre-excavation characterization sampling, protection or removal of existing site features, excavation of PCB, petroleum hydrocarbon, and/or radioactive contaminated soil and debris, ex situ screening of excavated soils and debris, post-excavation sampling, backfilling of the excavated area, site restoration, and waste management. The proposed excavation boundary for PCB Hot Spot will be further delineated following pre-excavation characterization sampling.

The HRA (NAVSEA, 2004) listed cesium-137 (^{137}Cs), radium-226 (^{226}Ra) and strontium-90 (^{90}Sr) as radionuclides of concern (ROCs) for this site. All radioactive materials encountered during the removal action that are above the RROs will be remediated for disposal as radioactive or mixed waste. The radiological surveying and characterization sampling under this TCRA will be conducted in accordance with the *Base-wide Radiological Work Plan* (Base-wide Plan) [Tetra Tech FW, Inc. (TtFW), 2005a] following guidance from the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) NUREG-1575 [Department of Defense (DoD) et al., 2000].

This removal action is being conducted pursuant to the Draft Action Memorandum (AM) for PCB Hot Spot Area at Parcels E and E-2 (referred to hereafter as the Draft AM for PCB Hot Spot) (DON, 2005) and the Final Basewide Radiological Removal Action AM, (referred to hereafter as the Final Basewide AM) (DON, 2001a) and will document for the Administrative Record the DON's decision to undertake a TCRA at this site due to PCBs, petroleum hydrocarbons and possible radioactive contamination in soils and debris.

This Work Plan describes the scope of the TCRA for the PCB Hot Spot and details the specific activities involved in implementation of the planned removal action. If additional risks such as other chemicals of concern (COCs) and/or landfill gases are discovered after the removal action has started, further evaluations will be completed to determine the appropriate health and safety controls.

1.1 SCOPE OF WORK

The scope of the planned removal action consists of three elements, including Work Plan development, removal action implementation, and post-construction activities, all of which must be facilitated to accomplish the complete removal of impacted soils and debris at this site. The Work Plan was prepared based on recommendations presented in the Draft AM for PCB Hot Spot (DON, 2005) and the Final Basewide AM (DON, 2001a), and includes a review of background information, such as that documented in the Parcels E and E-2 Standard Data Gaps Investigation Summary Report (SDGI) (TtEMI, 2005). Radiological Controls, a Traffic Control Plan (TCP), a Waste Management Plan (WMP), an Environmental Protection Plan (EPP), a Project Management Plan, and a construction schedule are included as a part of this Work Plan. The Work Plan is also supported by four appendices, including a Sampling and Analysis Plan (SAP) that details chemical and radiological data acquisition (Appendix A), a Project Contractor Quality Control (CQC) Plan Addendum (Appendix B), a Stormwater Pollution Prevention Plan (SWPPP) (Appendix C), and Response to Comments on the Draft Project Work Plan (Appendix D). A Site-Specific Health and Safety Plan (SHSP) and a Transportation and Disposal Plan have been prepared under separate covers.

Following approval of the Work Plan, Tetra Tech EC, Inc. (TtEC) will proceed with implementation of the removal action in accordance with the measures and procedures described in the Work Plan, applicable design criteria, Removal Action Objectives (RAOs), and regulatory requirements. Pre-construction activities, such as notifications and procurement, will be performed as a part of field implementation planning. Subsequently, field personnel and equipment will be mobilized to the site. The major field activities associated with the TCRA include clearing of vegetation, in situ radiological surveys, pre-excavation characterization sampling, protection or removal of existing site features, soil and debris excavation, ex situ screening, segregation of contaminated soil and debris, stockpiling of excavated soil and debris, post-excavation sampling, backfill placement and compaction with import materials, site restoration, waste classification, storage and disposal. Field activities will be completed upon decontamination and demobilization of all project equipment and personnel.

Post-construction activities will be performed following completion of the removal action. A Removal Action Completion Report will be prepared to document the information necessary to demonstrate that the fieldwork has resulted in completion of the RAOs.

1.2 PROJECT WORK PLAN ORGANIZATION

This Work Plan has been structured to provide details on the major aspects of the planned removal action. The remainder of this Work Plan is divided into eleven sections. Section 2.0 provides a discussion on the background and past operational history of the site, the physical and geological/hydrogeological setting of the site, and the results of previous investigations conducted at the site. The regulatory framework, applicable or relevant and appropriate requirements (ARARs), and RAOs are presented in Section 3.0. Radiological controls are located in Section 4.0 and provides a description of the radiological safety practices that will be implemented throughout the various stages of work to be performed. Section 5.0 includes a detailed description of the different tasks associated with implementation of the removal action. The TCP, WMP, and EPP are included as Sections 6.0, 7.0, and 8.0, respectively. A Project Management Plan, which includes the project schedule, is discussed in Section 9.0. Section 10.0 describes the community relation activities to be implemented during the course of this project. References are provided in Section 11.0.

1.3 SITE SAFETY

Occupational Safety and Health Administration (OSHA) excavation regulations and permit requirements will be followed. All excavations will be conducted in accordance with California Health and Safety Code, California Code of Regulations (CCR) Title 8, Sections 1539 through 1541, and 29 Code of Federal Regulations (CFR), Parts 1910 and 1926, requirements. All field activities will be conducted in accordance with the SHSP, which will be prepared as a stand-alone document.

If at any time during project activities unexploded ordinance (UXO) or suspected UXO is encountered , the UXO Specialist will be notified. Any subsequent actions in the area will be completed in accordance with the approved Work Instruction, Munitions and Explosives of Concern, Munitions Constituents and Munitions Debris Recovery, Storage, and Disposition, and associated Activity Hazard Analyses (AHAs).

1.4 RADIOLOGICAL CONTROL PRACTICES

Radiological control measures will be implemented by New World Technology, Inc. (NWT), a radiation protection subcontractor with a Nuclear Regulatory Commission (NRC) Type A Broad Scope License. TtEC will ensure that the radiological control program and work practices are implemented and performed in accordance with acceptable industry standards and NTW's NRC license requirements.

2.0 SITE CONDITIONS AND BACKGROUND

Presented in this section is site-specific information on geology, hydrology, the nature and extent of contamination, and applicable health risks.

2.1 SITE DESCRIPTION AND HISTORY

HPS is located in the City and County of San Francisco, California, on a long promontory in the southeastern part of San Francisco that extends east into San Francisco Bay (Bay). HPS encompasses 848 acres, including 416 acres on land. The land portion of HPS was purchased by the DON in 1939 and leased to Bethlehem Steel Corporation. At the start of World War II in 1941, the DON took possession of the property and operated it as a shipbuilding, repair, and maintenance facility until 1974. The DON deactivated HPS in 1974. From 1976 to 1986, the DON leased HPS to Triple A Machine Shop, Inc. (Triple A), a private ship repair company. In 1986, Triple A ceased operations at HPS and the DON resumed occupancy through 1989.

Because previous shipyard operations left hazardous materials on-site, HPS was placed on the National Priorities List in 1989 as a Superfund site pursuant to CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986. HPS then came under the administrative jurisdiction of the Treasure Island Naval Station in April 1990.

In 1991, HPS was placed on the Navy's Base Realignment and Closure list and its mission as a Navy shipyard ended in April 1994. Closure activities at HPS involve environmental remediation activities and making the property available for non-defense use. On March 31, 1994, control of HPS was transferred from the Treasure Island Naval Station to the Naval Facilities Engineering Command, Western Division (now Engineering Field Activity West) in San Bruno, California. In October 1999, NAVFAC SW assumed management of HPS.

HPS was divided into six parcels, Parcels A through F. In November 2004, Parcel A was transferred to the City and County of San Francisco. In 2004, the DON subdivided Parcel E, creating Parcel E-2 in order to move the Industrial Landfill forward under the CERCLA process. Parcel E-2, 47 acres in size, encompasses former portions of Parcel E, including IR-01/21, the Panhandle Area, parts of IR-02 Northwest and the area east of IR-01/21 that does not have an Installation Restoration (IR) site designation. Parcel E, a majority of which is unpaved and formerly used for industrial support, now occupies 138 acres along the upland shoreline in the southwestern portion of HPS.

The activities governed by this TCRA deal specifically with PCB Hot Spot, located primarily within Parcel E-2, with a small section in Parcel E, as shown in Figure 1-1. PCB Hot Spot covers approximately 3.0 along the shoreline. The DON created this land area by filling in the Bay margin, largely with soils derived from serpentinite bedrock quarried from the Hunters Point

peninsula. After the area was filled, the area to the north of PCB Hot Spot was used as an industrial waste landfill. The suspected source of PCBs is disposal of waste oils that contained PCBs.

Radioactive contamination was introduced to the site through the inadvertent disposition of radioluminescent devices containing ^{226}Ra and ^{90}Sr with other shipyard fill material. This was a common practice throughout the military and private industry from the 1940s to the 1960s. The radionuclides ^{137}Cs and ^{90}Sr may be encountered in contaminated sandblast grit, as well as other media besides sandblast grit. HPS used sandblast grit to decontaminate ships that were involved in atomic weapons testing and may have disposed of some of the grit at PCB Hot Spot area (NAVSEA, 2004).

Along the western portion of PCB Hot Spot, an 800-foot-long sheet pile barrier was constructed between the landfill area and the shoreline of the Bay in 1997. The barrier was constructed to intercept an identified contaminated groundwater plume originating from the landfill and flowing in the direction of the Bay. The main chemical of concern within the plume was PCBs, though volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and petroleum hydrocarbons were also present. To prevent excessive buildup of groundwater behind the wall, a groundwater extraction system was installed between December 1997 and May 1998. The system was shut down in mid April 2005 in preparation for the PCB Hot Spot fieldwork.

2.2 PHYSICAL CHARACTERISTICS

The topography of PCB Hot Spot is relatively bare and flat, with surface elevations of generally less than 10 feet above mean sea level (msl). The shoreline area generally consists of riprap containing rock, concrete, and other debris, with relatively sharp slopes to the bay as well as mudflats and sandy beaches. Groundwater is located at approximately zero to 2 feet above msl [8 to 11 feet below ground surface (bgs)], with a gradient generally to the west toward the Bay.

2.2.1 Geologic Setting

The geologic units within the project area, from the surface downward, consist of artificial fill (Qaf), undifferentiated upper sand deposits (Quus), Bay Mud deposits (Qbm), undifferentiated sedimentary deposits (Qu), and Franciscan complex bedrock (KJfm). The artificial fill ranges in thickness from approximately 3 to 22 feet and consists of predominantly dark grayish-brown to light olive-brown silty sand with gravel. Landfill debris has been encountered within the artificial fill. The undifferentiated upper sand deposits consist of yellowish-brown sand with clay and are approximately 4 feet thick. The Bay Mud deposits consist of predominantly dark gray to dark greenish-gray fat clay, with varying proportions of sand and/or silt (5 to 15 percent) and trace amounts of shell fragments. This stratigraphic unit ranges in thickness from approximately 1 to 41 feet and in elevation from -5 to 6 feet above msl and appears to increase from the southeast toward the northwest. The bedrock surface, which dips from the northeast to the southwest

toward the Bay, is estimated to exist at depths ranging from approximately 200 to greater than 250 feet below msl.

2.2.2 Hydrogeologic Setting

From the surface downward, the hydrogeologic units within the project area consist of the A-aquifer, Bay Mud aquitard, B-aquifer, and bedrock water-bearing zone. The A-aquifer consists of artificial fill and undifferentiated upper sand deposits. Based on groundwater data, the saturated thickness of the A-aquifer is approximately 4 to 7 feet. The Bay Mud aquitard appears to be laterally continuous beneath the site. The B-aquifer consists of undifferentiated sedimentary deposits. Based on groundwater data, the estimated saturated thickness of the B-aquifer is approximately 247 feet. Because bedrock was not encountered during drilling near the PCB Hot Spot, the composition of the bedrock water-bearing zone is unknown. However, this hydrogeologic unit is estimated to occur at depths ranging from approximately 200 to greater than 250 feet below msl.

The groundwater elevations in the A-aquifer have been found to range from approximately 8 to 11 feet bgs during the wet (December to April) and dry seasons (August to November). The A-aquifer is under unconfined conditions. The groundwater elevation in a single monitoring well installed in the B-aquifer near the PCB Hot Spot has ranged from approximately 8 to 9 feet bgs. The results of the 1992 and 1996 tidal influence studies indicate that the groundwater elevations in the A-aquifer within approximately 300 feet of the shoreline are influenced by the tidal fluctuations of the Bay.

Groundwater in the A-aquifer flows predominantly to the southwest, toward the Bay, with hydraulic gradients ranging from 0.001 to 0.04 during the wet and dry seasons, and from 0.003 to 0.04 during the transition period (May).

2.3 CHEMICAL AND RADIOLOGICAL CHARACTERISTICS

The following summary of the nature and extent of contamination within the PCB Hot Spot is based on the results of the SDGI (TtEMI, 2005) and the HRA (NAVSEA,2004).

2.3.1 Chemical Characterization

From September 2002 to February 2003, the SDGI (TtEMI, 2005) was conducted in support of a revised Remedial Investigation (RI) and Feasibility Study for Parcel E (Tetra Tech, Levine-Fricke-Recon, and Uribe & Associates, 1997). Figure 2-1 shows PCB and TPH concentration results from the RI and the SDGI sampling events, in mg/kg, for borings drilled within or near the PCB Hot Spot that were analyzed for PCBs. A total of 223 samples were collected and analyzed for PCBs at various depths from the 111 borings shown in Figure 2-1. Of the 223 samples, 114 had PCB concentrations greater than 1 mg/kg. PCB concentrations were

determined by addition of all known aroclor data ranging from 1016 to 1260 for each sampling location; however, the predominant PCB compound present was Aroclor 1260. In addition to PCB data, selected historical data for the following parameters are also shown on Figure 2-1:

- Total TPH (the sum of available analytical data for gasoline range, diesel range, and motor oil range petroleum hydrocarbons)
- Copper (Cu), lead (Pb), mercury (Hg), and zinc (Zn) when concentrations exceeded 10,000 mg/kg (as an indicator or possible sandblast grit locations)
- Sandblast grit locations noted in historical data boring logs (R&M Environmental and Infrastructure Engineering, Inc., 2003)

As described in Section 5-13, these data will be used to assess areas within the excavation footprint that may be extended below 3 feet bgs.

2.3.2 Radiological Characterization

Previous radiological investigations have identified radioactive materials in Parcels E and E-2. Examples of radioactive materials expected to be encountered in the project area are radioluminescent devices, such as gauges and dials that contain paint mixed with ^{226}Ra and ship's deck markers containing ^{226}Ra or ^{90}Sr that were disposed of in the project area by the DON. Another isotope that has been identified is ^{137}Cs, which may have been introduced to the site during disposal of residue from the decontamination of ships that participated in atomic weapons testing.

2.4 FUTURE SITE USE

The PCB Hot Spot and the immediately surrounding area are designated in the City's reuse plan as open space.

3.0 REGULATORY FRAMEWORK

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

3.1 REGULATORY PROCESS

A TCRA is defined as an action where, based on an evaluation of the site, the EPA determines that less than 6 months is available before site activities must be initiated. The TCRA is generally conducted as an interim action prior to a Feasibility Study and Record of Decision for a site.

The DON is directing this removal action under the DoD IRP in accordance with requirements of the CERCLA and the NCP. This TCRA is being conducted in accordance with the Final Basewide AM (DON, 2001a).

EPA, DTSC, RWQCB, and the Department of Health Services have all provided input to the DON, which serves as the lead agency for the cleanup. Input is provided through the Base Cleanup Team meetings, as well as through comments to this Work Plan. The agencies are responsible for ensuring that the cleanup proceeds in accordance with the substantive requirements of the applicable regulations. The agencies are also involved to the extent that, the City of San Francisco will only accept conveyance following certification that the land is clean and safe for development by the EPA, DTSC, RWQCB, and an independent City consultant.

The TCRA for PCB Hot Spot will be conducted pursuant to CERCLA and the NCP under the delegated authority of the Office of the President of the United States by Executive Order 12580. In accordance with Section 300.415(b) of the NCP, the Final Basewide AM (DON, 2001a) and the Draft AM for PCB Hot Spot (DON, 2005) have been presented by the DON for this TCRA. Upon concurrence by the regulatory agencies, the AMs (DON, 2001a; DON, 2005) will be included in the Administrative Record for HPS.

Field activities of the removal action, including site restoration, required in order to address PCB and TPH contamination and potential radiological impacts within the PCB Hot Spot, are expected to be completed within 120 days following approval of the Work Plan. Upon completion of the TCRA, TtFW will proceed with the preparation of the Removal Action Completion Report.

3.2 REMOVAL ACTION OBJECTIVES

Consistent with the NCP requirements in Title 40 CFR, Part 300.415(b)(2), the RAOs for this TCRA are to implement the AMs and protect public health and welfare and the environment by physically removing and disposing of PCBs, petroleum hydrocarbons and incidental radioactive materials that exceed the values presented in Tables 3-1 and 3-2. This prevents potential migration of PCBs, petroleum hydrocarbons and radioactive materials within or outside of the site. Meeting the currently specified chemical cleanup goals and RROs for PCB, petroleum hydrocarbon, and radioactive contamination within the PCB Hot Spot area is the purpose of this TCRA. Any remaining chemical contamination, including remaining PCB contamination, at the site will be addressed through the IRP process, consistent with CERCLA and the NCP.

3.3 ANTICIPATED WASTE STREAMS

Generation of several potential waste streams is anticipated from the site activities at the PCB Hot Spot. Non-radiological wastes that are anticipated to be generated may include, but not be limited to the following:

- Soil/sediment
- Debris
- Materials
- Waste liquids

Radioactive or mixed wastes that are anticipated to be produced, may include, but not be limited to:

- Point sources
- Soil/sediment
- Debris
- Materials
- Waste liquids

Waste management activities are described in the WMP provided in Section 7.0 of this Work Plan. The WMP has been prepared to address management, transportation, and disposal of the aforementioned waste streams.

3.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Section 121(d) of CERCLA 1980 [CERCLA, 42 United States Code (USC), Section 9621(d)], as amended, states that remedial actions at CERCLA sites must attain (or the decision document must justify the waiver of) any federal or more stringent state environmental standards, requirements, criteria, or limitations determined to be legally applicable or relevant and

appropriate. Although Section 121 of CERCLA does not itself expressly require that CERCLA removal actions comply with ARARs, the EPA has promulgated a requirement in the NCP mandating that CERCLA removal actions ". . . shall, to the extent practicable considering the exigencies of the situation, attain ARARs under federal environmental or state environmental or facility siting laws" [Title 40 CFR, Part 300.415(j)]. It is DON policy to follow this requirement. Certain specified waivers may be used for removal actions, as is the case with remedial actions.

In accordance with the NCP requirements, the ARARs for the TCRA for PCB Hot Spot are presented in the Draft AM for PCB Hot Spot (DON, 2005) and the Final Basewide AM (DON, 2001a). A summary of the potential chemical-specific, location-specific, and action-specific ARARs identified for this removal action is as follows:

Chemical-specific ARARs

- Resource Conservation and Recovery Act (RCRA) hazardous waste identification requirements [42 USC, ch. 82, 6901-6991(I), CCR Title 22, Division 4.5, Chapter 11, Article 2, 66261.21, 66261.22 (a)(1), 66261.23, 66261.24(a)(1), and 66261.100]
- Standards Applicable to Generators of Hazardous Waste, Applicability, Pre-transport Requirements, Title 22 Division 4.5, Chapter 12, Article 1, Article 3
- Toxic Substances Control Act (TSCA) PCB regulations relating to PCB remediation waste [15 USC, ch. 53, 2601-2692, 40 CFR, Part 761.61[c]]

Location-specific ARARs

- Executive Order No. 11990, Protection of Wetlands
- Clean Water Act of 1977, as amended, Section 404 (33 USC 1344)
- Porter Cologne Water Quality Control Act, California Water Code Division 7
- San Francisco Bay Water Quality Control Plan
- Federal Coastal Zone Management Act [16 USC 1451-1464, 1456(c)(1)(A)]
- Endangered Species Act of 1973 (16 USC 1531-1543)

Action-specific ARARs

- Requirements under RCRA for disposal of hazardous waste on land (Title 22 CCR 66268.7)
- Requirements under RCRA for pre-transport (Title 22 CCR 66262.30-66262.33 and 66262.20-66262.23)
- Clean Air Act excavation requirements [42 USC 7401 et seq., Bay Area Air Quality Management District (BAAQMD) Regulations 6-301, 6-302, and 6-305, Regulation 8-40]

- Federal Hazardous Materials Transportation Law hazardous materials transportation requirements [49 USC 5101-5127, 49 CFR 171.2(f), 171.2(g), 172.300-172.304, 17.312, 172.400, 172.504]
- PCB regulations under TSCA relating to storage and disposal of PCB remediation waste (Title 40 CFR Part 761.65)
- State Water Resources Control Board Order 99-08 adopted pursuant to Title 40 CFR Part 122, Subpart G
- Storage and control of licensed material in accordance with the license for the radiological materials, 10 CFR, Part 20, Subpart I, 20.1801

3.5 CHEMICAL CLEANUP GOALS AND RADIOLOGICAL REMEDIAL OBJECTIVES

Previous investigations have identified PCBs and petroleum hydrocarbons within soil at the site. To achieve the RAOs for this project, cleanup goals of 1 mg/kg for PCBs in the upper 3 feet of soil or greater than 100 mg/kg below 3 feet, and 3,500 mg/kg for TPH. The TPH cleanup goal was established based upon agreement with the DON and RWQCB (RWQCB, 2004). The potential presence of radionuclides will be assessed during the screening activities that will be conducted as part of this TCRA. The HRA (NAVSEA, 2004) identified ^{137}Cs, ^{226}Ra, and ^{90}Sr as potential ROCs for this area of HPS. Table 3-2 provides the RROs for the ROCs. If additional radionuclides are encountered, the cleanup goals established in the Final Basewide AM (DON, 2001a) will be adopted.

4.0 RADIOLOGICAL CONTROLS

This section details specific activities and procedures that are necessary in the preparation for and field implementation of radiological practices for the planned removal action at the PCB Hot Spot.

4.1 RADIOLOGICAL HEALTH AND SAFETY

All necessary controls for radiologically safe operations will be implemented in accordance with the SHSP, NWT's license, TtFW's Standard Operating Procedures (SOP), and current health physics practices. Critical requirements include the presence of a:

- Site Health and Safety Specialist (SHSS) at active work locations to ensure implementation of the SHSP
- TtFW Radiation Safety Officer (RSO) and NWT Radiation Safety Office Representative (RSOR) to ensure compliance with NWT's NRC license.
- Radiological Task Manager (RTM) to manage implementation of the radiological aspects of this Work Plan.
- Radiological Control Technician (RCT) at active work areas to ensure compliance with the Radiation Work Permit (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 judgment of the RCT. Personal protective equipment (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 and SHSP.

4.2 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 this Work Plan.

4.3 TRAINING

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

- OSHA 40-Hour and Annual 8-Hour Refresher
- Radiation awareness training
- RWP and Work Plan training for the specific site or task

- Activity Hazard Analysis (AHA) training for the specific site or task
- SHSP training, as required by the plans.

Additional training and experience is required for personnel responsible for radiological activities.

4.4 WHOLE-BODY EXTERNAL DOSE MONITORING

To support the monitoring, tracking, and recording of occupational whole-body radiation exposure, any personnel working directly with impacted materials, including equipment operators, under this Work Plan will be issued and required to wear dosimeters. Only National Voluntary Laboratory Accreditation Program (NVLAP)-approved dosimeters from a NVLAP-certified provider will be used. Personnel issued dosimetry must complete an NRC Form 4. The original Form 4 will be maintained by the organization issuing the dosimetry with a copy or the original kept at the project field office at HPS.

4.5 RADIATION WORK PERMITS

A RWP will be prepared that will specify the radiological safety requirements for activities performed under this Work Plan. Personnel assigned to site work will be required to understand the requirements and sign the RWP prior to beginning work.

4.5.1 Purpose of the Radiation Work Permit

RWPs specify the appropriate personnel protective measures within the scope of the work based upon the radiological conditions in the area. The RWP will also address radiological conditions, work scope and limitations, radiological limitations, PPE requirements, dosimetry requirements, ALARA considerations, and specific instructions to personnel. A 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 conditions have not changed as determined by the RTM 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.

4.5.2 Development of the Radiation Work Permit

The RTM, or qualified designee, will perform, or assign a 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, etc.). 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 (kneeling on the ground, leaning against one component to work on another), and the possibility of the presence of radioactive materials.

Assessments will clearly identify the radiological hazards present in the work area. The following guidelines will be considered when performing an 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 any materials 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.

4.5.3 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.

4.5.4 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.

4.5.5 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 concurrence of the RSO. 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.

4.6 RADIOLOGICAL REMEDIAL OBJECTIVES

The RROs for the PCB Hot Spot are listed in Table 3-2. The RROs for soils are taken from EPA's (risk-based) Preliminary Remediation Goals (PRGs) or from negotiated agreements with regulators. Equipment and materials release criteria are listed in Table 4-1. Release criteria for equipment and material are adopted from the Atomic Energy Commission's (AEC's) *Regulatory Guide 1.86* (1974).

4.7 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 (QC) check. For example, in addition to indicating potential contamination, a measurement that exceeds the investigation level may indicate a failing instrument.

When determining an investigation level using a statistical-based parameter (for example, standard deviation) the following may be considered: survey objectives, underlying radionuclide distributions (for example, normal, log normal, non-parametric), data population descriptors (for example, 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.

4.7.1 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 (TtFW, 2005a).

4.7.2 Investigation Levels for Alpha and Beta Radiation Surveys

For alpha and beta surveys, the investigation level will be the derived concentration guideline level (DCGL) or a statistical-based parameter (e.g., reference area mean + 3σ), if used (TtFW, 2005a).

4.8 RADIATION DETECTION INSTRUMENTATION

In support of the radiological control objectives for this TCRA, various instruments will be used to detect the radioactive material known or suspected to be present within the PCB Hot Spot. The instruments and measurement methods selected will be able to detect the ROC or radiation types of interest, and are, in relation to the survey or analytical technique, capable of measuring levels

that are sufficient to support the data quality objectives presented in the SAP (Appendix A). Table 4-2 identifies the instrumentation that may be used for radiological surveys.

4.8.1 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.

4.8.2 Daily Performance

Prior to use of the portable survey instruments, calibration verification, physical inspection, battery check, and 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
- 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 condition has been corrected.

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.

4.8.3 Alpha/Beta Survey Instrumentation

Alpha/beta radiation measurements will be performed using a Ludlum Model 2360 data logger (or equivalent) equipped with either a Ludlum Model 43-68 gas-proportional probe (or equivalent) for scan surveys and a Ludlum Model 43-89 zinc sulfide plastic scintillation detector (or equivalent) for static measurements.

4.8.4 Gamma Survey Instrumentation

Direct measurements and scan surveys for gamma radiation will be performed using a Ludlum Model 2350-1 data logger or Model 4612 (or equivalent) equipped with a Ludlum Model 44-10 2-inch by 2-inch sodium idodine (NaI) scintillation detector (or equivalent).

4.8.5 Initial Land Surface Scan Instrumentation

Initial gamma surface surveys will be performed using a Ludlum Model 4612. The Ludlum Model 4612 features a single channel analyzer (SCA) assembly array equipped with a programmable computer that streamlines all necessary operating parameters. Up to 12 detector assemblies can be used with the instrument, each with independent high-voltage, threshold, and window parameter settings. Parameters are loaded from a built-in flash memory that initiates during the power-up sequence. The parameters also include settings for upper and lower level discriminator, count time, count time range, output time, and recycle mode or slave mode settings. When connected to a NaI detector, the instrument is capable of detecting gamma photon energies ranging from 60 kiloelectron volts (keV) to 3 mega-electron volts (MeV). The instrument will be programmed to respond to the full spectrum of gamma photon energies.

Four arrays of three Ludlum Model 44-10 2-inch by 2-inch NaI detectors, spaced 12 inches apart, will be connected to a Ludlum Model 4612 instrument and a global positioning system (GPS), which will be used to plot and correlate logged data points to specific coordinates. The detectors will be positioned so that each will be maintained a distance of 4 inches from the surface being surveyed. The instrument array will be positioned on the back of a tow vehicle so as to "follow behind" the path of the vehicle. Survey lanes will be spaced 12 inches apart.

Inaccessible areas will be scan surveyed by hand using Ludlum Model 2350-1s equipped with Ludlum Model 44-10 2-inch by 2-inch NaI detectors. If areas become inaccessible due to groundwater or other obstacles, gamma scans will not be conducted in situ.

4.8.6 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 (GM) pancake probe (or equivalent). This instrument will be used for routine surveys associated with operational aspects of decommissioning activities such as monitoring personnel and equipment exiting a radiologically controlled area.

4.8.7 Conveyor Belt Survey Instrumentation

Secondary screening conveyor system surveys will be performed using a Ludlum Model 4612. The Ludlum Model 4612 features an SCA assembly array equipped with a programmable computer that streamlines all necessary operating parameters. Up to 12 detector assemblies can be used with the instrument, each with independent high-voltage, threshold, and window parameter settings. Parameters are loaded from a built-in flash memory that initiates during the power-up sequence. The parameters also include settings for upper and lower level discriminator, count time, count time range, output time, and recycle mode or slave mode settings.

The instrument detector array designated for conveyor system operations will feature six Ludlum Model 44-10 scintillation detectors, which use a 2-inch by 2-inch NaI crystal as well as six Ludlum Model 44-40 (or equivalent) lead-shielded halogen quenched G-M pancake detectors.

Pre-operational testing will be performed on this detection system to quantify system parameters and minimum detectable concentration (MDC) calculations. The results of the testing will be forwarded to the RASO for review and approval prior to system use.

4.8.8 Exposure Rate Survey Instrumentation

Exposure rate surveys will be conducted with 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 that is integral to the meter housing.

4.9 INSTRUMENTATION EQUATIONS

The following equations are used to calculate efficiencies, MDCs, and minimum detectable count rates (MDCRs). These equations are presented in the Base-wide Plan (TtFW, 2005a), which was developed for HPS. The Base-wide Plan presents a standardized MARSSIM, NUREG-1575 (DoD et al., 2000) compliant approach for radiological surveys and remediation.

4.9.1 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 from the Base-wide Plan 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 from the Base-wide Plan

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

Where:

ε_i	=	instrument efficiency (count per particle)
R_{S+B}	=	the gross count rate of the calibration measurement (cpm)
R_B	=	the background count rate in 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. The surface emission rate of the source must then 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 ROC(s)] 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 that is the same as the detector-to-surface distance used in the field.

4.9.2 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.

Because the time a contaminated area is under the probe varies 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 from the Base-wide Plan (TtFW, 2005a):

Equation 7-2 from the Base-wide Plan

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

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 interval can be calculated by Equation 7-3 from the Base-wide Plan (TtFW, 2005a):

Equation 7-3 from the Base-wide Plan

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

Where:

13,800	=	constant factor provided in MARSSIM
t	=	time period for static count(s)
C	=	contamination guideline (dpm/100 cm^2)
A	=	physical probe area (cm^2)
E	=	detector efficiency (4π)

4.9.3 Minimum Detectable Count Rate and Minimum Detectable Concentration for Beta and Gamma 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 d') as shown in Equation 7-5 from the Base-wide Plan (TtFW, 2005a).

Equation 7-5 from the Base-wide Plan

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

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 the MARSSIM, NUREG-1575 (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 beta surveys of structure surfaces is calculated using Equation 7-6 from the Base-wide Plan (TtFW, 2005a).

Equation 7-6 from the Base-wide Plan

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

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 = active area of the detector window (cm^2)

4.9.4 Minimum Detectable Concentration for Static Alpha and Beta Counts

The static MDC is the level of radioactivity that is practically achievable by the overall measurement process. The conventional equation, Equation 7-7 from the Base-wide Plan (TtFW, 2005a) shown below, is used to calculate instrument MDC in units of dpm per 100 cm^2:

Equation 7-7 from the Base-wide Plan

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

Where:

3+4.65 = constant factor provided in MARSSIM
R_B = background count rate (cpm)
T_B = background counting time [minute (min)]
ε_i = the instrument efficiency (count per particle)
ε_s = the contaminated surface efficiency (particle per disintegration)
W_A = active area of the detector window (cm^2)

In Equation 7-7 from the Base-wide Plan (TtFW, 2005a), 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 from the Base-wide Plan (TtFW, 2005a) is used to calculate the MDC in dpm per 100 cm^2.

Equation 7-8 from the Base-wide Plan

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

Where:

3+3.29	=	constant factor provided in MARSSIM
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)

4.9.5 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, and metal. Surface conditions include both physical effects, such as scabbled concrete, and the effect of surface coatings: such as dust, paint, rust, water, or soil.

In the absence of experimentally determined surface efficiencies, ISO-7503-1 [International Organization for Standardization (ISO), 1988] and NUREG-1507 (NRC, 1997), provide conservative recommendations for surface efficiencies. ISO-7503-1 recommends a surface efficiency of 0.5 for maximum beta energies exceeding 0.5 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, 1997). NUREG-1507 provides surface efficiencies based on studies performed for the NRC. In general, NUREG-1507 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. At HPS, a surface efficiency of 0.25 will be used for alpha and beta emitters.

4.9.6 MDC for Gamma Scans of Surface Areas (2-inch by 2-inch NaI Probe)

The scan MDC [in picocuries per gram (pCi/g)] for land areas is based on the area of elevated activity, depth of contamination, and the radionuclide (energy and yield of gamma emissions). To establish the scan MDC, the relationship between the detector's net count rate to net exposure rate must be established first. This is accomplished by determining the MDCR and then applying a surveyor efficiency factor. The MDCR is calculated using Equation 7-5 from the Base-wide Plan (TtFW, 2005a) with the following variables:

d' = 3.28
b_i = 5,148 cpm / 60 seconds per minute = 514.8 counts per second
i = 6 seconds

Therefore, MDCR equals 744 cpm.

To get the $MDCR_{Surveyor}$, a surveyor efficiency factor p is applied as shown below in Equation 7-9 from the Base-wide Plan (TtFW, 2005a):

Equation 7-9 from the Base-wide Plan

$$MDCR_{Surveyor} = MDCR / \sqrt{p}$$

The $MDCR_{Surveyor}$ can then be calculated assuming a surveyor efficiency (p) of 0.7 and the observed background count rate of 5,148 cpm (taken from a non-impacted area in Parcel E) and assuming a 6-second scan observation interval as follows:

$$MDCR_{Surveyor} = \frac{MDCR}{\sqrt{p}} = \frac{744}{\sqrt{0.7}} = 889\,cpm$$

The $MDCR_{Surveyor}$ is then converted into the corresponding minimum detectable exposure rate (MDER) by use of a calibration constant specific to the detector being used and the ROC. For example, when used with the Ludlum Model 2350-1, the calibration records for the Ludlum Model 44-10 2-inch by 2-inch NaI scintillation detector provide a calibration constant that can be used to determine the ratio of cpm to microroentgen per hour (μR/hr). As shown in Equation 7-10 from the Base-wide Plan (TtFW, 2005a), a dose rate can be calculated for a given count rate and vice versa.

Equation 7-10 from the Base-wide Plan

$$MDER\ (\mu R / hr) = \frac{MDCR_{Surveyor} * 6 \times 10^7}{cc}$$

Where:

$MDCR_{Surveyor}$ = 889 cpm (calculated in Equation 7-9)
cc = calibration constant = 5.81 x 10^{10} counts/R (average)
$6x10^7$ = a conversion factor accounting for differences in time and activity units [(μR-min)/(R-hr)]
$MDER$ = 0.92 μR/hr

Next, the relationship between the radionuclide concentration and exposure rate is established. This is accomplished by modeling (using Microshield™) to determine the net exposure rate produced by the radionuclide at a distance above the ground. The factors considered in modeling include:

- The dose point of 10 cm (4 inches) above the soil
- The density of material in grams per cubic centimeter (g/cm^3)
- DCGL of the ROC in pCi/g
- The depth of detection for the DCGL
- The circular dimension of the cylindrical area of detector capability [square meters (m^2)]

The concentration of ROC (Scan MDC) necessary to yield the MDER may be calculated by taking the ratio of the MDER to the exposure rate calculated by Microshield as shown in Equation 7-11 from the Base-wide Plan (TtFW, 2005a), using the following input parameters:

- The dose point of 4 inches above the soil was used.
- The density of 1.6 g/cm^3 was used for soil.
- ^{226}Ra concentration of 2.0 pCi/g was used.
- The depth of the area of elevated activity was 15 cm.
- The circular dimension of the cylindrical area of elevated activity was .25 m^2.

Microshield Version 5.05 calculates the exposure rate to be 1.42 μR/hr for ^{226}Ra (which accounts for buildup). The radionuclide concentration of ^{226}Ra (scan MDC) necessary to yield the MDER calculated in Equation 7-10 (0.92 μR/hr) may be calculated by taking the ratio of the MDER to the exposure rate calculated by Microshield.

Equation 7-11 from the Base-wide Plan

$$Scan\ MDC(pCi/g) = \frac{DCGL\ pCi/g * MDER\mu R/hr}{Microshield\ Exposure\ Rate\mu R/hr} = 1.2\ pCi/g$$

Where:

DCGL = 2.0 pCi/g (from Table 3-1)
MDER = 0.92 μR/hr (from Equation 7-10 from the Base-wide Plan)
Microshield Exposure Rate = 1.42 μR/hr

4.9.7 Minimum Detectable Count Rate for Static Gamma Counts

For gamma surveys, MDCR, rather than MDC, is calculated in cpm. Equation 7-12 from the Base-wide Plan (TtFW, 2005a) is used to calculate the MDCR when the background and sample are counted for the same time interval.

Equation 7-12 from the Base-wide Plan

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

Where:

3+4.65 = constant factor provided in MARSSIM
R_B = background count rate (cpm)
T_B = background counting time (min)

If the background and sample are counted for different time intervals, Equation 7-13 from the Base-wide Plan (TtFW, 2005a) is used to calculate the MDCR.

Equation 7-13 from the Base-wide Plan

$$MDCR = \frac{3 + 3.29\sqrt{R_B T_{S+B}\left(1 + \frac{T_{S+B}}{T_B}\right)}}{T_{S+B}}$$

Where:

3+3.29 = constant factor provided in MARSSIM
R_B = background count rate (cpm)
T_B = background counting time (min)
T_{S+B} = sample counting time (min)

4.10 LABORATORY INSTRUMENTS

On-site laboratory equipment will be used to analyze samples collected in the field. Table 4-3 lists the types of laboratory equipment to be used during survey activities at the PCB Hot Spot.

4.10.1 Quality Assurance Checks

Quality assurance (QA) 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 that are outside the tolerance limits shall be investigated to determine the cause and potential effect on measurement results.

4.10.2 Gross Alpha and Beta/Gamma Removable Surface Contamination Surveys

Swipe samples will be processed using a Protean IPC 9025 gas-flow proportional alpha and beta/gamma radiation counter (or equivalent), which features a low-background counting chamber. A microprocessor allows for data processing, and the unit provides a full range of simultaneous alpha and beta/gamma analysis at levels required for environmental release surveillance. Data is reported in units of dpm per 100 cm^2.

4.10.3 Gamma Spectroscopy

Gamma spectroscopy analysis is performed using an EG&G Ortec apparatus, which is maintained within the NWT field laboratory. Hardware features include a 40 percent high-purity Germanium gamma photon detector with a beryllium window supported by EG&G Gamma-Vision (multi-channel analyzer and Dart spectral analysis software). Instrument hardware is calibrated using a multi-energy NIST traceable source ranging from 10 keV to 2 MeV. Data results will be reviewed for quality assurance and reported in units of pCi/g. Analysis and review processes will address count integration, efficiency and background corrections, as well as the processing of overlapping peaks. Gamma spectroscopy focuses on energetic photons emitted from ROCs. A spectral region of interest resulting around a specified energy range allows for identification and quantification of associated nuclides and daughter products.

4.11 SURVEY IMPLEMENTATION

Radiological control procedures will be implemented to support remediation activities within the PCB Hot Spot. These procedures are intended to protect the health and safety of project personnel and the general public, to comply with NWT's NRC license requirements under which the work is to be performed, and to comply with ALARA principles. The following subsections describe the survey procedures that will be performed at the PCB Hot Spot.

4.11.1 Reference (Background) Areas

An average background level will be determined by performing measurements at systematic or random locations within a designated background area. The detector probe will be held approximately 10 cm (4 inches) from the surface area for gamma and 0.6 cm (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 the readings taken will determine the background for each energy emission. Background exposure rates will also be collected for reference data. Some solid samples will need to be collected in the background area for comparative analyses of specific survey units. 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 consistent with a normal distribution and that the variability of the background is not too high.

4.11.2 Scan Surveys

Scan 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. It will be used to identify areas that may require additional survey measurements.

4.11.2.1 Scan Surveys for Alpha/Beta Radiation

Surface scan surveys for alpha and beta radiation will be performed by moving the detector over the surface being surveyed at a rate of approximately 2.5 cm (1 inch) per second. The detector will be held approximately 0.6 cm (0.25 inch) of the surface being surveyed.

4.11.2.2 Scan Surveys for Gamma Radiation

Surface scan surveys for gamma radiation will be performed by traversing a path at a maximum speed (scan rate) of approximately 0.5 meter per second, while maintaining the detector approximately 10 cm (4 inches) above the area being surveyed. Prior to each 1-foot excavation lift (where practical), scan surveys for gamma radiation will be performed using the towed array described in Section 4.8.5.

Areas that cannot be surveyed using the vehicle with the instrument array due to rough or impassable terrain will be cordoned off around the boundaries and surveyed on foot by an assigned RCT. If areas become inaccessible due to groundwater or other obstacles, gamma scans will not be conducted in situ.

4.11.3 Static Surveys

Static surveys are used to determine contamination levels on surface areas. 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.

4.11.3.1 Static Surveys for Alpha/Beta Surface Activity

Static alpha/beta measurements will be conducted with the detector approximately 0.6 cm (0.25 inch) above the surface. Count time for conducting the measurement is dependent upon the isotope of concern. When the alpha/beta static measurements are used to release equipment and materials, a 1-min count time will be sufficient to measure the appropriate release criteria.

4.11.3.2 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.

4.11.4 Exposure Rate Measurements

Exposure rate surveys are performed to measure ambient gamma radiation levels. Exposure rate measurements are obtained by holding the detection device approximately 1 meter from the surface being surveyed. Instrumentation will be allowed to stabilize for approximately 30 seconds before taking the measurement.

4.11.5 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/gamma surface activity.

4.11.6 Equipment and Material Surveys

Equipment and material surveys will be performed following the methods in Sections 4.11.2, 4.11.3, and 4.11.5. Table 4-1 provides acceptable levels of contamination based on the AEC *Regulatory Guide 1.86* limits (1974). In the event that survey results indicate that levels of contamination exceed the limits listed in Table 4-1, appropriate decontamination methods will be performed.

4.11.7 Personnel Surveys

Properly trained staff will perform personnel surveys in a pre-designated low-background area, before leaving a radiologically controlled area as specified in the RWP or when deemed

necessary by the RCT. Personnel who are not qualified to administer a self-survey will be monitored by a qualified technician. Personnel surveys will be performed following the methods in Section 4.11.2.

4.11.8 Media Sampling

Various samples may be collected for radiological analysis, including soil, sediment and water. Appendix A, SAP, describes the methods for collecting samples, sample numbering, sample labeling, sample shipment, and completion of the associated chain-of-custody and other required documentation. Media samples for gamma spectroscopy and removable surface contamination will be analyzed on site using instrumentation described in Sections 4.10.2 and 4.10.3. Samples for alpha and beta analysis will be analyzed at an off-site laboratory. In addition, ten percent of the media samples analyzed by the on-site laboratory for gamma spectroscopy will also be analyzed at an off-site laboratory, as described in Appendix A.

4.11.9 Air Sampling

As specified in the RWP, airborne activity monitoring (continuous or grab samples) will be used during the course of work. In order to control occupational exposures, establish PPE, and determine respiratory protection requirements, monitoring and trending for airborne radioactive material will be performed as necessary. Engineered controls, with concurrence from RASO, will be implemented if required to maintain airborne concentrations below 10 percent of the applicable derived airborne concentration (DAC) value for the ROCs (Table 4-4).

If, during the course of work, an airborne concentration exceeds 10 percent of the DAC, ongoing activities will cease and the affected location will be posted until the source of the airborne concentration is eliminated and levels are confirmed to be below 10 percent of the DAC.

4.12 SAMPLING PROTOCOL

In support of this TCRA, numerous soil samples will be collected to determine the radionuclide concentrations in the soil. Direct surface radiation measurements will be performed at each location before initiating sampling to identify any presence of gross contamination. If elevated radiation levels are present, samples and equipment will be treated as radioactive and handled accordingly.

4.13 POST-WORK AREA SURVEILLANCE

At the conclusion of each workday, the assigned RCT(s) will complete all necessary paperwork associated with the daily radiological surveys. Air samples will be collected and analyzed to ensure that exposure to radioactive particulates is maintained below the designated levels.

4.14 DECONTAMINATION PROCEDURES

Equipment or materials that cannot be easily or cost-effectively decontaminated will be evaluated for possible limited use in radioactive materials use areas, or disposed of as radioactive waste.

5.0 PLANNED REMOVAL ACTIVITIES

This section describes the specific activities and procedures involved in preparation for, and field implementation of, the TCRA for the PCB Hot Spot. The planned activities include:

- Permitting and notifications
- Preparatory activities and meetings
- Environmental resources surveying
- Clearing of vegetation
- Topographic surveying
- Geophysical surveying
- Radiological surface surveying
- Identification and removal of radioactive material
- Mobilization
- Pre-excavation PCB characterization sampling
- Protection or removal of existing site features, such as utilities, structures, groundwater extraction wells, and piezometers
- PCB and/or petroleum hydrocarbon-contaminated soil excavation and removal of additional radioactive materials
- Dewatering of excavated materials
- Secondary screening of excavated materials
- Segregation and stockpiling of the screened materials (soil, radioactive materials, and construction debris)
- Post-excavation sampling
- Backfill placement and compaction
- Site restoration
- Decontamination of equipment and tools and free-release surveying
- Waste classification, on-site storage of radioactive wastes, and transportation and off-site disposal of non-radiological wastes
- Demobilization

5.1 PERMITTING AND NOTIFICATIONS

TtEC will obtain all necessary authorizations from the HPS Caretaker Site Office (CSO) for completing the TCRA for the PCB Hot Spot. Prior to field activities, TtEC will notify the DON Remedial Project Manager (RPM), CSO, and appropriate HPS security and fire department personnel about the nature of the anticipated work.

TtEC maintains a current annual excavation permit from the California Occupational Safety and Health Administration (Cal-OSHA) (No. 2004-573713). The required 5-day notification will be provided before excavation activities begin. Underground Service Alert (1-800-227-2600) will also be notified to obtain utility clearance a minimum of 72 hours prior to any drilling or excavation activities. All excavations will be conducted in accordance with CCR Title 8, Section 1539 through 1543, and CFR, Part 1910 and 1926 requirements. Daily inspections of the excavation will be performed by a competent person to assess the stability of slopes and the excavated area.

Additional permits and/or notifications required by regulatory agencies for specific activities conducted under this Work Plan will be addressed in the corresponding subsections of the Work Plan or in the stand-alone SHSP.

5.2 PREPARATORY ACTIVITIES AND MEETINGS

At least 2 weeks prior to the start of field activities, a kickoff meeting will be held between the DON, TtEC, and NWT. The purpose of this meeting will be to develop a mutual understanding of the removal activities and the CQC details, including forms to be used, administration of on-site work, and coordination of the construction management and production. This meeting may be held in conjunction with a regularly scheduled CQC meeting for CTO 0084, under which this removal action will be conducted. TtEC will prepare minutes of the meeting for submittal to the DON. The following people will be requested to attend the kickoff meeting: the RPM, the Resident Officer in Charge of Construction (ROICC), a CSO representative, a RASO representative, and a representative from the Police Department. TtEC representatives will include the PCB Hot Spot Project Manager, Construction Manager, Project Quality Control Manager (PQCM), Project Certified Health Physicist (CHP), RSO and Senior SHSS. The NWT RTM will also attend.

5.3 ENVIRONMENTAL RESOURCES SURVEYING

Prior to mobilization, the qualified Wildlife Biologist, Mr. Lenny Malo will perform an environmental resources survey to ensure that no special-status species are residing within the limits of work. Previous investigations have been performed within Parcels E and E-2 to determine the presence of habitat for plant and wildlife species protected under the Migratory Bird Treaty Act, California Fish and Game Code, and state and federal Endangered Species Acts

(ESAs). The initial findings concluded that Parcels E and E-2 did not contain direct evidence of species or habitat features likely protected under ESAs or other ARARs. Additionally, the EPP (Section 8.0) will be implemented as a means for protecting wildlife and biota and following substantive ARARs.

5.4 CLEARING OF VEGETATION

Prior to any intrusive activities, the vegetation will be cleared from the PCB Hot Spot. The vegetation will be managed in accordance with the results of an ongoing investigation to evaluate the potential uptake of radionuclides by vegetation.

Initially, mechanical equipment will be used to cut the overgrown vegetation. Weed-eaters/whackers, chainsaws, or similar equipment typically used for vegetative removal will be used to clear the vegetation growing over areas that are sloped, uneven, bumpy, or too densely vegetated to allow for mechanical equipment access.

5.5 TOPOGRAPHICAL SURVEYING

A pre-excavation topographic survey will be conducted following vegetation clearing activities to establish horizontal and vertical controls, and to assess the pre-removal site topographic features, such as high and low points and the limits of the excavation area, which will provide the basis for calculating the excavation quantities. During the pre-excavation survey, the nodes of a 25-foot by 25-foot grid system (to be used as pre-excavation characterization sampling locations) and a 50-foot by 50-foot grid system (to be used during the radiological surface scan and post-excavation sampling) will also be surveyed as marked in the field. This grid system will also be used to track the radiological surface survey within the excavation boundary, control the location of subsequent lifts, and assist in the collection of post-excavation samples.

Following completion of excavation activities and prior to the collection of post-excavation samples and backfilling, the excavation will be surveyed, including the bottom and sidewalls. All high points, low points, and grade breaks will be documented. The post-excavation and pre-excavation survey information will be compared to assess the total volume of excavated soil, evaluate the contours of the excavations, and determine the amount of backfill material that will be required.

5.6 GEOPHYSICAL SURVEYING

A geophysical survey will be performed following a review of existing as-built drawings of the area surrounding the PCB Hot Spot, the sheet pile barrier, and the groundwater extraction system. The geophysical survey will be conducted over the known or suspect areas where subsurface utilities may exist at the site (Figure 5-1) via ground-penetrating radar (GPR) and/or an electromagnetic instrument (EMI). The results of the geophysical survey will be compared to

the available as-built drawings to evaluate whether undocumented utilities or other features exist in the survey area. Appropriately colored paints (and/or stakes and flags) will be used to mark the identified utilities within the vicinity of the proposed excavation area.

5.7 RADIOLOGICAL SURFACE SURVEYING

The purpose of the radiological surface survey is to identify surface and near-surface [less than 30 cm (12 inches) bgs] radioactive materials for subsequent removal and proper on-site storage pending disposal through the DON Low-level Radioactive Waste (LLRW) Disposal Program. The initial surface survey will encompass an area that extends beyond the excavation area, including the laydown areas. This survey will be completed prior to mobilization of heavy equipment. In general, the survey area surface is relatively flat, although some locations extend a few feet above the height of their average surroundings.

The preliminary radiological surface survey will consist of a high-density gamma scan performed over a 50-foot by 50-foot grid system with the use of NaI detectors and supported by GPS equipment. The high-density survey process will result in a 100 percent scan survey.

Collected field data will be logged and survey points plotted on maps to document survey results. The GPS data will be used to directly tie the locations of any reported radiation measurements to the corresponding grid coordinates, which will be established during the pre-excavation topographic survey as detailed in Section 5.6. Data analysis will be performed as it is received, and questionable areas will be flagged in the field for resurvey/verification. Locations where surface radiation levels appear to be greater than 3 sigma of the mean background level will be noted on a grid map. Hand-held equipment featuring NaI detectors will then be used to perform static readings and verify the elevated measurements. Areas confirmed as containing radiation levels greater than the established 3 sigma of the mean background area level will be evaluated further, either by additional surveys with different instruments or soil sampling, for the presence of radioactive materials. If radioactive material are confirmed, the area will be physically marked and the associated radioactive material removed as described in Section 5.8.

5.8 IDENTIFICATION AND REMOVAL OF RADIOACTIVE MATERIAL

Once suspected radioactive material is confirmed, GPS/grid coordinates will be recorded and the location marked or flagged. The field survey team or the data group analyzing collected field information will notify the TtEC RSO and the NWT RTM. The TtEC RSO will notify RASO. Radiological support personnel under the supervision of a RCT will remove the radioactive material.

Areas known to or suspected to contain radioactive materials will be isolated pending removal of the material. The assigned RCT will ensure that the removal action will first be evaluated by the RTM for radiological impact.

Typical removal actions will involve evaluating an area within a radius of 1.5 meters (5 feet) [3 meters (10-foot) diameter] around the coordinates of the suspected radioactive material. Under RCT oversight, the location with an elevated radiation level will then be excavated using a small backhoe fitted with a smooth blade bucket and/or hand-digging tools. Soil removal will continue until the source of the elevated gamma activity reading is removed or a depth of 12 inches is reached.

Following removal of the source of elevated gamma activity, an additional foot of soil in all directions from the source will also be removed. After the radioactive material and surrounding soil is excavated, the resulting pit will be resurveyed by the assigned RCT to the extent practicable. If elevated gamma emitters persist, further examination of the soil will be made until the source of high gamma activity is found, removed, or a depth of 12 inches is reached.

If the source of elevated radioactivity cannot be readily identified as a point source, the material will be segregated for disposal. If the radioactive material is a point source, it will be given a unique identification number and recorded in the TtEC radiological logbook and on the drum inventory sheet. Radioactive point sources will be placed in plastic bags within metal drums and stored in a designated and posted radioactive materials storage area for subsequent packaging and disposal by a certified waste broker under the direction of the DON LLRW Disposal Program.

Soils removed as a function of radioactive material removal will be placed in a package in accordance with Department of Transportation (DOT) regulations, as specified in Title 49 CFR Subpart I, and will be stored in a designated and posted radioactive material storage area for characterization and subsequent disposal by a certified waste broker.

Filled 55-gallon drum(s) generated during this process will be placed in Building 406 for temporary storage until the contained material can be characterized for packaging and disposal by the waste broker. If more extensive contamination is found, additional waste packaging requirements will be considered in coordination with the RASO.

Any sandblast grit encountered during excavation activities will be handled in accordance with a RASO-approved work instruction specifically written to govern this material. In addition, a spotter will be used at all times during excavation activities. The spotter will be trained in recognizing sandblast grit, as well as underground utilities.

Removal and storage of radioactive material and/or contaminated soil will be performed under the supervision of a qualified RCT under NWT's license. Personnel performing removal of radioactive material and/or contaminated material will comply with the RWP.

Additional details on the management of generated wastes are included in Section 7.0.

5.9 MOBILIZATION

Mobilization activities will include site preparation, movement of equipment and materials to the site, and orientation and training of field personnel. At least 2 weeks prior to mobilization, the appropriate DON personnel, including the RPM, RASO and the CSO, will be notified regarding the planned schedule for mobilization and soil excavation activities. To arrange for authorized entry badges, a list of field personnel will be delivered to the City of San Francisco Redevelopment Agency. To obtain required vehicle decals, a list of personally owned vehicles, along with the required insurance and registration documentation, will also be provided to the HPS Police Department.

Upon receipt of the appropriate records and authorizations, field personnel, temporary facilities, and required construction materials will be mobilized to the PCB Hot Spot. The temporary facilities will include restrooms, security fencing, runoff controls, and one or more secure storage (Conex) boxes for short- and long-term storage of materials, if needed. Construction materials mobilized to the site will allow for building of the equipment decontamination pad, soil dewatering pad, soil and debris screening conveyor system, and waste stockpile area.

Equipment mobilization will be initiated with site preparation activities. The entire construction area of the PCB Hot Spot will be fenced. Prior to mobilizing equipment to the area, the entire surface within the limits of work (including excavation and laydown areas) will be screened for gamma emitting radioactive sources. To facilitate this, vegetation at the PCB Hot Spot will be removed before screening starts per Section 5.4. If radioactive material is found during the initial suface scan, it will be evaluated for removal in accordance with Section 5.8. To minimize storage requirements and to prevent the spread of contamination via the project equipment, the majority of the equipment and materials will be mobilized to the site on an as-needed basis following completion of radiological screening. Dedicated laydown areas, to be established in the field during mobilization, will be used for short-term storage of equipment and materials.

A decontamination pad will be constructed adjacent to the exit of the site. The decontamination pad will be constructed of two 20-mil layers of high-density polyethylene (HDPE) or polyvinyl chloride (PVC) liner. Prior to constructing the pad, the area will be cleared of rocks, debris, and other items that could puncture the liner. The first layer of the liner will then be placed directly on the ground surface. A 6-inch layer usually of coarse soil will be placed over the first layer of 20-mil liner and sloped such that all runoff is conveyed to a sump. A second layer of 20-mil liner will be placed over the coarse soil layer. A final top 6-inch layer of coarse soil will be placed on top of the liner. Equipment to be decontaminated will, therefore, drive over the soil layer, and not the liner. The purpose of this design is to prevent puncture of the HDPE or PVC liner, thereby preventing any contaminated soil or runoff from coming into contact with the native soil. The decontamination pad will be bermed with sandbags, and collected runoff will be pumped from

the sump into a container for sampling, characterization, and disposal as described in the SAP (Appendix A).

In addition to the radiological controls set forth in Section 4.0, incoming equipment and materials will be subject to the following guidelines:

- Equipment and materials will be surveyed for existing radiological contamination levels prior to being placed into service.
- Surveys will consist of a 100 percent scan of accessible areas for alpha/beta contaminants. Swipes will be taken to ensure that no removable contaminants are present. Should any survey results exceed the contamination limits listed in Table 4-1, the equipment will not be permitted for placement into service and will be returned to the shipment point of origin.

5.10 PRE-EXCAVATION PCB CHARACTERIZATION SAMPLING

Figure 2-1 shows the estimated extent of the PCB Hot Spot excavation based on currently available historical information. Prior to excavation, to further refine the expected extent and identify the final footprint of the excavation, characterization sampling for PCBs will be conducted within the PCB Hot Spot excavation area. The investigation will include soil sampling (via hand-augering) at pre-selected locations (Figure 5-2). The samples will be analyzed for PCBs, TPH, and ROCs at zero to 6 inches and at 30 to 36 inches bgs.

Due to the limited amount of available data, a 25-foot by 25-foot grid will be overlaid on the proposed excavation footprint. Sampling points along the perimeter of PCB Hot Spot are located on the nodes of the 25-foot by 25-foot grid to better delineate the excavation boundary. Along the western boundary, pre-excavation sampling will be conducted where practicable due to the presence of the riprap wall. No samples will be collected from within the excavation footprint because the entire footprint will be excavated. Sampling locations may be modified from those shown in Figure 5-2 to account for existing site conditions such as soil staining, riprap, and existing utilities. Sampling procedures for the collection of soil samples are detailed in the SAP (Appendix A).

Field test kits will be used as screening tools to evaluate PCB and TPH concentrations in samples collected at each grid node to further refine the excavation boundary. PCB field test kits will be chosen to screen for all the PCB aroclors, in particular aroclor 1260, which is the predominant aroclor detected at the PCB Hot Spot, based on historical data. The PCB field test kits will also be chosen to detect PCBs above the cleanup goal of 1 mg/kg. TPH field test kits will be chosen to look for petroleum hydrocarbons in the weathered gasoline to motor oil range, which are the hydrocarbons identified above 3,500 mg/kg at the PCB Hot Spot based on historical data. Subsequently, ten percent of the samples screened by the field test kits will be sent to an off-site laboratory to assess the correlation of the field screening results with standard laboratory method

results. Laboratory methods to be used are detailed in the SAP (Appendix A). One significant factor in comparing the field test kit and analytical laboratory results is the percent moisture content of the sample. Field test kits report semi-quantitative results based on wet weight and analytical laboratories report quantitative results based on dry weight. This factor will be taken into consideration when correlating results. Field personnel will select a range of samples for off-site laboratory analysis, including samples with high concentrations, samples with no detections, samples with low percent moisture, and samples with high percent moisture. At any time during this project, samples may be sent off site for laboratory analysis instead of using field test kits if the TtEC Project Chemist determines the correlation between the field screening and laboratory results to be inconclusive.

On-site radiological analysis data will also be used to establish the boundary of the excavation. The on-site gamma spectroscopy analysis will evaluate the specific activity of ^{137}Cs and ^{226}Ra. Ten percent of the samples will be sent to an off-site laboratory for ^{90}Sr analysis, which cannot be performed on site. In addition, ten percent of the samples will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and minimum detectable activity (MDA) that are within 20 percent of one another. Results from these samples will be considered acceptable if the results are within 20 percent. If the difference between the results is greater than 20 percent, then the data from both laboratories will be reviewed to evaluate the difference. Alpha spectroscopy will be performed by the off-site laboratory on samples if elevated levels of ^{137}Cs and/or ^{90}Sr are identified during laboratory analysis.

Additional sample locations may be placed in stepped-out or stepped-in grid nodes to further refine the limits of the excavation area as described in the SAP (Appendix A). The locations of the sampling points will be surveyed in the field. If large concrete, rock, metal, or other forms of resistance are encountered during hand-augering, the sampling at that location will be terminated, a new location will be selected within a 5-foot radius of the original location, and the sampling will resume at the new location.

5.11 EXISTING UTILITIES AND STRUCTURES

Several known utilities and structures associated with an existing groundwater extraction system, including groundwater extraction piping, underground electrical ducts, overhead electrical lines, and the groundwater system itself, may need to be de-energized and removed prior to excavation activities (Figure 5-1). In addition, the soil around a 350-foot section of a shallow sheet pile barrier, used to intercept and contain groundwater for extraction, will need to be excavated as specified in Section 5.13.1. This barrier falls within the proposed excavation limits at depths ranging from 12 to 15 feet bgs. All utilities and structures will be surveyed for radioactive contamination when removed.

5.12 EXISTING WELLS AND PIEZOMETERS

A minimum of nine groundwater extraction wells and 20 piezometers are located within PCB Hot Spot as shown in Figure 5-1. To the extent possible, the wells and piezometers will be preserved. Only wells and piezometers that are screened or have sandpack at or above the anticipated excavation depth for a given area will be destroyed prior to commencing excavation activities. Additional wells and piezometers may need to be destroyed based on the final excavation depths and footprint, as determined during excavation activities. For example, unanticipated excavation beyond 3 feet bgs in the case of TPH contamination greater than 3,500 mg/kg may result in the destruction of additional wells or piezometers.

Preservation of groundwater extraction wells and piezometers in areas to be excavated will be accomplished by first removing any bollards or well monument features that might interfere. Then, an oversized pipe sleeve will be driven down around the well packing material to a depth of 1 foot beyond the anticipated excavation depth (a total of 4 feet bgs in most cases, but variations may occur depending on soil conditions). The pipe sleeve will remain in place until the excavated area is backfilled and compacted as described in Section 5.15. Once the backfilling is completed to grade, the pipe sleeve will be removed. The bollards and monument coverings will then be reconstructed to meet prior standards.

When it is known that destruction of a well is necessary prior to excavation, well destruction permit requirements will be met prior to destroying existing wells. Because the project is being completed under CERCLA authority, permits and inspections are not required.

Regardless of whether or not the destructions were anticipated, the groundwater extraction wells and piezometers will be destroyed when necessary in a manner consistent with the specifications outlined by the California Department of Water Resources (DWR) (DWR, 1991). The procedures for destroying each well or piezometer are as follows:

- Following a review of available well construction logs and/or boring logs, the depth of the well or piezometer will be measured using a water level sounder to confirm the required depth for overdrilling and to estimate the amount of sealing material required.
- The well monument and wellhead will be removed prior to overdrilling the well or piezometer. The well monument and wellhead will be surveyed for radioactive contamination and discarded based on survey results (for example, with the debris from the fill area as clean waste or as segregated radioactive waste).
- The well or piezometer will be overdrilled to a depth of 3 feet past the bottom of the existing well or piezometer depth using hollow-stem auger methods. The overdrilling auger diameter will be at least 2 inches larger than the existing well or piezometer diameter. The components used inside the wells, such as the drilling auger, will be surveyed for radioactive contamination.

- If radioactive contamination is found, the well or piezometer will be excavated and disposed. The existing excavation area will be resurveyed to ensure radioactive contamination has been removed.
- If no radioactive contamination is found, the borehole will be backfilled with a mixture of bentonite and cement slurry. The planned cement to bentonite mixture for the well borehole backfill will be 5 to 10 percent bentonite.
- To prevent bridging during backfilling, the sealing material will be placed via a tremie pipe, proceeding upward from the bottom of the borehole. The sealing material will be placed in one continuous operation (or "pour") and allowed sufficient time to settle.
- Records will be kept of the volume of sealing material placed during destruction operations to ensure that it is consistent with the calculated borehole volume. This will ensure that the well or piezometer has been properly destroyed and that no bridging of backfill material has occurred.
- Waste materials resulting from overdrilling each well or piezometer, such as soil cuttings and well casing remnants, will be placed on a lined stockpile area pending screening and sampling for the presence of radioactive material. Radioactive materials identified in the drill cuttings will be removed and disposed of appropriately in accordance with the WMP requirements. The soil cuttings, well monuments, casings, and other debris resulting from well or piezometer abandonment will be hauled off site for disposal at an approved disposal facility.
- The auger flights will be surveyed for radioactive contamination and subsequently cleaned prior to overdrilling each well or piezometer. Auger decontamination will be performed within a self-contained decontamination trailer. If such a trailer is unavailable, a temporary equipment decontamination pad, consisting of a bermed polyethylene liner, will be constructed to facilitate collection of any generated wastewater. Decontamination wastewater will be collected in an on-site temporary storage tank pending sampling, analysis, and off-site disposal. Waste profiling will be performed in accordance with the SAP (Appendix A).

5.13 PCB HOT SPOT SOIL EXCAVATION AND REMOVAL OF ADDITIONAL RADIOACTIVE MATERIALS

Prior to beginning excavation of PCB and/or petroleum hydrocarbon-contaminated soil, a sandbag berm and/or silt fencing will be installed along the entire perimeter of the PCB Hot Spot excavation area per the SWPPP (Appendix C) to prevent any stormwater on the contaminated portion of the site from leaving the site, as well as to prevent stormwater run-on from outside of the site (Figure 5-3).

The proposed excavation area containing PCB concentrations greater than 1 mg/kg is approximately 3.01 acres in size, as shown in Figure 5-2. However, the boundary of this area will be redefined as indicated by pre-excavation characterization sampling (see Section 5.10). The redefined area will be excavated to an eventual depth of 3 feet bgs in conjunction with

radiological surveys after each 1-foot lift. Excavation beyond 3 feet bgs (to an estimated maximum depth of 10 feet bgs) will occur in the following circumstances;

- PCB concentrations greater than 100 mg/kg, as indicated by historical information in Figure 2-1, laboratory data or field test kit data
- TPH contamination greater than 3,500 mg/kg, as indicated by historical information in Figure 2-1, laboratory data or field test kit data
- Visual observation of petroleum hydrocarbon-contaminated soil
- Evidence of sandblast grit based on visual observations in the field and historical information shown in Figure 2-1 (as indicated by high metals concentration or details from boring logs), and/or
- Radioactive contamination greater than the RROs based on field screening or laboratory data

Monitoring for landfill gases and methane will be required during excavation activities due to the proximity of the IR-01/21 landfill. Landfill gas and methane monitoring activities will be conducted in accordance with the SHSP.

After the surface screen is complete, material within the boundaries of the PCB Hot Spot will be excavated in 12-inch lifts. Each of these lifts will be surveyed in situ prior to excavation to identify and allow removal of radioactive material, as described above. Following the identification and removal of radiological materials in the upper 12 inches of soil across the project area, an excavator will be used to remove the soil from the upper 12-inch layer in the redefined excavation area. The protocol for removing the remaining contaminated materials from the excavation area consists of conducting radiological surveys of each 12-inch lift surface and removing the surveyed radioactive materials (Section 5.8) prior to excavation of each lift, until the excavation reaches the final depth of 3 feet (or up to an estimated maximum 10 feet bgs, as stated above). The excavation sidewalls will be sloped with a ratio of 1.5 horizontal to 1 vertical (1.5H:1V), unless otherwise determined as discussed in Section 8.4.2.1. Large-size debris will be segregated from the soil during excavation for ex situ radiological surveillance. If necessary to minimize the potential for dust, a water truck equipped with a hose will be used to mist the soil and debris during excavation and segregation. The total in-place volume of soil anticipated to be excavated using this iterative approach is approximately 31,000 cubic yards.

In addition, an estimated 95 cubic yards of soil within the IR-02 Northwest and Central Excavation Boundary (Figure 5-4) will be excavated based on historical data indicating the presence of PCB concentrations above 100 parts per million (ppm) at two locations. The soil will be excavated and radiologically screened. The screened non-radiologically impacted soil will be placed in dump trucks and transported to the PCB Hot Spot conveyor area, where it will be processed as part of the PCB Hot Spot soils. The dump trucks will be scanned for radioactivity

prior to leaving the IR-02 Northwest and Central site. Post-excavation samples will be collected from the hot spot removal in IR-02 Northwest and Central and analyzed via field test kits and the off-site laboratory for PCBs (only) per the SAP, with the exception that there will be no post-excavation samples collected at 8 feet bgs. Any PCB concentrations greater than 100 ppm will be over-excavated in 1-foot increments laterally and vertically.

If free-phase product is encountered during excavation activities, absorbent booms and/or pads will be used to collect the majority of the free-phase product to the extent practical. Contaminated groundwater will not be collected.

Unsaturated soil removed from the excavation will be placed in trucks, transported to the grizzly, and then processed through a conveyor system featuring an array of beta/gamma detectors (as detailed in Section 4.8.7). Saturated soil removed from the excavation will be transported to the dewatering pad for dewatering prior to the placement in the grizzly/conveyor system. The conveyor system will be used to identify radioactively contaminated materials that may not have been detected during the preliminary or subsequent surface surveys, and to detect any beta-emitting sources that may be present. Each 12-inch soil lift will be excavated, surveyed, and sampled to ensure that radioactive soil and non-radiologically impacted soil is stockpiled separately. Radiologically contaminated materials identified during surveys or sample analysis will be placed in storage containers at the originating site pending disposal. Radioactive Material Management will be performed in accordance with the requirements of NWT's NRC license.

Materials saturated with free-phase product will be placed on the dewatering pad and spread out in lifts not to exceed 6 inches for scanning. Radiological surveys will be performed manually for beta/gamma emitters as detailed in Section 4.0 of this Work Plan. Radioactive material that is identified during screening activities will be collected, segregated and stored in appropriate containers for subsequent packaging and disposal by a certified waste broker under the direction of the DON LLRW Disposal Program. A minimum of one solid sample will be collected for each 14 cubic yards of material placed on the screening pad. The sample will be collected at the location exhibiting the highest gamma radiation measurement. Additional samples will be collected at locations where the investigation level of 3 sigma is exceeded. The samples will be analyzed at the on-site radiological laboratory by gamma spectroscopy prior to moving the surveyed soil. Radiologically contaminated material identified during surveys or sample analysis will be placed in storage containers pending disposal. Any liquids that have accumulated on the pad will be collected, characterized for chemical and radiological constituents, and properly disposed. Radioactive Material Management will be performed in accordance with the requirements of NWT's NRC license.

Large-size debris will be segregated from the soil when encountered and screened separately for radioactivity and proper disposal. Debris may include small tree roots, vegetation, small pieces of asphalt, concrete, wood, lumber, metal objects, plastic, glass, or other similar waste materials.

The debris will be surveyed to preclude release of radioactive materials that may be affixed to the surface areas of the debris. The release criteria for debris can be found in Table 4-1.

Radioactive waste, including any identified mixed waste, will be properly stored on site pending disposal by a certified waste broker through the DON LLRW Disposal Program. Excavated soils that are not radioactively impacted will be placed into stockpiles.

Soil stockpiles will be managed per Section 5.13.5 and the SWPPP (Appendix C) and sampled for laboratory analysis in accordance with the SAP (Appendix A) pending subsequent disposal. Large debris that has been radiologically cleared will be placed in roll-off bins for transportation to and disposal at a CERCLA Off-site Rule-approved landfill, or if approved by RASO transported to an appropriate recycler.

5.13.1 Excavating Around Sheet Pile Barrier

A 350-foot section of a sheet pile barrier has been constructed within the proposed excavation—limits to depths ranging from 12 to 15 feet bgs. The soil on either side of the sheet pile barrier will be excavated evenly in 12-inch lifts to a depth of 3 feet bgs (or to an estimated maximum 10 feet bgs if contamination is present). In the event that excavation on either side of the wall exceeds 3 feet, the maximum length of the excavation along the sheet pile barrier will be based on the Field Engineer's review of the condition of the barrier material and structure supports. Bracing of the sheet pile wall may be required for sections of the excavation that are greater than 20 feet in length, based on an inspection review by the Field Engineer. Backfilling shall be performed per Section 5.15.

If required, an alternate method for supporting the sheet pile barrier and trench face during excavations along both sides of the sheet pile barrier is to use trench boxes, trench shields, or a hydraulic/screw jack shoring system.

5.13.2 Dewatering of Excavated Materials

A dewatering pad will be constructed, per the SWPPP (Appendix C), adjacent to the excavation area for the dewatering of saturated soils excavated from greater than 8 feet bgs, the approximate depth to groundwater across the PCB Hot Spot area, if necessary. The purpose of the dewatering pad is to allow the excavated soils to dry enough to perform a radiological survey. The dewatering pad will be constructed of two 20-mil layers of HDPE or PVC liner. Prior to constructing the pad, the area will be cleared of rocks, debris, and other items that could puncture the liner. The first layer of the liner will then be placed directly on the ground surface. A 6-inch layer of coarse soil will be placed over the first layer of 20-mil liner and sloped such that all runoff is conveyed to a sump. A second layer of 20-mil liner will be placed over the coarse soil layer. A final top 6-inch layer of coarse soil will be placed on top of the second liner. As a result, the excavated material will be placed on the soil layer, not directly on the liner, to dewater.

The purpose of this design is to prevent puncture of the HDPE or PVC liner, thereby preventing any contaminated soil or runoff from coming into contact with the native soil. The dewatering pad will be bermed with sandbags, and collected runoff will be pumped from the sump into a Baker tank or equivalent appropriate container. Water from the dewatering pad will be collected, characterized for chemical and radiological constituents, and properly disposed. Wastewater sampling will be conducted according to the procedures and frequency detailed in the SAP (Appendix A).

5.13.3 Secondary Screening Conveyor System

A lined area will be constructed adjacent to the excavation area for the location of a conveyor system, which will perform secondary radiological screening of excavated soils and debris ex situ. The soil and debris conveyor system will feature a vibrating grizzly feeder designed to separate the soil from small debris. Segregated debris will be transported to the debris laydown area and radiologically screened. The soil passing through the grizzly will be fed through a conveyor belt which is equipped with an array of gamma/beta detectors, where secondary ex situ screening will be performed to identify radioactively contaminated material as described in Section 5.13.4. Sprinklers/misters will be installed along the catwalk of the conveyor system for dust suppression purposes. Water for the sprinklers/misters will be supplied by a water tank located adjacent to the conveyor system.

The conveyor system area will be lined with 20-mil HDPE or PVC liner and bermed to prevent surface water runoff and rainwater from contaminating clean soil outside of the containment area. A sump basin will be installed in the containment area and any runoff water collecting in the sump will be pumped to a temporary storage tank with appropriate secondary containment. Collected runoff water will be sampled, characterized, and disposed of as appropriate.

5.13.4 Secondary Screening Conveyor System Surveying

Secondary screening at the conveyor system will be performed using a Ludlum Model 4612 equipped with Ludlum Models 44-10 and 44-40 detectors (or equivalent) as detailed in Section 4.8.7. The detectors will be staggered in position to ensure complete beta/gamma radiation screening of all conveyor-processed materials. For this effort, the survey method will focus on the gamma radiations emitted from ^{226}Ra and ^{137}Cs and the beta radiations emitted from ^{90}Sr. Radiation detection instrumentation will be programmed with alarm trip points. Integrated connections to power controls for the conveyor circuitry will allow for the immediate shutdown of the conveyor system should an alarm set point value be exceeded. The conveyor system may also be stopped manually.

Background radiation levels will be established for the conveyor system by obtaining readings from a fixed position directly above the surface of clean soil. Clean soil and check sources will be used for the initial setup of the instrument and detector array, which will be detailed in a separate work instruction and approved by RASO.

5.13.4.1 Conveyor System Radioactive Material Removal

If the conveyor system stops due to the tripping of a preset alarm point (or manually due to an elevated radiation reading), impacted soils and material will be scraped off of the conveyor, under the direction of the assigned RCT, into an approved container. A section of soil extending approximately 3 feet in both directions from the sources and if no source is found 6 feet will be removed as directed by the RCT in charge.

In such instances, the assigned RCT will ensure that no contaminants remain on the conveyor system where the soil was removed by taking a large area masslin swipe of the area. If no contaminants are present, the conveyor will be released for restart. However, if contaminants remain, the conveyor system will be wiped down with damp rags and resurveyed. If, after initial decontamination efforts, contaminants are still present, additional decontamination methods will be instituted prior to release and/or reactivation of the conveyor system.

Any soil removed from the conveyor system due to an alarm trip (or manually due to an elevated radiation reading) will be surveyed by the assigned RCT to identify any radioactive material or discrete point sources. If radioactive material is found, it will be handled as radioactive waste. If no radioactive material can be found, the entire soil pile will be sampled and placed into an appropriate container for subsequent characterization and disposal.

5.13.4.2 Conveyor System Soil Sampling

For on-site radiological analysis, the assigned RCT will collect soil samples from the conveyor system at a rate of two composite samples per 50-foot by 50-foot lift. This will be done to ensure that the soil is free of radioactive contaminants prior to the soil being stockpiled.

For QA purposes, 10 percent of the radiological samples analyzed at the on-site laboratory (for ^{137}Cs and ^{226}Ra) will be sent to an off-site laboratory for confirmation of the gamma spectroscopy analysis. A minimum of 10 percent of the samples will be sent to an off-site laboratory for ^{90}Sr analysis. Additional analyses will be performed by the off-site laboratory for ^{90}Sr analyses and alpha spectroscopy if elevated levels of ^{137}Cs are identified during field laboratory gamma spectroscopy analysis. Soil sampling instructions are detailed in the SAP (Appendix A).

5.13.5 Soil Stockpiles

Excavated soil not impacted by radioactive materials, as supported by radiological analysis and survey results, will be placed in a large soil stockpile containment area constructed east of the PCB Hot Spot. The stockpile containment pads will be constructed of two layers of 20-mil HDPE or PVC liner separated by a 6-inch-thick coarse soil layer. The purpose of the design is to prevent puncture of the liners, thereby preventing any contaminated soil or leachate from coming into contact with the native soil.

Prior to construction of the stockpile containment areas, the ground surfaces will be cleared of rocks, debris, and other items that could puncture the lower liner. The ground surfaces will then be surveyed by a qualified RCT for the presence of radioactive materials. In accordance with the SWPPP (Appendix C), the stockpile areas will be bermed to prevent surface water runoff from coming into contact with the stockpiled materials in accordance with the RCRA staging pile regulations of 40 CFR, Part 264.554, and Section 25123.3 of the California Health and Safety Code provision for stockpiling of non-RCRA hazardous soil. A 6- to 8-inch-high berm will be constructed surrounding the stockpile area. The 20-mil HDPE or PVC liner will be extended over the berms surrounding the stockpile pads. In addition, to prevent rain from coming into contact with the stockpiled soil and to minimize wind dispersion of particulate matter, the stockpiles will be covered with a 10-mil liner and secured with sandbags at the end of each workday.

Soil that contains TPH concentrations greater than 3,500 mg/kg will be placed in a separate, discrete location within the stockpile area. Additionally, excavated soil will be segregated into separate stockpiles, each with up to 3,000 cubic yards of soil, within the large stockpile area. Stockpiled soil will be hauled off site for disposal.

Radioactive and mixed wastes will be staged separately and the area clearly demarcated as a radiologically controlled area.

5.14 BURIED DRUMS, BOTTLES, JARS AND CONTAINERS WITH UNKNOWN CONTENT

The following sections outline the procedures for handling and removal of buried drums, bottles, jars and/or containers (containers) unearthered during excavation of PCB Hot Spot. The procedure addresses the identification and inspection of buried containers, their recovery and removal from the excavation, Hazardous Categorization (HazCat), waste catergorization sampling, temporary staging on site and disposal.

Specialized equipment, tools, and supplies that may be required for container removal activities include (the need for specialized equipment will be evaluated on a case-to-case basis):

- Excavator equipped with drum grappler, bladed bucket (demolition grading)
- Loader/backhoe
- Shovels
- Blast shields for personnel protection
- Non-sparking/brass hand tools
- Remote drum opener/punch
- Air monitoring equipment, flame ionization detector (FID), photoionization detector (PID), radiation meter, combustible gas indicator/oxygen meter or similar
- Level B PPE to include: saranax suits, silvershield gloves, supplied air respirators
- Over-pack containers
- Spill containment kit (pads, oil dry, etc.)
- ABC fire extinguisher
- Air/water hoses
- Pumping equipment
- Radiation detection instrumentation
- Sampling and characterization kit
- Camera
- Labeling equipment

The following sequence will be followed once a container is encountered during the excavation activities (Figure 5-5):

- Uncovering chemical or unknown containers
- Review previous site characterization data (see geophysical survey results)
- Mobilize recovery team for evaluation/inspection of exposed containers
- Establish work zones/containment
- Radiological screening of containers
- Material excavation and transfer
- Container sampling
- Waste compatibility screening/"HazCat"
- Over-packing or lab-packing (container selection conducted following the HazCat analysis)
- Segregation, sampling and containerization of soil impacted with chemicals from the unknown containers

- Labeling of all containers with preliminary determination and accumulation start date and staging of all containers within the 90-day accumulation area
- Pre-disposal analysis and authorization for disposal
- Final labeling of containers based on analytical results
- Preparation of manifests
- Loading, transportation and disposal

Weather conditions will be considered prior to excavation of containers. Primary weather concerns are wind direction/velocity and precipitation. Wind direction will be considered and a safe distance during the removal of unknown contaminants will be established to ensure that workers downwind are not at risk. Airborne releases may be controlled by water mists, foam blankets, airtight enclosures, covering the container with earthen materials, or other suitable means. Precipitation is a concern due to the potential for contaminant migration (including inadvertent discharge, overflow, etc.), cross contamination, and chemical reactions. The potential for cross contamination and materials migration can be controlled by berms, trenches, covers, and/or sumps.

5.14.1 Excavation of Containers and Soil

Once a container with unknown content has been uncovered, all nonessential personnel will remain at a minimum 25 feet away from the excavation area. When possible, personnel should be upwind of the excavation and behind a solid barrier such as a berm, vehicle or heavy equipment. A recovery team (team leader, technician, RCT, stand-by health and safety support personnel) in Level B PPE will be deployed to inspect the container and/or area with unknown chemicals and together with the Project Site-superintendent determine the approach for the removal.

The excavation area will be examined to determine the general condition and burial depth of the containers. Air monitoring will be performed to determine if contaminant concentrations within the excavation exceeds background readings. If radioactive materials are encountered, work will not proceed until the radiation safety officer has inspected and evaluated the situation. Removal of radioactive material and mixed waste will be carried out in accordance with the Work Plan.

Once an area with containers of unknown materials is uncovered, and after air monitoring has been conducted, the recovery team will inspect for external markings that may reveal the drum or container content and/or generator. If the container is a drum, the feasibility of using a mechanical grappler will be evaluated. If the burial site is severely decayed, the appropriateness for mass excavation of the site will also be evaluated.

Prior to physically handling any container, the following checklist will be applied:

1. Is the container radioactively contaminated?
2. Does the container appear to be intact or open/damaged? Does the container exhibit leakage or deterioration (i.e., is it unsound)?
3. Does the container exhibit apparent internal pressure?
4. Is the container empty?
5. Does the container contain markings that would indicate that the contents are potentially explosive or reactive?
6. If the container is open or broken, does the container contain radioactive material(s)?

Specific items to look for when evaluating the integrity of buried containers include corrosion, rust, scaling, leakage, crystallization, bulging, smoking, hissing, fuming, unusual discoloration, etc. If compressed gas cylinders are discovered, they will be inspected thoroughly by a competent employee prior to movement.

The primary requirement for successful movement of a container is the integrity of the container shell; if the walls or ends are decayed, lifting of the container safely may not be possible.

After the exposed face of the burial site has been examined and the approach determined, the equipment operator can begin removing the containers.

5.14.2 Mass Excavation

Mass excavation is usually performed when containers containing solid matter are in a serious state of decay, indistinguishable from one another, the contents are compatible, and the issue of ownership has been determined or there is little possibility of finding meaningful evidence of origin or prior use.

Prior to excavation, the area will be surveyed for radioactive material as per Section 4.0, as well as inspected for compressed gas cylinders or other similar pressurized containers or surficial large containers with contents. The burial area will be excavated or removed in an orderly manner. Once the area to be excavated has been evaluated to be safe for mass excavation and clearly delineated, the removal activities can start. The excavated soil and container materials will be spread out at a temporary laydown area consisting of two 20-mil layers of HDPE, PVC liner or solid polyethylene trays as appropriate located next to the identified burial site. A recovery team in level B PPE will go through and remove containers from the excavated material. Liners will be inspected for evidence of breaches (including breaks, bubbles or distortion) on a frequent basis. If liner breaches are observed, the field team will evaluate substitution to solid trays. The excavated soil will be segregated for separate waste profile sampling and disposal. Each waste container will be sampled and analyzed for radioactive

material and waste compatibility screened (HazCat). The excavated material will also be isolated from any potential source of run-on from surface water or other liquids. Areas with pooled liquids will be pumped dry and the liquids contained.

5.14.3 Container Identification Numbers

Prior to removal of the container, a unique container identification number will be assigned to each buried container in accordance with an established numbering system for the project. The identification number will be marked on the exterior of the container with fluorescent paint or a grease stick, by application of a label, or by other approved means. The expected duration of any anticipated temporary storage will be considered when determining the type of marking/labeling system to be employed. Some markings, such as grease pencils and fluorescent paints, may become illegible after relatively short exposures to the environment.

The following information will be recorded in the field logbook:

- Container number
- Name of person logging data
- Date and time of container removal
- Container type
- Location where container was found
- Container condition
- Container size
- Labels and markings
- Disposition of container
- Photographic documentation

Once the condition of a container has been determined, it will be removed from the excavation either individually or by mass excavation. If necessary, containers will be transferred into an over-pack container prior to removal from the excavation. Each container or over-pack will be assigned a unique number, which will be marked on the exterior using either fluorescent paint or a grease stick. The drum number will also be recorded in the TtEC site drum log. If there is evidence of container breakage or leaking, soil generated and associated with mass excavation of small containers or bottles will be segregated, analyzed and profiled for disposal.

5.14.4 Handling and Staging of Containers

Moving and transporting containers will be accomplished with the use of mechanical equipment. Manual handling of containers will be kept to a minimum and only used should mechanical

equipment not be practical. Remote container handling equipment may consist of a grappler-equipped backhoe or front-end loader. Container transportation will be with front-end loaders or fork lifts with modified carrying platforms. Handling and transport equipment will be equipped with full frontal and side splash shields as appropriate. Container handling equipment will be fitted with a Class ABC fire extinguisher that is immediately accessible to the operator. The size and number of extinguishers will be determined by the SHSS.

5.14.5 Special Handling

Containers exhibiting the following characteristics require special treatment in handling and sampling:

- Leaking or deteriorated drums
- Bulging drums
- Drums containing explosive or shock-sensitive waste
- Drums containing or contaminated with radioactive waste
- Packaged laboratory wastes (Lab-packs)
- Air reactive waste

When containers are moved, they will be taken to an upwind staging and sampling area located upwind of the burial site. This area will be away from other drums on the site until HazCat analysis to prevent a chain reaction from occurring between incompatible materials.

5.14.5.1 Leaking of Deteriorated Containers

If containers exhibit leakage or apparent deterioration such that movement may cause rupture (determined by the SHSS or recovery team lead), they will immediately be inspected and, if deemed appropriate, transferred to an over-pack drum.

5.14.5.2 Bulging Containers

Containers that potentially may be under internal pressure, as evidenced by bulging, will be sampled in place. Extreme care will be exercised when working with and adjacent to potentially pressurized containers. Should movement of a pressurized drum be unavoidable, they will be handled only by a grappler unit constructed for explosive containment. The bulging container will be moved only as far as necessary to allow seating on firm ground or it will be carefully over-packed.

Any open bungs or drill openings in pressurized containers will be plugged with pressure-venting caps set to a 5 pounds per square inch (psi) release to allow venting of vapor pressure as outlined in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site*

Activities [National Institute for Occupational Safety and Health (NIOSH), 1985]. Creation of explosive conditions will be avoided.

If intact compressed gas cylinders are encountered, they will be handled and removed by a specialized gas cylinder disposal subcontractor.

5.14.5.3 Containers Containing Explosive of Shock-sensitive Waste

If containers are found containing wastes that have been identified by prior sampling or are suspected by visual examination to be explosive in nature, the Site Superintendent and SHSS will be notified immediately, before the drums are handled in any way. If the Site Superintendent and/or SHSS approve handling of these drums, they will be handled with extreme caution. Initial handling will be by a grappler unit constructed for explosive containment. Containers will be palletized prior to transport to a hazardous waste interim storage area prior to disposal.

If at any time during remedial activities, an explosive, pursuant to provisions of Title 18, USC, Chapter 40 (Importation, Manufacture, Distribution, and Storage of Explosive Materials, 1975 Explosives List) is identified, it will be secured and the appropriate state and federal agencies notified. Identification of an explosive substance will be done by experienced on-site personnel. Potentially explosive materials usually may be identified by their physical characteristics (texture, color, density, etc.), as well as the way they are packaged or labeled. Most explosives are solids. In some cases, they are packaged in water-tight containers to exclude water, while in other cases, they are packaged wet to preclude explosion.

Prior to handling or transporting containers containing explosive wastes, personnel working in the area will be removed to a safe distance (as determined by the SHSS). Continuous contact between handlers and the Site Superintendent and the SHSS will be maintained until handling or transporting operations are complete. An audible siren signal system, similar to that employed in conventional blasting operations, will be used to signify the commencement and completion of explosive waste handling or transporting activities.

5.14.5.4 Containers Containing Radioactive Waste

Containers containing radioactive or mixed wastes may be encountered at the site; however, no container will be handled until radiation and contamination levels have been determined by an initial field survey. The survey will include direct radiation and contamination measurements, as detailed in SOP HPO0-Tt-006, Radiation and Contamination Surveys, and SOP HPO-Tt-009, Sampling Procedures for Radiological Surveys.

5.14.5.5 Packaged Laboratory Wastes

If individual containers suspected of containing discarded laboratory chemicals, reagents or other potentially dangerous materials in small volume are found, the Site Superintendent and SHSS will be notified immediately, prior to any removal or opening of the containers or bottles. If the Site Superintendent and/or SHSS approve the handling or these containers, they will be handled with extreme caution. Until otherwise identified or categorized, they will be considered explosive or shock sensitive wastes and will be handled as described in the section above.

5.14.5.6 Air Reactive Wastes

If the presence of an air reactive substance is verified or suspected, as concluded by a competent person, the material will be immediately segregated and transported to a separate hazardous waste interim storage and disposal area.

Air reactive wastes may be discovered during opening or sampling operations. Air reactive substances normally require special packaging. They may be stored under water or some other liquid to minimize air contact. They may also be found in sealed ampules, corrugated drums, stainless steel canisters, or specially lined drums. If conditions become reactive, clean sand can be used to smother flammable materials.

5.14.6 Over-packing of Drums

An over-packing station will be constructed adjacent to the burial site in the temporary laydown area. Straw bales, 20-mil HDPE, PVC liner and/or solid polyethylene trays may be used for construction of this station. In situations where over-packing needs to take place outside the excavation boundary, it will be done carried out on top of already existing pads. Only materials screened for radioactive materials may be over-packed.

When using mechanical equipment, the equipment operator will pick up a container from the burial area, move to the over-pack station and gently slide the container into the over-pack. When handling a container, whether by mechanical means or by hand, the container will be examined for any sign of collapse or excessive leaking prior to lifting. The container will only be lifted as high as necessary to clear obstacles between the point of removal and the staging/over-pack area. Safe lifting practices will be observed at all times.

After the container has been screened for radioactive materials, it can be placed into the over-pack, and the lid of the defective container can be pierced with a brass punch. The brass punch is attached to the bucket of a backhoe, or other remotely operated device. The brass punch will be surveyed for radioactive contamination after piercing the container. The purpose of this operation is to provide an access port for sampling. Following this operation, the drum is either

sampled or prepared for movement to the sampling area. Preparation for movement includes placing a stopper in the access port and securely installing the over-pack drum lid.

5.14.7 Container Sample Collection Procedures

Sampling activities will be coordinated with the over-packing operations or container HazCat analysis. Sampling protocols are established in the SAP. All containers will be sampled and analyzed for the presence of radioactive materials. Samples collected for radiological analyses will be collected using SOP HPO-Tt-009. Samples will be analyzed by gamma spectroscopy and for gross alpha/beta. Additional analysis may be requested based upon sample results. Smaller containers and bottles will be transported in a safe manner (see AHA - Container Removal) to the HazCat area in Building 271 for individual categorization. The term "waste compatibility screening" or "HazCat" as used in this document refers to a series of rapid, qualitative chemical and physical tests conducted to determine potential hazards, handling precautions, storage criteria and disposal classification of the material in question. Container sample material will not be shipped until waste compatibility results have been reviewed and radiological screening complete.

5.14.7.1 Container Sampling for Waste Compatibility Screening/HazCating

All containers or over-packs will be kept sealed and resealed after sampling to prevent the escape of vapors and possible reactions from intrusion of rainwater, air, etc.

No container sampling may be performed until the drum has been examined from a health and safety stand point. If radioactivity greater than 3 sigma above background radiation levels are not detected, the RSO in conjunction with the SHSS may then, at their discretion, issue clearance to begin field sampling of inspected drums. If containers are deemed non-radioactive, sampling can take place.

Containers identified as containing radioactive material (radioactivity greater than 3 sigma above background) will require a RWP to be in place prior to opening or sampling.

The SHSS will continuously monitor the atmosphere around the work area before and during sample collection to ensure that sampling personnel employ an appropriate level of respiratory protection. Air sampling for radioactive particulates will also be performed.

During sampling, a thorough qualitative visual description of the contents of each container will be obtained and recorded in the Container Removal Inventory Logbook. This initial visual characterization includes noting the following:

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

For liquids, samples will be extracted through the bunghole if there is one on the container. If the container contains mostly solid material rather than liquids, the entire top of the container will be removed and the contents will be sampled for chemicals in a star pattern. Sampling for radiological material will be executed in accordance with SOP HP-Tt-009, Sampling Procedures for Radiological Surveys. Using the appropriate sampling device or a combination of devices, several representative grab samples with a combined volume of approximately 250 milliliters (mL) will be withdrawn and carefully placed into a labeled, clean, clear glass sampling container with a Teflon-lined plastic lid. If a container contains more than one phase (e.g., solids and liquids or multi-phase liquids), separate samples are to be taken from each phase. If the volume of any individual phase is so small as to preclude recovery of a sufficient sample, a remark to this effect will be recorded in the Container Removal Inventory Logbook.

Information to be entered into the field logbook during sampling activities may also include the following:

- Container contents
- Physical state
- pH
- Air monitoring results
- Color
- Clarity
- Thickness of layers
- Radiological monitoring results
- Other observations

The log should be photocopied, a chain-of-custody completed, and samples delivered to a State-of California certified analytical laboratory.

Used disposable sampling equipment, paper towels or waste rags used to wipe up spills will be placed into an empty metal container for subsequent disposal. If glass tubing is used, it may be broken and left inside the container being sampled.

The bung or covers on containers will be replaced and the top of the over-pack secured, if used. Two custody seals will be affixed to opposite sides of the outermost cover, lid or across the bung opening.

The outside surface of the sample containers will be thoroughly cleaned then transferred to the HazCat area (Building 271) where the HazCat Technician(s) will carry out waste compatibility screening. The waste compatibility screening tests include:

- Water Reactivity (air or water reactive)
- Miscibility (aqueous vs. organic solubility)
- Flammability and Explosivity
- pH
- Presence of Sulfide and Cyanide
- Presence of Significant Halogen Content
- Presence of Oxidizers and Peroxides
- Field Compatibility for Uncharacterized Wastes.

5.14.7.2 Sampling of Intact Excavated Drums and Large Containers

The required method of opening drums is by remote means. Three types of equipment for opening drums remotely are available: the bung spinner, the remote-controlled drill, and the hydraulic or pneumatic drum piercer. When any of these pieces of equipment are used, the opening device is attached to the drum and the control lines are extended to their maximum length (typically 100 feet). Drum-opening personnel will operate the controls from behind sandbags, a concrete or brick structure, or other solid barriers. The contact surfaces of the drum opening equipment will be decontaminated after each use. The drum opening equipment will be surveyed for radioactive contamination prior to chemical decontamination.

5.14.7.3 Resealing Containers

All drums/containers opened during the sampling investigation need to be resealed to prevent the escape of vapors and any possible reactions with rainwater, air, etc. The resealing methods will depend on the opening methods used and will include the following:

- Replacing the bung, screw cap, etc.
- Replacing the lid and retaining ring

- Placing the drum in an over-pack
- Using the non-reactive special rubber or plastic plug if a hole was driller. If utilized, these plugs will be checked periodically for soundness since material within the drum may react with the plug and cause it to corrode/leak. A drum bonnet will also be used to ensure that rainwater does not seep around the plug.

These sealing methods are for the purpose of preventing leakage from containers while in storage on site. If a container is moved off site, DOT drum sealing requirements must be met. DOT regulations generally have more rigorous sealing procedures than the sealing methods listed above.

Once containers are sampled and resealed, they will be placed where they cannot react with other containers on the site. Slowly progressing chemical reactions can start when a container is moved and/or opened, as the contents have been exposed to air and/or have been disturbed by handling the drum. Such a reaction could take hours or even days to occur. Segregation of the containers will be carried out according to hazard class, to prevent any potential chemical reactions between containers. For a small number of containers, the storage area(s) may be the staging and opening area. Mixed waste will be transferred and stored in the mixed waste storage area.

Sample identification, packaging, shipment and analytical protocols are provided in the site drum log.

5.14.7.4 Staging

Containers will be stored in a secure area according to compatibility grouping. The staging area will be located in a remote or controlled environment area away from other operations. Staging area construction usually includes: an impermeable liner, secondary containment, run-on collection systems, a roof, and a location above the floodplain. The minimum requirements may be met with double 20-mil liners, straw bales for sidewalls, a tarp cover, and caution tape.

5.15 POST-EXCAVATION SAMPLING

Following completion of excavation activities, a 50-foot by 50-foot grid will be established along the excavation bottom, including sloped sidewalls. One discrete post-excavation soil sample will be collected at randomly located point within each grid cell from the bottom. PCB and TPH field test kit and on-site radiological analyses will be conducted on the discrete sample and the resulting data will be used as a screening tool to indicate the need for further excavation of areas still above cleanup goals or RROs. One post excavation soil sample will be collected per grid once field screening indicates cleanup goals and RROs have been achieved, and this post excavation sample will be sent off site for PCB and TPH laboratory analysis. In addition, for grids excavated to a depth of 7.5 feet bgs or less, a sample will be collected at approximately 8

feet bgs to evaluate vertical extent of contamination that could be present at depth and determine if further overexcavation is necessary.

Following completion of excavation/overexcavation activities along the bottom, one sample will also be collected from the perimeter sidewall every 50 linear feet in areas where the perimeter sidewall extends to 3 feet bgs. This sample will be collected at a random location within the 50-foot perimeter sidewall interval. An additional sample will be collected within each 50-foot interval where the perimeter sidewall extends below 3 feet bgs. This sample will be collected at the location below 3 feet bgs that is most likely to exhibit contamination based on field observations, historical data, and available analytical data generated under this Work Plan. Perimeter sidewall samples will be analyzed as described in the SAP (Appendix A). PCB and TPH field test kit and on-site radiological analyses will be conducted on the perimeter sidewall samples and the resulting data will be used as screening tool to indicate the need for further excavation of areas still above cleanup goals or RROs. Post excavation soil samples will be collected once field screening indicates that cleanup goals and RROs have been achieved, and these samples will be sent off site for PCB and TPH laboratory analysis. ROC analysis on the post excavation samples will be performed by the on-site radiological laboratory. Once post excavation samples are below cleanup goals and RROs, then those post excavation samples will also be analyzed for pesticides, Title 22 metals, and, if TPH is confirmed, polynuclear aromatic hydrocarbons (PAHs). The data from these additional analyses will be considered during the Parcels E and E-2 Feasibility Study.

Since the off-site chemical laboratory results will be used as the final indicator that the area is below cleanup goals, post-excavation samples analyzed by the field test kits for PCBs or TPH will not be sent off site for confirmation or correlation comparisons. The field screening data will solely be used to determine the extent of the overexcavation that may be required.

Prior to backfilling the excavation, systematically located post-excavation samples will be collected after establishing a grid consisting of 2,000-square meter cells over the PCB Hot Spot. Sixteen systematically located samples will be collected from each grid cell. Post-excavation sampling procedures are described in the SAP (Appendix A). In addition to collecting and analyzing samples form the excavation bottom and perimeter sidewalls, a 100 percent high-density gamma scan will be performed of these areas.

Ten percent of the samples analyzed by the on-site radiological laboratory will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and MDA that are within 20 percent of one another. Results from these samples will be considered acceptable if the results are within 20 percent. If the difference between the results is greater than 20 percent, then the data from both laboratories will be reviewed to evaluate the difference. Alpha spectroscopy will be performed by the off-site

laboratory on samples if elevated levels of ^{137}Cs and/or ^{90}Sr are identified during laboratory analysis. In addition to collecting and analyzing samples from the excavation bottom and perimeter sidewalls, a 100 percent high density gamma scan will be performed at these areas.

5.16 BACKFILL PLACEMENT AND COMPACTION

Following completion of the post-excavation sampling and prior to placement of backfill, an 8-ounce layer of geotextile will be placed over the bottom and sidewalls of the excavation. The geotextile layer will function as an excavation boundary indicator.

The excavation area will be backfilled with clean imported fill material from the Bay Area Rapid Transit (BART) pile, which, based on previous sampling results, has been deemed suitable for use as backfill by the DON [International Technology Corporation (IT), 2002a; 2002b] or clean import fill material.

Backfill will be placed in the excavation in 12-inch lifts. Where possible, the backfill material will be compacted by wheel or track rolling to a firm, unyielding condition (no rutting) and verified by the Field Engineer. No compaction testing shall be conducted, because of the slating of the site is for open space reuse. The final 6 inches of backfill will not be compacted but will be graded to match its surrounding elevation for site restoration.

Once the PCB Hot Spot has been backfilled to the existing grade, a topographic survey will be performed by a licensed land surveyor. The survey will document existing surface features and conditions in sufficient detail to generate a topographic map with 1-foot contour intervals.

5.17 SITE RESTORATION

Upon completion of backfilling and removal of stockpiles, all of the disturbed areas within the perimeter of the PCB Hot Spot will be revegetated. Of primary concern are the prevention of long-term surface erosion from transporting PCB-contaminated soil from the stockpile area as sediment to remediated areas, and prevention of increased sedimentation to the Bay following disturbance. Hydroseeding will be performed in conjunction with either straw or a soil stabilizer [California Department of Transportation (CalTrans), 2002]. Seed will consist of a mixture of native and sterile cereal grain seed. The sterile seed will more rapidly colonize the area and will stabilize soil with root growth. The following year, the native vegetation should provide long-term soil stability. This technique has been used successfully at the HPS landfill. All erosion control and seeding activities will be closely coordinated with the RPM and CSO.

Restoration of the PCB Hot Spot will also include repairing any damage made to previous site improvements, for example, the utilities and structures associated with the adjacent groundwater treatment system.

5.18 DECONTAMINATION OF EQUIPMENT AND FREE-RELEASE SURVEYING

Preliminary surveys, consisting of a 100 percent scan of accessible areas for alpha/beta contamination will be conducted on equipment, tools, and materials prior to chemical decontamination. Radioactive contamination identified above the criteria established in Table 4-1 that is readily removable, will be removed prior to decontamination activities. Heavy equipment will be decontaminated over a lined area prior to exiting the site. Heavy brushes will be used to remove soil and dirt attached to the equipment surfaces. If dry practices are not sufficient, the soil residue may be removed using by washing with water, but not with high pressure. The water used during the cleaning of the trucks will be collected. Special attention will be paid to removal of soil and dirt on and within the bucket, the tracks/tires, and undercarriage of the equipment. Tools and items for which decontamination is difficult or impossible to verify, such as rope or lumber, will remain on site until completion of the work for subsequent packing and off-site disposal at an approved disposal facility. The exterior and interior surfaces of temporary facilities (connex boxes, portable toilets) will be radiologically surveyed and decontaminated as required.

Free-release surveys, consisting of a 100 percent scan of accessible areas for alpha/beta contamination will be conducted on equipment, tools, and storage areas subsequent to an initial cleaning (wipe or spray down) and prior to demobilization and decommissioning. Swipes will be taken to ensure that there is no removable contamination present. Free-release criteria will meet the limits established in Table 4-1 for material and equipment. Should the levels exceed those listed in Table 4-1, the equipment will not be permitted to leave the site, and appropriate decontamination will be performed. If equipment survey results are below the free-release criteria listed in Table 4-1, the equipment will be released to the equipment rental vendor.

Survey elements for excavators, dozers, and similar-type heavy equipment will include surface scans and removable contamination swipes taken at the cab interior, undercarriage, tracks, stick, and bucket interior and exterior. Survey elements for loaders, backhoes, and similar rubber tire equipment will include surface scans and removable contamination swipes taken at all four tires, the front loader bucket interior and exterior, the left and right hydraulic stabilization pads, the backhoe bucket interior and exterior, and the cab interior. Hand tools used for radioactive material removal will be surveyed for free release. Tools include shovels, pry bar, pick, broom, and similar items.

Surveys will be documented and given a unique survey number.

5.19 WASTE CLASSIFICATION, STORAGE, AND DISPOSAL

Specific control and management practices for project-related wastes are discussed in the WMP (Section 7.0).

5.20 DEMOBILIZATION

Demobilization will consist of surveying, decontaminating, and removing all construction equipment and materials, cleaning the project site, inspecting the site, and issuing a certification of completion. Demobilization activities will also involve collection and disposal of all contaminated materials, including decontamination water and disposable equipment for which decontamination is inappropriate.

Prior to removal from the project area, all decontaminated equipment and materials will be inspected and accepted by the RTM, SHSS, and Construction Manager. These individuals will certify that decontamination was performed for all equipment and materials. A copy of each decontamination certificate will be provided to the ROICC and vendors, if requested. The original certificate will be maintained in the project file.

Site cleaning activities will include repair of any erosion or runoff related damage; grading of all areas used for construction; removal of all materials such as excess construction material, wood, debris, and other foreign material; and removal of all construction equipment and storage boxes.

Once all construction equipment and material have been removed from the project site, the ground surface within unexcavated areas at PCB Hot Spot, including laydown areas, will be surveyed for gamma-emitting radionuclides. Data obtained from the pre-mobilization survey will be compared to the data collected during the demobilization survey to ensure that radioactive materials have not been relocated or additional radioactive contamination has not been introduced to the PCB Hot Spot.

6.0 TRAFFIC CONTROL PLAN

This TCP provides guidelines and addresses measures for vehicular traffic control at the site. Additional traffic controls are discussed in the Transportation and Disposal Plan, which will be prepared under separate cover.

6.1 ANALYSIS OF POTENTIAL IMPACTS

During implementation of the TCRA, HPS will host construction-related traffic consisting of trucks delivering equipment and material, personnel and support vehicles, and trucks transporting wastes off site. The project activities will require traffic at various times and will be assessed on a daily basis since the exact times of the traffic cannot be defined prior to the start of fieldwork. The project team will coordinate all construction activities that may generate traffic with the CSO and the ROICC in order to avoid conflicts with other activities being performed concurrently at HPS. A schedule of proposed traffic routes and times will be reviewed with the CSO and ROICC during the weekly CQC meetings.

During construction activities, commuting workers will require an estimated average of 15 vehicles per day. Project personnel will access HPS at the main gate (Innes Avenue) and proceed to the 270 Nimitz construction office via Donahue Street to Galvez Avenue, to Robinson Street, to Fisher Avenue, to Spear Avenue, to Blandy Street, and then to Nimitz Avenue (Figure 6-1). When leaving HPS, workers will use the same route as they entered. Personnel will park in designated areas at the 270 Nimitz construction office and be transported between the construction office and PCB Hot Spot in project site trucks via Blandy Street and Spear Avenue.

The delivery and transportation of equipment and materials will only be allowed between 0730 and 1700 hours (no exemptions) to minimize interference with the normal traffic pattern in the area. Trucks of various capacities, some which may exceed 20 tons, will be entering and exiting the PCB Hot Spot. The project will require permitted oversized vehicles for the transportation of heavy and extra-wide construction equipment. Truck staging will only be allowed in designated radiologically non-impacted areas inside the fenced area of Parcel E because no trucks will be allowed to idle along public streets. Additionally, this project will not allow any truck staging, overflow, other project-related traffic on the 707 triangle area, which is located southeast of the PCB Hot Spot and is bounded by "J" Street, "R" Street, and 6th Avenue (Figure 6-1).

Due to the limited duration of construction activities, the impacts to transportation and traffic patterns are expected to be insignificant. Heavy construction equipment such as front-end loaders, excavators, and other support vehicles will remain at the site for the duration of the field activities following initial mobilization. Equipment will not leave the site until such time as it is no longer needed and surveyed for free release.

6.2 TRAFFIC SAFETY MEASURES

In order to expedite the passage of traffic through or around the work area and within HPS, TtFW will install and maintain the necessary signs, lights, temporary railings, barricades, and other facilities for the sole convenience and direction of facility personnel and tenant traffic, as well as to prevent potentially hazardous conditions from existing. If necessary, TtFW will furnish competent flagmen whose sole duties will be to direct the movement of facility traffic through or around the work area and to give adequate warning to facility personnel and tenants of any dangerous conditions to be encountered.

Convenient access to driveways and around the work area will be maintained during construction activities. Water and dust abatement measures will be applied as necessary to the on-site roads used by construction vehicles for alleviation or prevention of dust nuisance.

No materials or equipment will be stored where they may interfere with the free and safe passage of facility personnel and tenants. At the end of each day's work and at other times when construction operations are suspended for any reason, TtFW will remove all equipment and other obstructions from that portion of the roadway for use by facility and tenant traffic. In addition, TtFW will adhere to all facility speed limit requirements.

6.3 TRAFFIC CONTROLS

Traffic controls will be used to provide for the efficient completion of work activities in a safe working environment while minimizing the impact to the normal traffic flow. Traffic controls will be required during removal activities in the excavation and stockpile areas to allow for equipment operation and truck loading for off-site transportation. Traffic controls may include, but will not be limited to, the following:

- Traffic flow will be maintained at all times during construction activities on through roads.
- Transportation demand management strategies, such as using carpools or vanpools for construction workers, will be encouraged.
- End dumps and other transportation trucks removing radiologically cleared construction debris from the PCB Hot Spot site will be scheduled to avoid queuing along major streets. Close coordination between the TtFW foreman and the truck dispatcher will be maintained at all times during loading and unloading activities.
- A sufficient area for parking will be provided to all passenger vehicles in the support area and all haul trucks in the exclusion zone.
- Cones, flags, signs, and other traffic control measures will be used, as needed, to facilitate loading and unloading.

In order to prevent congestion of site access roads during loading and hauling operations, no trucks will be allowed to queue along any street. On-street parking will be prohibited for all vehicles associated with the construction activities in order to maintain normal access and clear lanes. During non-construction periods, non-applicable signs will be covered with black plastic or temporarily removed.

Other project-specific measures will be used to minimize the impacts of the proposed construction activities. These measures include the following:

- Proper design geometrics will be applied at access driveways and all internal streets to accommodate trucks and fire apparatuses.
- Clear access points for trucks will be maintained at the project entrance to allow for efficient movement of construction-related traffic and expedite the entry and exit of construction vehicles in and out of the site.
- An adequate turning radius will be provided in all areas, including loading areas near the stockpiles.
- Sufficient area will be provided for parking all vehicles on-site during construction, including space for haul trucks.
- Close coordination will be maintained between the DON and all other facility contractors to ensure safety and to minimize impacts to other activities within HPS.

All traffic control activities shall conform to the applicable specifications of the *State of California Manual of Traffic Controls for Construction and Maintenance Work Zones* (Caltrans, 1996) and will be approved by the DON.

7.0 WASTE MANAGEMENT PLAN

The purpose of the WMP is to present the waste management practices and procedures to be followed for the types and quantities of waste expected to be generated during the field activities associated with the removal activities at the PCB Hot Spot. The WMP identifies waste management activities conducted during the storage and the preparation and/or disposal of waste (including waste characterization, packaging, storage, and management while in storage). The transportation and disposition of waste material at appropriate disposal and recycling facilities are also included.

The WMP provides information on how wastes, including potentially hazardous wastes, LLRW and/or low-level mixed waste (LLMW) associated with project activities, will be managed and disposed. A secondary goal of this section is to ensure that waste minimization practices are followed, to the extent practical, to reduce the volume of waste that will be generated, stored, and removed from the site for disposal.

The WMP is also a primary component of the TtFW Compliance Program, which includes on-site environmental compliance inspections. The WMP will be revised if the scope of this project or any applicable regulations change.

7.1 PROJECT WASTE DESCRIPTIONS

Site activities will consist of excavation of soil, debris and other fill material, and stockpiling and radiological screening of removed material and restoration of the PCB Hot Spot. Waste generated during this remedial action will either be radiological or non-radiological in nature.

There are several waste streams that may be generated as a result of the planned excavation activities. The following is a list of hazardous waste stream examples that are anticipated to be produced:

- TSCA-regulated, PCB-contaminated soil
- RCRA hazardous soil (as defined by federal regulations)
- Non-RCRA hazardous soil (as defined by California regulations)
- Non-hazardous soil [soil that does not contain chemical constituent concentrations exceeding Total Threshold Limit Concentration (TTLC) and does not contain constituent concentrations in the Toxicity Characteristic Leaching Procedure (TCLP) extract exceeding the EPA regulatory levels for a RCRA hazardous waste nor concentrations in the Soluble Threshold Limit Concentration (STLC) extract exceeding State of California regulatory levels for a California-hazardous waste]
- Refuse and debris, including grubbing material

- Runoff from the dewatering pad, decontamination pad and other wastewater
- PPE

LLRW and/or LLMW wastes that are anticipated to be produced, may include, but not be limited to:

- TSCA-regulated, PCB-contaminated soil
- RCRA hazardous soil (as defined by federal regulations)
- Non-RCRA hazardous soil (as defined by California regulations)
- Non-hazardous soil (soil that does not contain chemical constituent concentrations exceeding TTLC and does not contain constituent concentrations in the TCLP extract exceeding the EPA regulatory levels for a RCRA hazardous waste nor concentrations in the STLC extract exceeding State of California regulatory levels for a California-hazardous waste)
- Refuse and debris, including grubbing material
- Runoff from the dewatering pad, decontamination pad, and other wastewater
- PPE
- Radioactive point sources

The following disposal options will be applied to the wastes described above:

- Soil, PPE, and debris intended for off-site disposal that is classified as a TSCA hazardous, RCRA (federal) hazardous, or non-RCRA (California) hazardous waste will be transported to a CERCLA Off-site Rule-approved hazardous waste facility for treatment and/or disposal.
- Soil, PPE, and debris intended for off-site disposal that is classified as non-hazardous waste will be transported to a CERCLA Off-site Rule-approved waste facility.
- Cleared vegetative wastes that do not exhibit elevated levels of radioactivity will be disposed of at an off-site green waste recycling and disposal facility.
- Wastewater will be characterized and profiled for proper off-site treatment and/or disposal.
- LLMW will be properly packaged, labeled, and stored on site pending disposal at a permitted LLMW disposal facility.
- LLRW will be properly stored on site pending packaging and disposal by a certified waste broker at a permitted LLRW disposal facility.

Use of any disposal facility for radioactive wastes is subject to approval by the DoD LLRW Executive Agency (Army).

7.2 WASTE MANAGEMENT FOR HAZARDOUS/NON-HAZARDOUS WASTES

In accordance with the ARARs for site characterization in preparation for TCRA activities, the substantive requirements of the state and federal hazardous waste generation, characterization, storage, treatment, and management regulations of Title 22 CCR, Sections 66261, 66262, and 66264, and 40 CFR, Parts 261, 262, and 264, are applicable to the management of hazardous wastes generated during the investigation activities and associated project activities.

7.2.1 Waste Classification

According to RCRA requirements of Title 22 CCR, Section 66261.10, waste characteristics can be measured by an available standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste, provided that the waste has already been reliably tested or if there is documentation of chemicals used.

A waste determined not to be a RCRA hazardous waste may still be considered a state-regulated non-RCRA hazardous waste. The state is broader in scope in its RCRA program in determining hazardous waste. Title 22 CCR, Section 66261.24(a)(2), lists the TTLCs and the STLCs for non-RCRA hazardous waste. A waste is considered hazardous if its total concentrations exceed the TTLCs or if the extract concentrations from the Waste Extraction Test (WET) exceed the STLCs. A WET is required when the total concentrations exceed the STLC by a factor of ten, but are less than the TTLCs. California also has additional hazardous waste classification criteria (including 96-hour fish bioassays) that may need to be considered on a case-by-case basis. Wastes determined to be hazardous wastes under California regulations and not under federal regulations are referred to as non-RCRA hazardous wastes.

The waste classification requirements also apply to water generated from daily decontamination activities, dewatering of excavation material, collected stormwater, and waste oils and fluids generated from the on-site project equipment. Wastewater resulting from stormwater runoff, dewatering and decontamination water will be collected and contained in tanks or other appropriate containers. When the container is approximately half-full or at least every 60 days, whichever occurs first, it will be sampled to determine proper disposition of the wastewater. PPE will be characterized based on generator knowledge and will be disposed of at an off-site landfill.

7.2.2 Waste Accumulation and Storage

Regulations per 40 CFR, Parts 262 and 40, and 22 CCR, Section 66262, are applicable to the generation, storage, management, and accumulation of RCRA, and non-RCRA hazardous wastes, respectively. Specific requirements apply to the accumulation time for hazardous wastes on site and to the accumulation and labeling of hazardous wastes. This project may result in the temporary accumulation of hazardous wastes. These wastes will be managed, accumulated, and inspected in accordance with the regulations.

7.2.3 Soil

Hazardous and non-hazardous soil will be generated during excavation at the PCB Hot Spot. Soil classified as hazardous or non-hazardous will be stockpiled, as described in Section 5.13.5 of the Work Plan. The operation and maintenance of the stockpiles will conform to the requirements of RCRA staging pile regulations of Section 264.554 of 40 CFR and with Division 20, Chapter 6.5, Section 25123.3 of the California Health and Safety Code.

7.2.4 Debris/Material

Debris and other hazardous waste materials will be stored in DOT-approved containers, including 55-gallons drums and roll-off bins, and stockpiles. Containers will be stored within designated hazardous waste container storage areas, which will be designed and managed in accordance with the substantive requirements of the container management regulations codified in 22 CCR, Sections 66264.170 through 66264.178. Non-hazardous materials and debris will be managed and disposed of as trash.

7.2.5 Wastewater and Waste Fluids

Facilities that store hazardous wastes in tanks or containers for over 90 days are expected to follow applicable requirements contained in 22 CCR, Section 66264, and 40 CFR, Part 264.

Any wastewater generated (for example, decontamination water generated from equipment and personnel decontamination and water generated from dewatering excavated material) will be collected in containers such as Baker tanks or 55-gallon drums and labeled as "Potentially Hazardous Water – Pending Analysis." The drums will be temporarily staged within a predesignated and secondarily contained on-site waste accumulation area pending characterization and appropriate disposal. Wastewater generated from hazardous and non-hazardous waste and/or decontamination activities will be segregated from wastewater generated from radioactive decontamination.

When possible, waste fluids generated from heavy equipment maintenance activities will be collected and removed from the site by the maintenance contractor for recycling. If waste fluids are required to be stored on site, they will be labeled accordingly, contained within DOT-approved containers, and situated within a predesignated and properly designed hazardous waste container storage area. Containers of hazardous wastes containing free liquids have stringent secondary containment requirements.

These requirements include the following:

- A base free of cracks or gaps and sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed.

- The base will be sloped or the containment system will be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation. Alternatively, the containers may be elevated on pallets to prevent contact with accumulated liquids.
- The containment system will have sufficient capacity to contain 10 percent of the volume of containers or the volume of the largest container, whichever is greater, plus the maximum rainfall from a 25-year 24-hour storm event.
- Spilled or leaked waste and accumulated precipitation will be removed from the sump or collection area in a timely manner to prevent overflow of the collection system.

7.2.6 Container Labeling

Indelible ink will be used to label containers of potentially hazardous waste with a detailed description, including source and location; contents and quantity; potential health, safety, and environmental hazards; accumulation start date; date container sampled; parameters analyzed for; and the words "Analysis Pending – Potentially Hazardous." If containers are determined to contain non-hazardous waste, they will be labeled accordingly. If containers are determined to contain hazardous waste, they will immediately be labeled with a completed "Hazardous Waste" label, which will include:

- EPA identification number of the generator
- Name and address of the generator
- EPA waste code
- DOT shipping name (prior to off-site shipment)
- Description of contents
- Date of generation

An inventory of waste containers will be maintained. In addition, weekly inspections of container storage areas will be conducted and logged while wastes remain in these areas to ensure the integrity of the containers and secondary containment, to check for leaks or spills, and to ensure that labels and markings are in good condition.

7.2.7 Waste Accumulation Areas

TtFW and contractors working on this project will implement the following hazardous waste storage area requirements for waste stored on site:

- A sign with the legend, "Danger Hazardous Waste Area-Unauthorized Personnel Keep Out" (written in English and Spanish), will be posted at each waste accumulation area and stockpile in sufficient numbers to be seen from any approach. The signs will be legible from a distance of at least 25 feet.

- Aisle space will be maintained to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, unless aisle space is not needed for any of these purposes.
- The following emergency equipment will be located or available to personnel during active waste management activities at each accumulation area:
  - A device, such as a telephone or a hand-held two-way radio, capable of summoning emergency assistance will be available.
  - Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment will be available.
  - Water at adequate volume and pressure to supply water hose streams, or foam-producing equipment, automatic sprinklers, or water spray systems will be available.
  - A spill response kit for minor spills will be available. The kit will include a shovel, adsorbent pads and/or "kitty litter," and a collection container.

Bulk quantities of fuel, oil, or other hazardous material will not be stored on site. These materials will be managed by an off-site contractor who will, on an as-needed basis, perform equipment fueling and maintenance activities.

7.2.8 Waste Disposal

Hazardous and non-hazardous wastes will be transported off site for appropriate recycling or disposal. Used PPE will generally be managed and disposed of as non-hazardous waste, unless work is required in areas of significant contamination. Other waste streams requiring off-site disposal will be sampled and analyzed, as necessary, to ensure that it is properly characterized and profiled and meets the waste acceptance criteria and packaging requirements for the proposed treatment, storage, and disposal facility (TSDF) prior to transport.

Hazardous waste will be disposed only at a hazardous waste disposal facility approved by the DON and permitted for the disposal of the particular type of hazardous waste generated. Wastes disposed off site will be sent to RCRA Subtitle C or RCRA Subtitle D facilities that meet the requirements of 40 CFR, Part 300.440 (CERCLA off-site policy).

7.2.9 Waste Transportation

Hazardous wastes sent off site for disposal or recycling will be done so in accordance with the DOT Hazardous Material Transportation regulations of 49 CFR, Parts 171 through 177, and 40 CFR, Part 262, Subpart B, and 22 CCR, Section 66262, which involves packaging, placarding, labeling, and manifesting requirements. Additionally, hazardous wastes will be sent off site for disposal or recycling with appropriate land disposal restriction (LDR) certification notices per 40 CFR, Part 268, and 22 CCR, Section 66268. Personnel having the required DOT

training will perform all DOT functions. In addition, all transporter and disposal contractors will be subject to the contractor qualification process. Under no circumstances will TtFW personnel sign hazardous waste manifests.

If material is hazardous, it will be shipped under the appropriate hazard class. All hazardous waste will be transported under DOT hazardous material regulations. Each shipment of a suspected hazardous material will be properly classed using the Hazardous Material Table in 49 CFR, Part 172.101. DOT-trained personnel will make all determinations.

7.2.10 Waste Minimization

To minimize the volume of all waste streams generated during the project, the following general guidelines will be followed:

- Waste material will not be contaminated unnecessarily.
- Work will be planned ahead.
- Material may be stored in large containers, but the smallest reasonable container will be used to transport the material to the location where it is needed.
- Cleaning and extra sampling supplies will be maintained outside any potentially contaminated area to keep them clean and to minimize additional waste generation.
- Mixing of detergents or decontamination solutions will be performed outside potentially contaminated areas.
- Drop cloths or other absorbent material will be used to contain small spills or leaks.
- Contaminated material will not be placed with clean material.
- Wooden pallets inside the exclusion zone will be covered with plastic.
- Material and equipment will be decontaminated and reused when practical.
- Volume reduction techniques will be used when practicable.
- Waste containers will be verified to ensure that they are solidly packed to minimize the number of containers.
- Only the size waste containers adequate to contain the volume of waste generated will be used.
- Less hazardous substances will be used whenever possible (only the volume of standard solutions needed for testing will be brought, and minimal amounts of decontamination water and solvent rinses will be used).

7.2.11 Inspections

While all waste accumulation areas will be informally inspected on a daily basis, formal inspections of all container accumulation areas will be conducted and recorded at least weekly in

accordance with 40 CFR, Part 264, Subpart I, and 22 CCR, Section 66264. The Project Environmental and Safety Specialist or designee will conduct inspections. Inspections will be logged in a dedicated field notebook, and a weekly inspection checklist will be completed. The container storage area(s) will be inspected to ensure the following:

- The containers will be checked for good condition. If a container is not in good condition or appears to be leaking, the waste will be transferred to another container.
- All containers used will be checked to be sure that they are made of material that will not react with, and are otherwise compatible with, the hazardous waste to be stored.
- The containers will be checked to ensure that they remain closed at all times, except when adding or removing waste.
- The container label will be checked to ensure that it is filled out properly and to check the waste accumulation date.

Containers used for storage of collected runoff and decontamination water will be inspected on a daily basis and the inspections will be logged. The inspections will ensure that tanks have adequate secondary containment, are properly labeled, that they are in good condition (no apparent structural defects or deterioration), and have no visible leaks.

7.2.12 Documentation

Documentation requirements apply to all waste managed during project activities. Field records will be kept of all waste generation activities. All pages of the field data record log will be signed and dated by the supervising field leader who is entering the data. In addition, the following information will be recorded in the log:

- Description of waste-generating activities
- Location of waste generation (including depth, if applicable)
- Type and volume of waste
- Date and time of generation
- Description of any waste sampling
- Name of person recording information
- Name of field manager at time of generation

7.2.13 Hazardous Waste Manifests and LDR Certification

All hazardous waste transported from the site will be accompanied by a hazardous waste manifest. DON personnel will be responsible for reviewing and signing all waste documentation, including waste profiles, manifests, and LDR notifications (manifest packages). Prior to signing the manifest, the designated DON official will ensure that pre-transport requirements of

packaging, labeling, marking, and placarding are met according to 40 CFR, Parts 262.30 through 262.33, and 49 CFR, Parts 100 through 178.

The DON will receive one copy of the manifest; the remaining copies will be given to the transporter. The manifest will be returned to the DON's signatory official for the base's recordkeeping requirements. Copies of all manifests for waste generated at the site will be kept in a compliance file within the project files. (The PCB Hot Spot Project Manager will provide the DON with the generator's copies of the manifest.)

A LDR notification will accompany the shipment of hazardous waste to the TSDF. The TSDF will be notified prior to the waste being sent. The following items must accompany the notification and are included in one of the following facility-specific forms:

- EPA hazardous waste generator identification number
- Manifest number, including state disposal application number
- Waste analysis data
- Corresponding concentration-based or technology-based treatment standards that will be identified if the waste is also land disposal restricted

RCRA recordkeeping requirements per 40 CFR, Parts 262.20 through 262.44, including retention of signed copies of manifests from the designated facility that received the waste, will be followed. Additionally, biennial and exception reporting information will be submitted, as necessary, according to 22 CCR, Sections 66262.41 and 66261.42, and 40 CFR, Parts 262.41 and 262.42. Additional reporting may be required in accordance with 22 CCR, Section 66262.43, and 40 CFR, Part 262.43.

7.3 WASTE MANAGEMENT FOR RADIOACTIVE WASTES

The following subsections address specific control and management practices for LLRW and LLMW. Disposal of all radiological wastes will be handled through the DON's LLRW Disposal Program.

A certified waste broker contracted by the DoD Executive Agency for LLRW will be used for all packaging, shipping, manifesting, and disposal of LLRW and LLMW. The waste broker will coordinate closely with RASO.

7.3.1 Waste Classification

Radioactive wastes will be classified as specified in 49 CFR and/or disposal facility requirements. These wastes will be categorized as either LLRW or LLMW. Waste characteristics including, the radionuclides present and their associated specific activity, will be measured by an available standardized test method such as gamma spectroscopy, strontium analyses, and/or

alpha spectroscopy. Additionally, for LLMW, chemical waste characteristics can be measured by a standardized test method or be reasonably classified by generators of waste based on their knowledge of the waste, provided that the waste has already been reliably tested for acceptance at the waste disposal facility.

A waste determined not to be a RCRA LLMW may still be considered a state-regulated non-RCRA LLMW. The state is broader in scope in its RCRA program in determining hazardous waste. Relevant information pertaining to this can be found in Section 7.2.1.

7.3.2 Waste Accumulation and Storage

As for hazardous waste, specific requirements apply to the accumulation time for LLMW on site and to the accumulation and labeling of LLMW. This project may result in the temporary accumulation of LLMW in containers. These wastes will be managed, accumulated, and inspected in accordance with the regulations. Accumulation time requirements do not apply to LLRW.

All LLRW and LLMW will be packaged per the direction of a waste broker certified by the DoD Executive Agency for LLRW (Army Field Support Command) in accordance with federal directives and disposal facility requirements. Typical containers that may be used for these wastes including 55-gallon drums, B-25 boxes, and covered roll-off containers. Containers will be properly lined, and absorbent will be used if it is considered necessary. All containers will be surveyed and/or swiped when received. Each container will be properly inventoried and labeled. Inventories will include material description and isotopic identification, and hazardous components if appropriate. The contents of each container will be recorded in the field logbook, and each container will be assigned a unique identification number.

Containers will be stored in a designated and posted radioactive material storage area under the authority of NWT's NRC license. Storage areas may be at the site where the waste originated or in Building 406 at HPS. Containers will be secured to prevent unauthorized access to the contents of the container. Once filled, all containers will be surveyed and surface radiation measurements collected using an ion chamber survey meter or equivalent.

Radiological sources may include radium or strontium-containing devices such as radioluminescent devices, markers, clocks, and other instruments. The sources will be placed in Ziploc® plastic bags and labeled with location information indicating where they were found. (Sources too large to be placed in a Ziploc bag will be managed as radiological debris.) Each bag will be sealed to prevent contamination from inadvertently escaping from the container. Each bag will be electronically photographed and the radiation level measured using an ion chamber or equivalent survey instrument. Some of these items may be analyzed by gamma spectroscopy to identify the radionuclide associated with the source. If gamma spectroscopy cannot identify

the source, an off-site laboratory may need to analyze the source for beta- or alpha-emitting radionuclides. A master inventory list will be constructed, which will include:

1. Date of collection
2. Grid identification
3. Point source description
4. Radiation level
5. Electronic photograph

In the case of the discovery of radioactive contaminated debris or other similar waste material not associated with a point source, such material will be removed and placed separately into lined 55-gallon steel drums or other appropriate container. Containers will be marked with a unique identification number that will be assigned and recorded in the TtFW radiological logbook.

7.3.3 Soil, Debris, and Materials

Soil, debris, and materials classified as LLRW or LLMW may be generated during excavation at the PCB Hot Spot. When classified as LLRW or LLMW, these wastes may be placed in 55-gallon drums, B-25 boxes, and/or roll-off containers. These containers will be managed as described in Section 7.3.2.

7.3.4 Wastewater and Waste Fluids

Wastewater from the radioactive material decontamination area will be maintained separately from hazardous decontamination and dewatering wastewater. If the wastewater chemical characteristics are unknown, wastewater will be managed as LLRW wastewater, until characterized. Known or suspected LLMW wastewater will be segregated during accumulation and storage. When decontaminating and dewatering radioactively contaminated material, every effort should be made to minimize the generation of mixed waste.

7.3.5 Labeling and Posting of Containers Containing Radioactive Waste

Each waste container containing LLRW or LLMW will be labeled. The specific activity contained in each waste container and maximum contact radiation levels will be measured in milliroentgen per hour (mR/hr). Following the surveying and labeling, the waste container will be placed in a designated and posted radioactive material storage area. The waste container will be posted with a "Caution – Radioactive Material" sign. The sign will also note the maximum surface radiation level (measured in mR/hr). An inventory of contents with radionuclide and specific activity (if available) will be posted on the outside of the container or a notice will be posted stating where this information is found. LLMW will also be marked in accordance with

the requirements in Section 7.2.6. The waste inventories will be managed under NWT's license including the mixed waste inventory due to the radioactive constituents.

7.3.6 Waste Accumulation Areas

TtFW and contractors working on this project will implement, at a minimum, the following requirements for radioactive waste stored on site within a designated radioactive waste storage area:

- The display of industry standard placard and barrier materials with wording that includes the following, "Caution, Radioactive Materials Area-Unauthorized Personnel Keep Out" (written in English and Spanish), at each radioactive waste storage area sufficient to be seen from any approach. The signs will be legible and clearly conspicuous for outdoor and indoor locations.
- Aisle space will be maintained to allow for the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of facility operation in an emergency, unless aisle space is not needed for any of these purposes.
- The areas will be secured to prevent unauthorized access to the material.
- The following emergency equipment will be located or available to personnel during active waste management activities at each accumulation area:
  - A device, such as a telephone or a hand-held two-way radio, capable of summoning emergency assistance will be available.
  - Portable fire extinguishers, fire control equipment, spill control equipment, and decontamination equipment will be available.

Filled containers generated during performance of this Work Plan will be stored at the site where they were generated or may be placed in Building 406 until the contained material can be characterized for packaging and disposal by the waste broker.

7.3.7 Waste Disposal

A certified waste broker contracted by the DoD Executive Agency for LLRW will be used for all packaging, shipping, manifesting, transportation and disposal of LLRW and LLMW. The waste broker will coordinate closely with RASO. LLRW and LLMW inventories will be managed under NWT's license due to the radioactive constituents.

The waste broker will be responsible for preparing the hazardous waste manifests for the LLMW and the radioactive waste manifests for the LLRW. These manifests will be signed by the waste broker. The waste broker will also be responsible for coordinating the shipment of LLMW and LLRW and coordinating with the waste disposal facilities.

7.3.8 Waste Transportation

Wastes sent off site for disposal will be done so in accordance with the DOT Radioactive Material Transportation regulations of 49 CFR, by a certified waste broker contracted by the DoD Executive Agency for LLRW. Personnel having the required DOT training will perform assistance as needed.

The waste broker will be responsible for surveying and taking radiation measurements on the outside of the container prior to shipment. The waste broker will work with the RTM to ensure that containers leaving the site meet the release limits for equipment and materials identified in Table 4-1.

7.3.9 Waste Minimization

To minimize the volume of radioactive waste generated during the project, the following general guidelines will be followed:

- Waste material will not be contaminated unnecessarily.
- Work will be planned ahead.
- Cleaning and extra sampling supplies will be maintained outside any potentially contaminated area to keep them clean and to minimize additional waste generation.
- Mixing of detergents or decontamination solutions will be performed outside potentially contaminated areas.
- When decontaminating radioactively contaminated material, every effort should be made to minimize the generation of mixed waste.
- Contaminated material will not be placed with clean material.
- Wooden pallets inside the exclusion zone will be covered with plastic.
- Material and equipment will be decontaminated and reused when practicable.
- Volume reduction techniques will be used when practicable.

7.3.10 Inspections

While all waste accumulation areas will be informally inspected on a daily basis, formal inspections of all container accumulation areas will be conducted and recorded at least weekly in accordance with NWT license requirements. The NWT RTM or designee will conduct inspections. Inspections will be logged in a dedicated field notebook, and a weekly inspection checklist will be completed. The container storage area(s) will be inspected to ensure the following:

- The containers will be checked for good condition. If a container is not in good condition the waste broker will be informed.

- The containers will be checked to ensure that they remain closed and secured at all times, except when adding or removing waste.
- The container label will be checked to ensure that it is visible and filled out properly.

7.3.11 Documentation

Documentation requirements apply to all waste managed during project activities. Field records will be kept of all waste generation activities. All pages of the field data record log will be signed and dated by the person who is entering the data. In addition, the following information will be recorded in the log:

- Description of waste-generating activities
- Location of waste generation (including depth, if applicable)
- Type and volume of waste
- Date and time of generation
- Description of any waste sampling
- Name of person recording information
- Name of RTM at time of generation

7.3.12 Radioactive Waste Manifests

All radioactive waste transported from the site will be accompanied by a radioactive waste manifest and/or hazardous waste manifest if necessary.

The CSO and RASO will each receive one copy of the manifest; the remaining copies will be given to the transporter. The manifest will be returned to the DON's signatory official for the base's recordkeeping requirements. Copies of all manifests for waste generated at the site will be kept in a compliance file within the project files.

7.4 UPDATING THE WASTE MANAGEMENT PLAN

The WMP will be updated as changes in site activities or conditions or changes in applicable regulations occur. Revisions to the WMP will be reviewed and approved by the DON. All changes to the WMP associated with radioactive or mixed waste will require approval from RASO.

8.0 ENVIRONMENTAL PROTECTION PLAN

This EPP presents information regarding the environmental management program for the PCB Hot Spot. The purpose of this EPP is to detail the means of compliance with the applicable or relevant and appropriate environmental regulatory requirements for the TCRA as identified in the Draft AM for PCB Hot spot (DON, 2005) and the Final Basewide AM (DON, 2001a). This EPP will help ensure that activities associated with the environmental management program are conducted in a systematic and well-documented manner. The EPP includes environmental compliance procedures and regulatory, procedural, and training requirements associated with conducting the TCRA field activities. The TtFW PCB Hot Spot Project Manager's responsibility is to verify that all project personnel are aware of the compliance requirements of this plan.

8.1 EXISTING NATURAL RESOURCES

The PCB Hot Spot is located within Parcel E-2, with a small section in Parcel E. The project area includes tidal wetlands along the shoreline and is adjacent to inland seasonal freshwater wetlands. Each discrete (tidal or freshwater) wetland is less then 5 acres in size, has low vegetative diversity classifications, potentially toxic inputs, and is small and discontinuous in nature (Levine-Fricke-Recon, Inc. and PRC Environmental Management, 1997; and TtEMI, 2005).

The climate in the South Bay area is temperate and is influenced by the regional topography and proximity to the Pacific Ocean. The climate is fairly constant and predictable, having a bimodal seasonal pattern with respect to temperature and rainfall. Summers are usually warm and dry, with the exception of morning and evening fog due to a marine inversion layer. Winters are wet and cool with most annual precipitation occurring between October and March.

Existing vegetation at the site is sparse. Habitats adjacent to the PCB Hot Spot are composed of ruderal upland species and relatively flat topography. Surface elevations of adjacent land areas are generally less than 10 feet above msl.

8.2 DESCRIPTION OF HABITAT AND SENSITIVE SPECIES

San Francisco Bay coastal open water, tidal channels, and wetlands are found within or are adjacent to the project area and its associated 1,000-foot zone of influence (ZOI). While numerous species of plants, wildlife, and other biota have been observed in San Francisco Bay waters at or near the project area and its associated ZOI, no federally listed or candidate species are known to permanently reside or regularly breed within the project impact area or ZOI [Levine-Fricke-Recon, Inc. and PRC Environmental Management, 1997; TtEMI, 2002; California Department of Fish and Game (CDFG), 2003].

The project area includes tidal wetlands along the shoreline and is adjacent to inland seasonal freshwater wetlands. Each discrete (tidal or freshwater) wetland is less than 5 acres in size, has low vegetative diversity classifications, potentially toxic inputs, and are small and discontinuous in nature (Levine-Fricke Recon, Inc., and PRC Environmental Management, 1997; TtEMI, 2002). Therefore, these wetlands/habitat features provide low effectiveness and opportunity for wildlife breeding habitat (TtEMI, 2002).

In general, existing vegetation within the project area is sparse. Portions of the project area are located in intertidal areas. These wetland/habitat features provide low-quality habitat and little opportunity for wildlife breeding. The dominant vegetation in all wetland areas is common pickleweed (*Salicornia virginica*) and salt grass (*Distichillis spicata*), while the uplands have a predominance of fennel (*Foeniculum vulgare*), black mustard (*Brassica nigra*), barley (*Hordeum murinum*), cultivated oat (*Avena sativa*), plantain (*Plantago* sp.), and perennial rye grass (*Lolium perene*). Habitats adjacent to the project area are composed of disturbed upland species.

The California Natural Diversity Database maintained by the CDFG has no published records of special-status species within the proposed project's direct impact area and ZOI. These findings are consistent with previous site-specific surveys, which have investigated HPS for the presence of special-status plants and wildlife species (Levine-Fricke-Recon, Inc. and PRC Environmental Management, 1997; TtEMI, 2002; CDFG, 2003; TtFW, 2004).

8.3 RUN-ON AND RUNOFF CONTROL PROVISIONS

A SWPPP is attached as Appendix C. The SWPPP addresses run-on and runoff control measures and other Best Management Practices (BMPs) that will be implemented during field activities to prevent the migration of potentially contaminated soil and sediment.

8.4 REGULATORY REQUIREMENTS

Based on the AMs (DON, 2001a; DON, 2005), the DON recommended a removal action for PCB and petroleum hydrocarbon-contaminated soil and/or incidental radioactive material that includes excavation and off-site disposal. This alternative was recommended because it best meets the NCP criteria of overall protectiveness of human health; compliance with ARARs; long-term effectiveness; reduction of mobility, toxicity, or volume through treatment; short-term effectiveness; implementability; cost; and state and community acceptance. Implementation of the TCRA requires that soils impacted by PCBs, petroleum hydrocarbons and ROCs be excavated, stockpiled, and transported off-site to an appropriately permitted TSDF. Prior to the start of work, the DTSC and RWQCB will be notified of the intent to begin cleanup. A complete discussion of ARARs and evaluation of potential ARARs are presented in the AMs (DON, 2001a; DON, 2005).

8.4.1 Specific Environmental/Regulatory Requirements

Environmental/regulatory requirements that are applicable to the PCB Hot Spot TCRA activities are described below.

8.4.1.1 Hazardous Waste Management

Excavated soils and waste materials classified as TSCA or hazardous waste will be temporarily staged on a 20-mil HDPE or PVC liner pending off-site disposal processing. Wastes staged on site will be protected from run-on and runoff and will be covered to prevent wind dispersion. Permits are not required by HPS, the waste generator, for the transportation or disposal of hazardous waste off site. HPS has an EPA generator identification number that will be used on the manifests that accompany each hazardous waste shipment.

8.4.1.2 Air Emissions

The substantive requirements of the BAAQMD rules relating to visible emissions, fugitive dust, and particulate matter emissions must be complied with; however, no permits are required. A grading permit is also not required, as the federal government is exempt under county ordinance, provided grading is supervised and inspected by a registered professional engineer.

8.4.1.3 SWPPP

A SWPPP (Appendix C), which addresses installation and maintenance of appropriate BMPs for controlling stormwater, has been prepared in accordance with State Water Resources Control Board requirements; however, a general National Pollutant Discharge Elimination System (NPDES) stormwater construction permit will not be required. Because the field activities are regulated under CERCLA, only the substantive requirements of the NPDES permit apply.

8.4.1.4 Base Approvals

TtFW will coordinate with the CSO and the RPM to obtain necessary station approvals for the excavation of impacted soil from within the PCB Hot Spot. Required approvals may include underground utility clearance and selection of the analytical laboratory and off-site disposal facilities.

8.4.2 Excavation Activities

Excavation activities will be performed in accordance with pertinent regulatory requirements. The applicable regulations, along with the methods to assure compliance with these regulations, are described below.

8.4.2.1 Excavation Management Plan

Unstable earth conditions are not expected at the PCB Hot Spot during the removal activities. Soil within the limits of excavation will be excavated in 12-inch lifts to a maximum of 3 feet bgs (or to an estimated maximum depth of 10 feet bgs in the case of known contamination). Excavations that are up to 4 feet deep will be cut vertically. Excavations greater than 4 feet deep will be sloped with a ratio of 1.5 horizontal to 1 vertical (1.5H:1V), unless otherwise determined by a competent person. Steeper slopes may be allowed if the soil exhibits cohesive properties, the soil is found to be in dry condition (not in the water table), and no adverse weather is forecasted. Daily inspections of excavations will be performed by a competent person to assess the stability of the slopes and the excavated area. Any excavation deeper than 5 feet will require that notification be given to Cal-OSHA, per the current excavation permit that is acquired by TtFW on an annual basis, and received excavation permits will be posted. OSHA excavation regulations and permits will be followed at all times. Excavation activities will be conducted in accordance with the requirements within CCR Title 8, Sections 1539 through 1541, and Title 29 CFR, Parts 1910 and 1926.

8.4.2.2 Fugitive Dust

Fugitive dust emissions may occur during soil excavation and waste handling activities. All construction activities will comply with the substantive requirements of BAAQMD Rule 40 and Regulations 6-305 and 8 pertaining to fugitive dust emissions and maintaining, covering, and stockpiling excavated soil. Dust will be controlled during excavation with water application. Ambient air monitoring for PCBs and particulates, including potential airborne radioactivity, will be performed upwind and downwind of the project area per the stand-alone SHSP and the associated RWP. The monitoring results will be used to determine if additional measures are required to control adverse impacts from airborne contaminants. Measures may include increased PPE levels for project personnel, reduction or stopping of excavation activities, and/or dust abatement using water application or by covering stockpiles with plastic sheets.

8.4.2.3 Floodplains and Wetlands

The project area is not located within a 100-year floodplain as defined by the U.S. Geologic Survey. The area where excavation will occur are also not considered wetlands. Limited shoreline areas near the PCB Hot Spot have wetlands; however, these areas will not be impacted by site activities. Therefore, requirements pertaining to floodplain and wetlands protection are not applicable to this TCRA.

8.4.2.4 Endangered Species and Migratory Birds

No federally listed species are known to permanently reside on or in the vicinity of HPS (Levine-Fricke-Recon, Inc. and PRC Environmental Management, 1997); however, San Francisco Bay is

a seasonal home for birds migrating along the Pacific Flyway, and numerous species of migratory birds have been observed at HPS. Table 8-1 provides a listing of threatened and endangered species that have been observed at or near HPS. Disturbance of habitats will be restricted to only those areas necessary for site mobilization and setup and locations where work is being performed.

8.4.2.5 Worker Health and Safety

Field activities will be governed by the SHSP, RWPs, and NWT's NRC license.

All activities will be performed in accordance with OSHA requirements for worker safety. The SHSP provides requirements and guidelines that will be used in the field to protect the health and safety of workers. A SHSS will provide full-time oversight of activities to ensure compliance with OSHA regulations and the SHSP. In parallel, qualified RCTs will provide continuous oversight of work area operations to ensure compliance with the occupational and environmental standards and practices defined in the NWT radioactive materials license and subject to enforcement by the NRC.

8.5 RELEASE PREVENTION, RESPONSE, AND REPORTING

8.5.1 Spill Prevention

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

- **Fueling** – All vehicles will be fueled and serviced prior to moving onto the site. Any on-site fueling of equipment will be conducted within a designated and controlled area. No bulk quantities of fuel will be stored on site.
- **Wastewater** – Wastewater will be stored in temporary tanks or 55-gallon drums within a secondary containment area. Therefore, any spills from the containers or tanks will be contained and will not be released to the surrounding areas.

8.5.2 Spill Response

In the event of a release of hazardous materials into the environment, per the SHSP, TtEC will contain or control the release or evacuate the area if the spill is significant or represents an immediate health threat. Spills, leaks and fires involving at HPS must be reported to the RPM, ROICC and CSO. In addition, all spills involving radioactive materials must be reported to the RSO and RASO. Absorbent pads, shovels, and 55-gallon drums will be kept on site to address the possibility of spills.

8.5.3 Spill/Release Reporting

The steps below outline the chain of communications that will be followed if a significant spill of any hazardous substance occurs. A significant spill will be considered any spill over the reportable quantity, as determinable by federal and/or state regulations, as well as any spill below the reportable quantity that is not properly contained and released to the environment.

1. Site personnel involved in the spill will immediately contact the TtEC Spill/Release On-Site Coordinator, Construction Manager, or SHSS, who will notify the PCB Hot Spot Project Manager. At least one of the following two individuals will be on-site during all remedial activities:

SHSS:	Richard Quinn
On-site Coordinator and Construction Manager:	Bill Williams

The TtEC SHSS or Construction Manager will contact the RPM, ROICC, and CSO identified below:

RPM:	Jose Payne (619) 532-0962
ROICC:	Peter Stroganoff (510) 749-5941
CSO:	Mike Mentink (415) 743-4729
RASO:	Laurie Lowman (757) 887-4692

2. If a release of a waste or hazardous substance, regardless of quantity, could threaten human health or the environment outside the facility, the PCB Hot Spot Project Manager will verify that the National Response Center [(800) 424-8802] and the local Emergency Response Coordinator (Fire Department) have been notified by the DON. Releases will be reported, and written follow-up emergency notices will be submitted under the SARA, Title II requirements.

3. In concert with the above actions, the following persons will be contacted by the PCB Hot Spot Project Manager or Construction Manager:

TtEC Regulatory Compliance:	Greta Neuman Office: (757) 963-1670 Cell: (757) 619-4291

TtEC Certified Industrial Hygienist: Roger Margotto
Office: (619) 471-3503
Cell: (949) 306-2517

In the event of a spill of radioactive material NWT will make appropriate notifications in accordance with its NRC license requirements. Notifications will also include the DON RPM, RASO, and TtEC.

8.6 PROJECT AND PERSONNEL REQUIREMENTS

TtEC personnel training requirements and inspection programs applicable to the PCB Hot Spot TCRA are described below. Protocols for inspections by regulatory agencies and third parties are also addressed below.

8.6.1 Personnel Training/Certification Requirements

Project personnel training/certification requirements are as follows:

- OSHA 40-hour Hazardous Waste Operations and Emergency Response and annual 8-hour refresher training
- Radiation awareness training
- RWP and Task-specific Plan training for the specific site or task
- AHA training for the specific task
- SHSP training, as required
- For site personnel performing DOT functions, such as selecting, packaging, marking, labeling, preparing shipping papers for, and loading non-radiological wastes, must be trained in accordance with the requirements of HM-126F; Subcontractors performing DOT functions must supply proof of training
- For project personnel performing non-radiological waste management activities must be certified under TtEC waste management training in accordance with Title 40 CFR, Parts 262.11 through 265.16
- Personnel who are handling/storing radioactive material will be trained in accordance with NWT's NRC license requirements
- Only waste brokers certified by DoD Executive Agency (Army Field Support Command, Rock Island) will ship LLRW and LLMW

All project personnel (subcontractors and TtEC) will be trained according to TtEC compliance policies and procedures, including TtEC's Radiological Protection Program (RP-1). TtEC personnel records will be verified along with the subcontractors' training records prior to beginning project activities.

Project-specific training/certification records will be kept on site until project completion. At project completion, the records will be filed within the CTO project files (in San Diego).

8.6.2 Inspection and Audit Procedures

Site inspections and audits may occur during the removal activities to ensure compliance with applicable state and federal regulations, the SHSP and the Base-wide Health and Safety Plan (HSP) (TtFW, 2005b).

8.6.2.1 Inspections by TtEC Personnel

TtEC inspections will be conducted regularly to document compliance with environmental health and safety regulations and TtEC procedures. The inspection requirements are documented within this Work Plan, TtEC company procedures, the HSP (TtFW, 2005b) and in the SHSP.

8.6.2.2 Inspections by Regulatory Agencies

Regulatory inspections will be handled by TtEC in accordance with the TtEC Compliance Procedure for Environmental Inspections by Regulatory Agencies. These procedures require that, in addition to contacting the RPM and CSO, project personnel or the PCB Hot Spot Project Manager must notify the Regulatory Compliance Manager, Keli McKay-Means. Specific NRC license inspections will be handled by the license holder (NWT).

8.6.2.3 Designated Representative for Inspections by Regulatory Agencies

The PCB Hot Spot Project Manager has designated Gerard Slattery as the TtEC on-site representative for inspections by regulatory agencies. For inspections pertaining to the NRC license, Bert Bowers is the designated on-site representative.

8.6.3 Inspections by Non-regulatory Third Parties

Any non-regulatory third party requesting access to inspect the site must be referred to the DON for access. TtEC personnel or their subcontractors must not grant site access or answer questions for unauthorized personnel. The PCB Hot Spot Project Manager will notify the RPM and CSO of any attempts to gain site access by third parties.

Members of the media asking questions or attempting to access the project area will be referred to the RPM.

8.7 DOCUMENTATION AND RECORDS RETENTION

Documentation of regulatory compliance issues and records retention will be conducted in accordance with the TtEC compliance procedures for documentation and records retention and *Installation Restoration Manual 2001* (DON, 2001b).

Under contract conditions, documents must be kept in the project files for a minimum of 10 years. In addition, compliance records will be maintained in accordance with the compliance procedure for documentation and records retention.

8.8 UPDATING THE EPP

This EPP will be updated as needed to reflect changing site conditions.

9.0 PROJECT MANAGEMENT PLAN

The project management team will be responsible for all technical and administrative aspects of the TCRA. Included among the team's responsibilities are the project schedule, staffing, data management, document control, project meetings, and reporting.

9.1 PROJECT SCHEDULE

The proposed schedule for implementation of the TCRA is included as Figure 9-1. The schedule is presented in a critical-path method format. Construction activities have been planned to start after approval of the Work Plan and procurement of the necessary equipment, materials, and subcontracting services.

9.2 PROJECT RESPONSIBILITIES

The RPM for this project is Mr. Jose Payne, R.E.A. Mr. Payne is responsible for project management, budget control, schedule maintenance, and coordinating project survey plans, reports and negotiations with regulatory agencies. Mr. Payne is also responsible for community relations and ensuring that field activities relating to chemicals are in compliance with applicable rules and regulations. Mr. Mike Mentink and Mr. Doug Delong of the CSO are responsible for coordination of field activities with different HPS departments and personnel. Mr. Peter Stroganoff is the ROICC, responsible for the technical oversight and QC. Ms. Laurie Lowman is the technical lead for the RASO and is responsible for the technical oversight and review of the project documents and all issues related to radiological activities. RASO acts as the lead interface with regulatory agencies on radiological issues, survey plans and reports, and is responsible for negotiations with regard to radiological release criteria.

Ms. Ulrika Trulsson Messer, as the PCB Hot Spot Project Manager, will be responsible for specific project administration. Ms. Trulsson Messer will oversee the project budget, schedule, and document preparation, and will ensure the quality of all project activities and deliverables. In addition, Ms. Trulsson Messer will be responsible for managing the on-site technical aspects of the project and coordination with the CSO, ROICC, and PCB Hot Spot Project Manager. Mr Gerard Slattery is the HPS Project Manager for TtEC's radiological activities at HPS. The Construction Manager, Mr. Bill Williams, will manage the fieldwork and provide oversight to the subcontractors. Mr. Williams will coordinate the field activities with the senior technical staff and the SHSS.

Mr. Alan Bradford will act as the PQCM and will coordinate with the QC Program Manager, Ms. Mary Schneider, to ensure that all field activities are in compliance with the project specifications. Mr. Richard Quinn will be the Senior SHSS on site and will be responsible for ensuring that field activities are conducted in compliance with the SHSP. Mr. Quinn will

coordinate with Mr. Roger Margotto, Certified Industrial Hygienist. Mr. Cliff Stephan, the Project CHP, is responsible for oversight of the TtEC radiological program. Mr. Daryl DeLong will act as the RSO.

Mr. Bert Bowers, NWT's Project Manager, is responsible for ensuring that all radiological operations are performed in compliance with the NWT NRC license and Radiological Health Program. Additional support will be provided by other engineering and technical resources. A project organization chart showing the relationship among select team members is provided as Figure 9-2.

The following is a list of the key project and regulatory contacts:

Agency	Contact	Project Title
NAVFAC SW BPMOW.JP 1455 Frazee Road, Suite 900 San Diego, CA 92108-4310	Jose Payne (619) 532-0962	DON Remedial Project Manager (RPM)
NAVSEA DET RASO Building 1971 NWS P.O. Drawer 260 Yorktown, VA 23691-0260	Laurie Lowman (757) 887-4692	Radiological Site Manager
NAVSEA DET RASO Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260	Matthew Slack (757) 887-4692	Assistant Radiological Site Manager
NAVFAC SW 1220 Pacific Highway San Diego, CA 92131-5190	Narciso Ancog (619) 532-2540	Quality Assurance Officer
NAVFAC SW ROICC San Francisco Bay Area 2450 Saratoga Ave., Building 110, Suite 200 Alameda, CA 94501-7545	Peter Stroganoff (510) 749-5941	ROICC
NAVFAC SW ROICC San Francisco Bay Area 2450 Saratoga Ave., Building 110, Suite 200 Alameda, CA 94501-7545	Andy Uehisa (510) 749-5946	ROICC Construction Management Technician
CSO Hunters Point Shipyard 410 – Palm Avenue, Building 1, Suite 161 San Francisco, CA 94130	Mike Mentink (415) 743-4729	CSO
CSO Hunters Point Shipyard 410 – Palm Avenue, Building 1, Suite 161 San Francisco, CA 94130	Doug Delong (415) 743-4713	CSO
EPA, Region IX 75 Hawthorne Street (SFD-8-3) San Francisco, CA 94105	Michael Work (415) 972-3024	EPA RPM

Agency	Contact	Project Title
California Environmental Protection Agency (Cal/EPA) DTSC Office of Military Facilities 700 Heinz Ave., Bldg. F, Suite 200 Berkeley, CA 94710	Tom Lanphar (510) 540-3776	Cal/EPA DTSC RPM
WB 1515 Clay Street, Suite 1400 Oakland, CA 94612	James Ponton (510) 662-2492	WB RPM
City and County of San Francisco Department of Public Health (DPH) 1390 Market St., Suite 210 San Francisco, CA 94102	Amy Brownell (415) 252-3967	San Francisco DPH RPM
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Gerard Slattery (415) 671-1990	HPS Project Manager
TtEC 1230 Columbia Street, Suite 500 San Diego, CA 92101	Ulrika Trulsson Messer (619) 471-3528	PCB Hot Spot Project Manager
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Bill Williams (415) 671-1990	Construction Manager
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Chuck Bartholomew (415) 216-2738	Site Superintendent
TtEC 1940 East Deere Avenue, Suite 100 Santa Ana, CA 92705	Mary Schneider (949) 756-7586	QC Program Manager
TtEC 1940 East Deere Avenue, Suite 100 Santa Ana, CA 92705	Lisa Bienkowski (949) 756-7592	Program Chemist
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Alan Bradford (415) 671-1990	PQCM
TtEC	To be determined	Field Engineer
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Daryl DeLong (415) 671-1990	RSO

Agency	Contact	Project Title
TtEC Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Richard Quinn (415) 671-1990	Senior SHSS
TtEC 1230 Columbia Street, Suite 500 San Diego, CA 92101	Roger Margotto, CIH, CSP, CHMM (619) 471-3503	Certified Industrial Hygienist
TtEC One Columbus Center, Suite 675 Virginia Beach, VA 23462	Greta Neuman (757) 963-1670	Regulatory Compliance
TtEC 3200 George Washington Way, Suite G Richland, WA 99352	Cliff Stephan (509) 371-0140	Project CHP
TtEC 1940 East Deere Avenue, Suite 100 Santa Ana, CA 92705	Matt Amalog (949)756-7533	Wildlife Biologist
NWT Hunters Point Shipyard 270 Nimitz Avenue, Building 270 San Francisco, CA 94124	Bert Bowers (415) 216-2742	NWT Radiological Task Manager

9.3 DATA MANAGEMENT

The following is a summary of the data management tools that will be employed for the duration of this project:

- Primavera® and Harper Shuman accounting software will be used for all scheduling and project cost tracking.
- Home and field office staff will use Microsoft Excel® spreadsheets for technical data management. Microsoft Word® will be used for word processing.

9.4 DOCUMENT CONTROL

TtEC's internal document control procedures will be followed for the duration of the project. Additional guidance provided by the DON will be used for document control, particularly for matters relating to regulatory compliance. Management of internal and external correspondence will be administered at the home office in San Diego, California. Document control will include assigning alphanumeric codes to each submittal. Complete project files will be maintained in a secure, dry area at the field office.

9.5 MEETINGS AND REPORTS

Project status/CQC meetings will be held weekly (or at less frequent intervals if desired by the DON) at the field office during the field construction activities. The PCB Hot Spot Project Manager, Construction Manager, PQCM, and other selected individuals will be required to attend these meetings with the CSO, ROICC, and RPM. The agenda of the project status meetings will include the following:

- Review and approval of the minutes of the previous meeting
- Review of work progress
- Field observations, problems, and conflicts
- Problems that may impede the construction schedule and proposed corrective actions
- Review of off-site delivery schedules
- Corrective measures and procedures to regain the projected schedule
- Revisions to the construction schedule
- Forecast of progress for the succeeding work period
- Coordination of schedules
- Review of submittal schedules, if any
- Review of quality/health and safety programs
- Review of quality/radiation safety program
- Pending changes and substitutions
- Review of proposed changes for the effects of construction, completion date, and other aspects of the project
- Other project-related business

Minutes of the meetings will be prepared by TtEC and submitted to the DON. Daily reports will be prepared by the Construction Manager and the PQCM and submitted to the CSO and RASO. Weekly reports will be prepared by the PCB Hot Spot Project Manager and submitted to the RPM. The weekly reports will include work completed by the end of each week and work that is planned for the following week. The weekly reports will be submitted on Tuesdays for the week prior.

10.0 COMMUNITY RELATIONS ACTIVITY

Several community relations activities will be conducted to inform the public of the ongoing TCRA activities and to encourage involvement in the review of relevant documents and discussions regarding the proposed TCRA.

10.1 PUBLIC INFORMATION

This remediation process is being conducted in accordance with the Community Relations Plan prepared for HPS, to facilitate public involvement in the decision-making process. The Work Plan for the PCB Hot Spot TCRA and other documentation associated with remediation activities at HPS are contained in the Administrative Record for this site. The Administrative Record Index is maintained by NFECSW and is available to the public at the NFECSW offices at 1220 Pacific Highway, San Diego, California.

The DON, as lead agency with state agency concurrence, has overall responsibility for public participation activities. As such, this document, the Final Basewide AM (DON, 2001a), and other information concerning the PCB Hot Spot are available to the public via the Information Repository. There are two public information repositories where the public can review any of the documents associated with the Administrative Record. The repositories are:

San Francisco Main Library
100 Larkin Street
Government Information Center, 5th Floor
San Francisco, CA 94102
(415) 557-4500

Anna E. Waden Library
5075 Third Street
San Francisco, CA 94124
(415) 715-4100

10.2 PUBLIC PARTICIPATION

To encourage local participation in the hazardous waste cleanup program at HPS, the DON established a Restoration Advisory Board (RAB). This board is a citizen-based committee representing local community interests. RAB meeting agendas, minutes, and presentation materials are included in the Administrative Record for public review.

The RAB held meetings during the investigation and preparation of the Draft AM for PCB Hot Spot (DON, 2005) and Final Basewide AM (DON, 2001a) A separate public meeting was held on 25 January 2005 when the DON discussed and solicited comments on the Draft AM for PCB Hot Spot (DON, 2005). All meetings were advertised locally in an effort to encourage public attendance and participation. In addition, the DON has prepared a master mailing list of the local community members, and whenever significant cleanup activities or decisions are planned, the community members are notified by mail for information purposes and involvement.

The Final Basewide AM (DON, 2001a) was issued to the RAB for review. A public notice was posted in the local newspaper, inviting public comments on the Final Basewide AM (DON, 2001a). The purpose of the public notice was to invite the interested community members to review the subject Final Basewide AM (DON, 2001a) and provide their comments or questions.

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TABLES

TABLE 3-1

CHEMICAL CLEANUP GOALS

Contaminant	Soil Cleanup Goal (Open Space)
Polychlorinated Biphenyls (PCBs)	1 mg/kg (soil to 3 feet bgs) 100 mg/kg (soil greater than 3 feet bgs)
Total Petroleum Hydrocarbons (including gasoline through motor oil range)	3500 mg/kg (open space)

Notes:

bgs – below ground surface
mg/kg – milligrams per kilogram

Source:

(DON, 2005)

TABLE 3-2

RADIOLOGICAL REMEDIAL OBJECTIVES[d]

Contaminant	Soil Remedial Objectives[a]
Radium-226	1 pCi/g > background, not to exceed 2 pCi/g total[b]
Cesium-137	0.13[c] pCi/g
Strontium-90	42.3[a] pCi/g

Notes:

[a] Except where noted, values are EPA Preliminary Remediation Goals (PRGs) for soil for outdoor worker (EPA, 2004). The on-site and off-site laboratory will ensure that the minimum detectable activity (MDA) meets the listed RROs by increasing sample size or counting time as necessary. The MDA is defined as the lowest net response level, in counts, that can be seen with a fixed level of certainty, customarily 95 percent. The MDA is calculated per sample by considering background counts, amount of sample used, and counting time.

[b] Limit established between the EPA and DON.

[c] Decay-corrected PRG for outdoor worker soil reuse provided by EPA Region IX.

[d] Release criteria for water generated as a result of remedial activities will be negotiated with regulatory agencies, and therefore, are currently unavailable.

DON – Department of the Navy
EPA – U.S. Environmental Protection Agency
pCi/g – picocuries per gram
RRO – radiological remedial objective

TABLE 4-1

MATERIALS AND EQUIPMENT SURFACE CONTAMINATION LIMITS

Radionuclide	Removable (dpm/100 cm^2)	Fixed (dpm/100 cm^2)
Radium-226	20 α	100 α
Strontium-90	200 β^-	1,000 β^-
Cesium-137	1,000 β^-, γ	5,000 β^-,γ

Notes:

These limits are for the release of equipment and materials and are based on *Regulatory Guide 1.86* (Atomic Energy Commission, 1974).

Types of radiation: α - alpha, γ - gamma, β^- - beta

cm^2 – square centimeters

dpm – disintegrations per minute

TABLE 4-2

INSTRUMENTATION FOR RADIOLOGICAL SURVEYS

Measurement/ Technique	Type of Instrumentation		Typical Background	Typical Efficiency (%)	Detection Sensitivity
	Detector	Meter			
Surface alpha/beta scans	Large-area gas proportional 43-68 (126 cm^2)	Data logger, 2350-1, 2360	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
Direct measurement static alpha/beta	Scintillation, Ludlum Model 43-89 (100 cm^2)		100-200 cpm β 0-2 cpm α		
Stationary conveyor / surface scans	NaI scintillation Ludlum Model 44-10	Ludlum Model 4612	100 to 12,000 cpm; varies with calibration γ	N/A	~1,000 cpm γ
	Geiger-Mueller Ludlum Model 44-40		40 – 50 cpm β	~22.3 β efficiency	500 cpm β
Surface gamma scans	NaI 2-inch x 2-inch scintillation Ludlum Model 44-10	Data logger 2350-1, 4612	100 to 12,000 cpm; varies with calibration γ	N/A	150-1500 cpm γ
Direct measurement static gamma					
Surface beta/gamma scans	Geiger-Mueller 44-9	Ratemeter 3	50 to 100 cpm β γ	~ 10 β γ total efficiency	~1,000 dpm per probe area β γ
Direct measurement beta/gamma					
Exposure rates	MicroR Meter with integral 1-inch x 1-inch NaI Scintillation	Ratemeter 19	7-8 μR/hr	N/A	2 μR/hr

Notes:

α – alpha
β – beta
γ – gamma
μR/hr – microroentgens per hour
cm^2 – square centimeters

cpm – counts per minute
dpm – disintegrations per minute
N/A – not applicable
NaI – sodium iodide

TABLE 4-3

ON-SITE 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)
Gross alpha and beta/gamma on swipes	Protean IPC9025 low-background gas-flow proportional counter	1-5 cpm β 0-0.5 cpm α	~62 β ~27 α	4-10 dpm/100 cm^2 β 2-5 dpm/100 cm^2 α

Notes:

* or equivalent

Types of radiation: α - alpha, γ - gamma, β - beta

cm^2 – square centimeters

cpm – counts per minute

^{137}Cs– Cesium-137

dpm – disintegrations per minute

N/A – not applicable

pCi/g – picocuries per gram

TABLE 4-4

DERIVED AIRBORNE CONCENTRATION

Radionuclide	Worker	
	DAC (μCi/mL)	10% DAC (μCi/mL)
Radium-226	3.0E-10	3.0E-11
Strontium-90	2.0E-9	2.0E-10
Cesium-137	6.0E-8	6.0E-9

Notes:

The above guideline values were determined using the NRC's 10 CFR, Part 20, Appendix B.

μCi/mL – microcuries per milliliter (activity)
CFR – Code of Federal Regulations
DAC – derived airborne concentration
NRC – Nuclear Regulatory Commission

TABLE 8-1

THREATENED AND ENDANGERED SPECIES AT OR NEAR HPS

Ocnorhynchus tshawytscha	Chinook salmon	Observed	SSC, SE, FT
Gavia immer	Common loon	Observed	SSC
Pelecanus erythrorhychos	American white pelican	May be present	SSC
Pelecanus occidentalis californicus	California brown pelican	Observed	SE, FE
Phalacrocorax auritus	Double crested cormorant	Observed	SSC
Bucephala islandica	Barrow's goldeneye	Observed	SSC
Charadrius alexandrinus	Snowy plover	May be present	SSC
Numenius madagascariensis	Long-billed curlew	Observed	SSC
Larus californicus	California gull	Observed	SSC
Sterna caspia	Caspian tern	May be present	SSC
Sterna elegans	Elegant tern	May be present	SSC
Circus cyaneus	Northern harrier	May be present	SSC
Pandion haliaetus	Osprey	Observed	SSC
Falco peregrinus	Peregrine falcon	Observed	SE, FE
Asio flammeus	Short-eared owl	May be present	SSC
Athene cunicularia	Burrowing owl	Observed	SSC
Eremophila alpestris	Horned lark	May be present	SSC
Lanius ludovicianus	Loggerhead shrike	Observed	SSC
Geothlypis trichas	Common yellowthroat	May be present	SSC
Melospiza melodia	Song sparrow	May be present	SSC

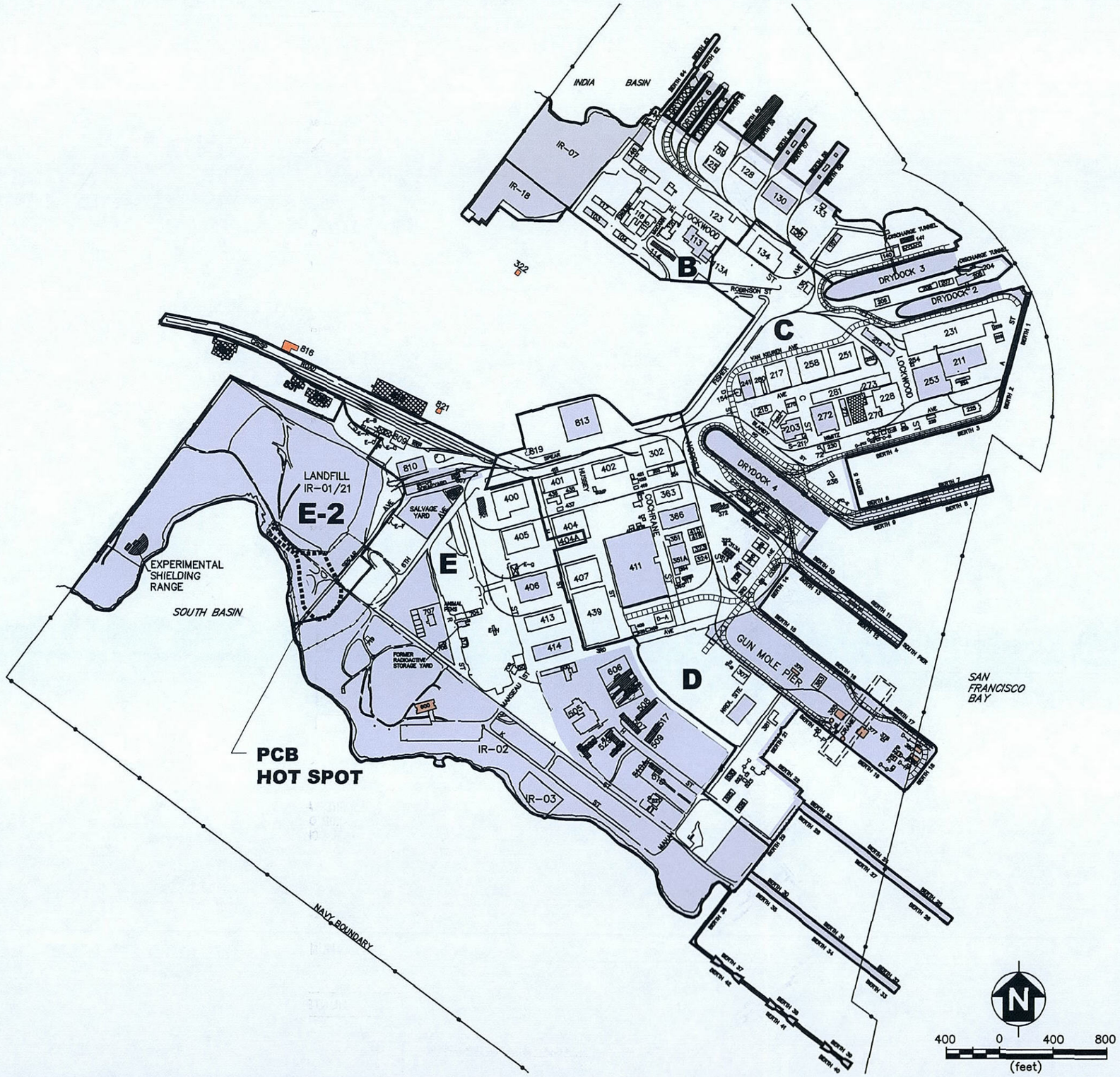
Notes:

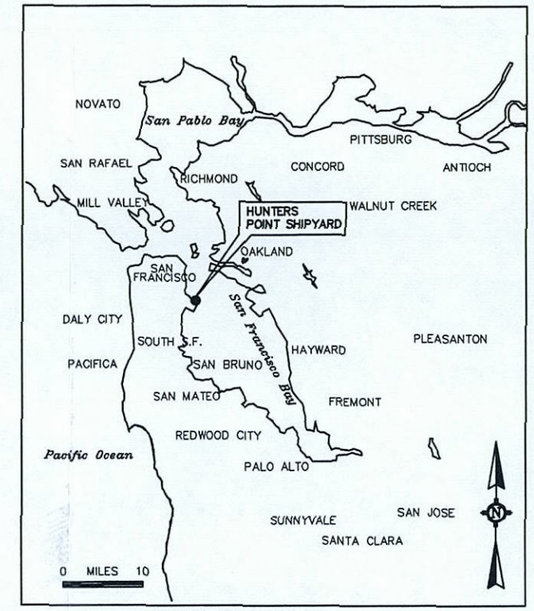
Source: Radiological Control Office. 2000. *Historical Radiological Assessment Hunters Point Annex Volume I, Naval Nuclear Propulsion Program 1966-1995.*

Designation Codes:

FE - Listed as endangered by the federal government
FT - Listed as threatened by the federal government
HPS - Hunters Point Shipyard
SE - Listed as endangered by the State of California
SSC - California Department of Fish and Game Species of Special Concern

FIGURES





KEY MAP

- NAVY PROPERTY BOUNDARY (OFFSHORE)
- 6-FOOT TEMPORARY FENCE
- PCB HOT SPOT EXCAVATION BOUNDARY
- PARCEL BOUNDARY
- IMPACTED BUILDINGS OR SITES
- DEMOLISHED IMPACTED BUILDINGS/STRUCTURES
- DEMOLISHED BUILDINGS/STRUCTURES
- IMPACTED SITES THAT HAVE OBTAINED REGULATORY RELEASE
- IMPACTED FUDS SITES
- NON-IMPACTED BUILDINGS WITHIN AN IMPACTED SITE, RADIOLOGICAL PRECAUTIONS MAY BE REQUIRED

NOTE
IMPACTED SITES ARE SITES THAT HAVE KNOWN RADIOLOGICAL CONTAMINATION OR WHERE SITE HISTORY INDICATES THAT RADIOLOGICAL CONTAMINATION MAY BE PRESENT.

FIGURE 1-1
HUNTERS POINT SHIPYARD AND PCB HOT SPOT SOIL EXCAVATION SITE-LOCATION MAP

HUNTERS POINT SHIPYARD-SAN FRANCISCO, CA

TETRA TECH EC, INC.

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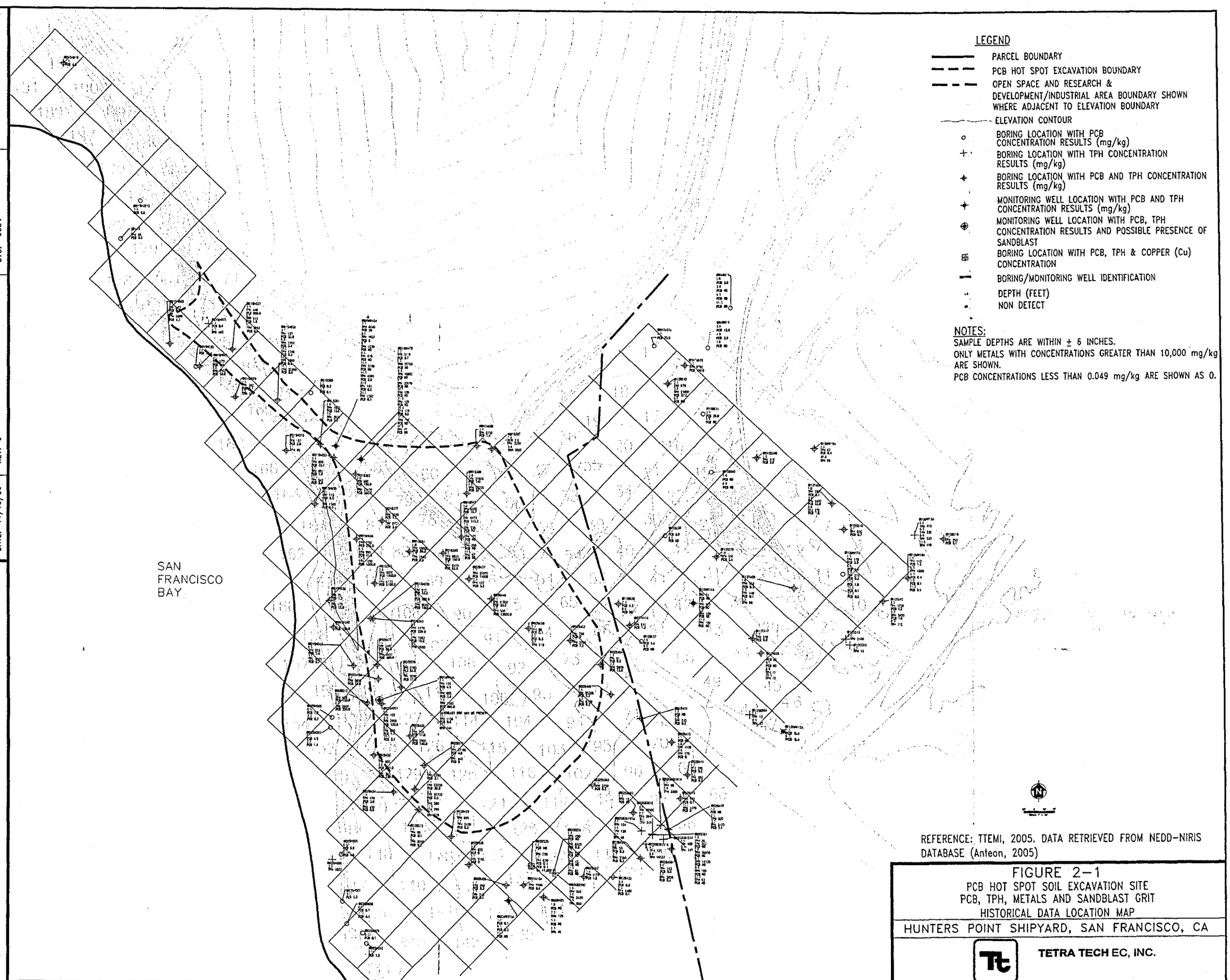

LEGEND

- PARCEL BOUNDARY
- PCB HOT SPOT EXCAVATION BOUNDARY
- OPEN SPACE AND RESEARCH & DEVELOPMENT/INDUSTRIAL AREA BOUNDARY SHOWN WHERE ADJACENT TO ELEVATION BOUNDARY
- ELEVATION CONTOUR
- BORING LOCATION WITH PCB CONCENTRATION RESULTS (mg/kg)
- BORING LOCATION WITH TPH CONCENTRATION RESULTS (mg/kg)
- BORING LOCATION WITH PCB AND TPH CONCENTRATION RESULTS (mg/kg)
- MONITORING WELL LOCATION WITH PCB AND TPH CONCENTRATION RESULTS (mg/kg)
- MONITORING WELL LOCATION WITH PCB, TPH CONCENTRATION RESULTS AND POSSIBLE PRESENCE OF SANDBLAST
- BORING LOCATION WITH PCB, TPH & COPPER (Cu) CONCENTRATION
- BORING/MONITORING WELL IDENTIFICATION
- DEPTH (FEET)
- NON DETECT

NOTES:
SAMPLE DEPTHS ARE WITHIN ± 6 INCHES.
ONLY METALS WITH CONCENTRATIONS GREATER THAN 10,000 mg/kg ARE SHOWN.
PCB CONCENTRATIONS LESS THAN 0.049 mg/kg ARE SHOWN AS 0.

REFERENCE: TTEMI, 2005. DATA RETRIEVED FROM NEDD-NIRIS DATABASE (Anteon, 2005)

FIGURE 2-1
PCB HOT SPOT SOIL EXCAVATION SITE
PCB, TPH, METALS AND SANDBLAST GRIT
HISTORICAL DATA LOCATION MAP

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

TETRA TECH EC, INC.

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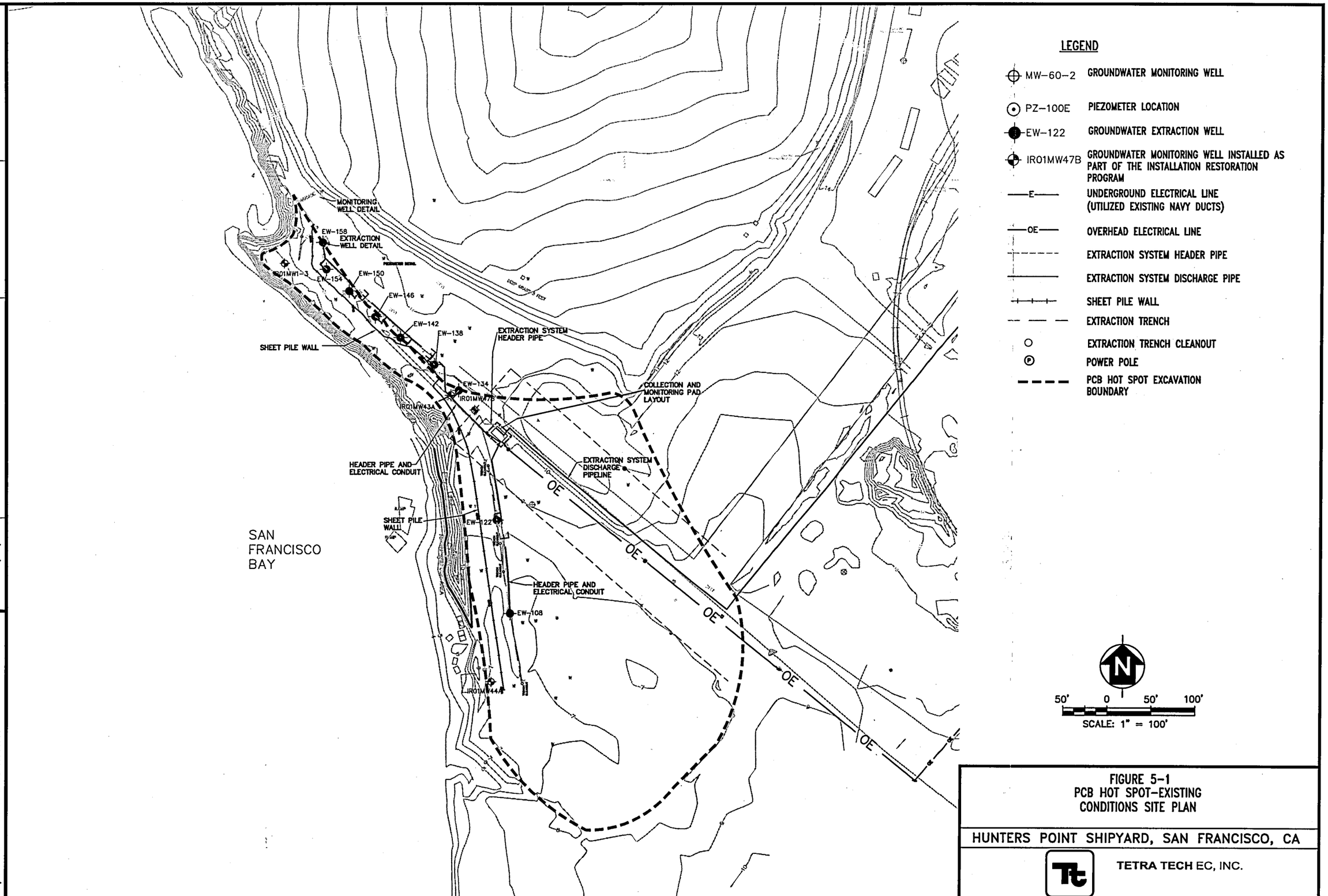

FIGURE 5-1
PCB HOT SPOT-EXISTING CONDITIONS SITE PLAN

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

TETRA TECH EC, INC.

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DATE: 11/10/05	REV: 0		CTO: 0084	

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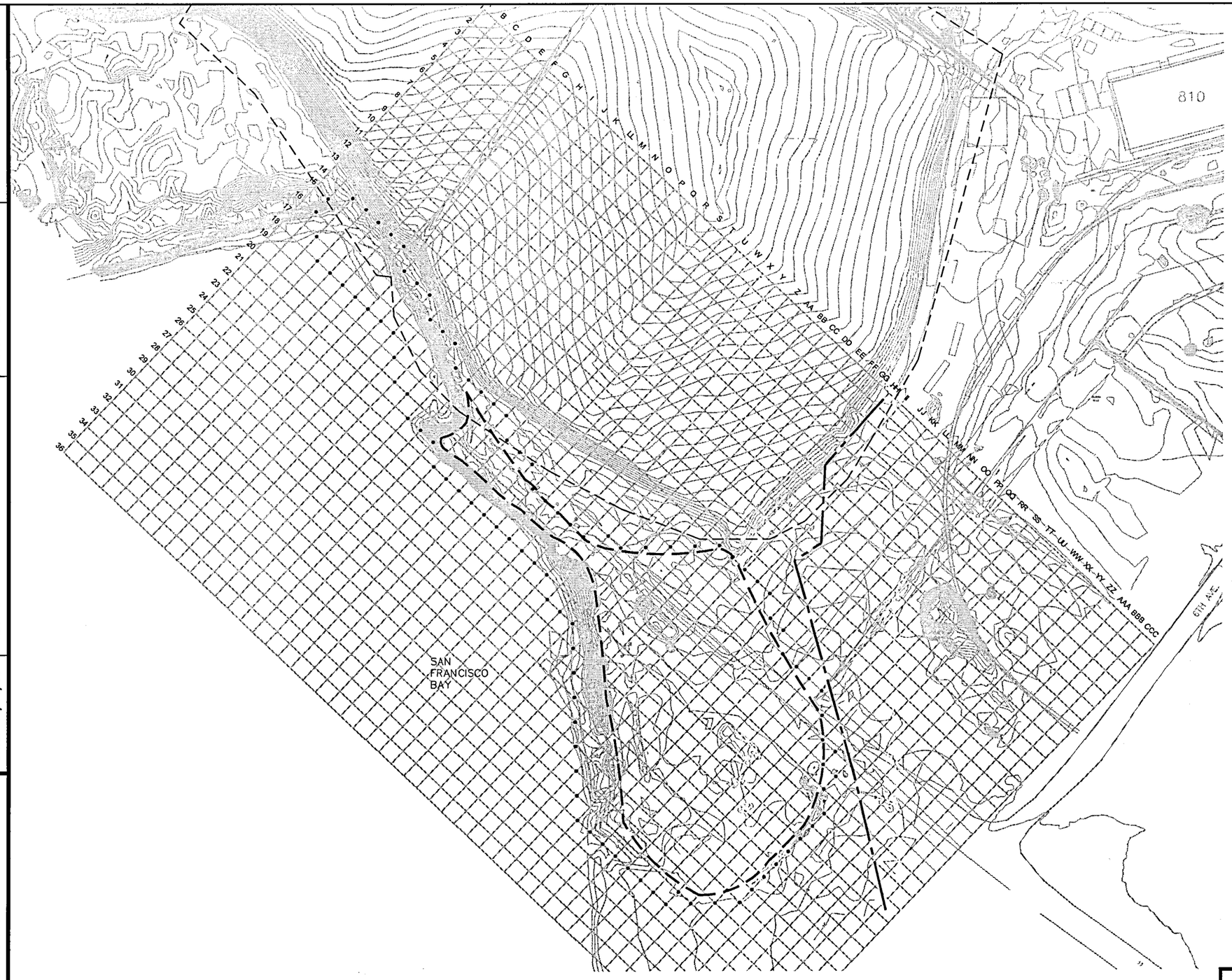

LEGEND

- PCB HOT SPOT EXCAVATION BOUNDARY
- ELEVATION CONTOUR
- PRE-EXCAVATION SAMPLING LOCATION
- INDUSTRIAL LANDFILL BOUNDARY
- OPEN SPACE AND RESEARCH & DEVELOMENT/INDUSTRIAL AREA BOUNDARY

NOTES:

TWO (2) SAMPLES PER LOCATION – BETWEEN 0–6 INCHES AND 30–36 INCHES BGS.
EXCAVATION BOUNDARY MAY BE REVISED BASED ON PCB AND/OR TPH PRE-EXCAVATION CHARACTERIZATION SAMPLING.

N

80 0 80 160
(feet)

FIGURE 5-2
PCB HOT SPOT PROPOSED PRE-EXCAVATION CHARACTERIZATION SAMPLING PLAN

HUNTERS POINT SHIPYARD–SAN FRANCISCO, CA

TETRA TECH EC, INC.

DRAWING	05144252.DWG
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CTO: 0084	
APPROVED BY: UTM	
CHECKED	LB
DRAWN BY: KLD	
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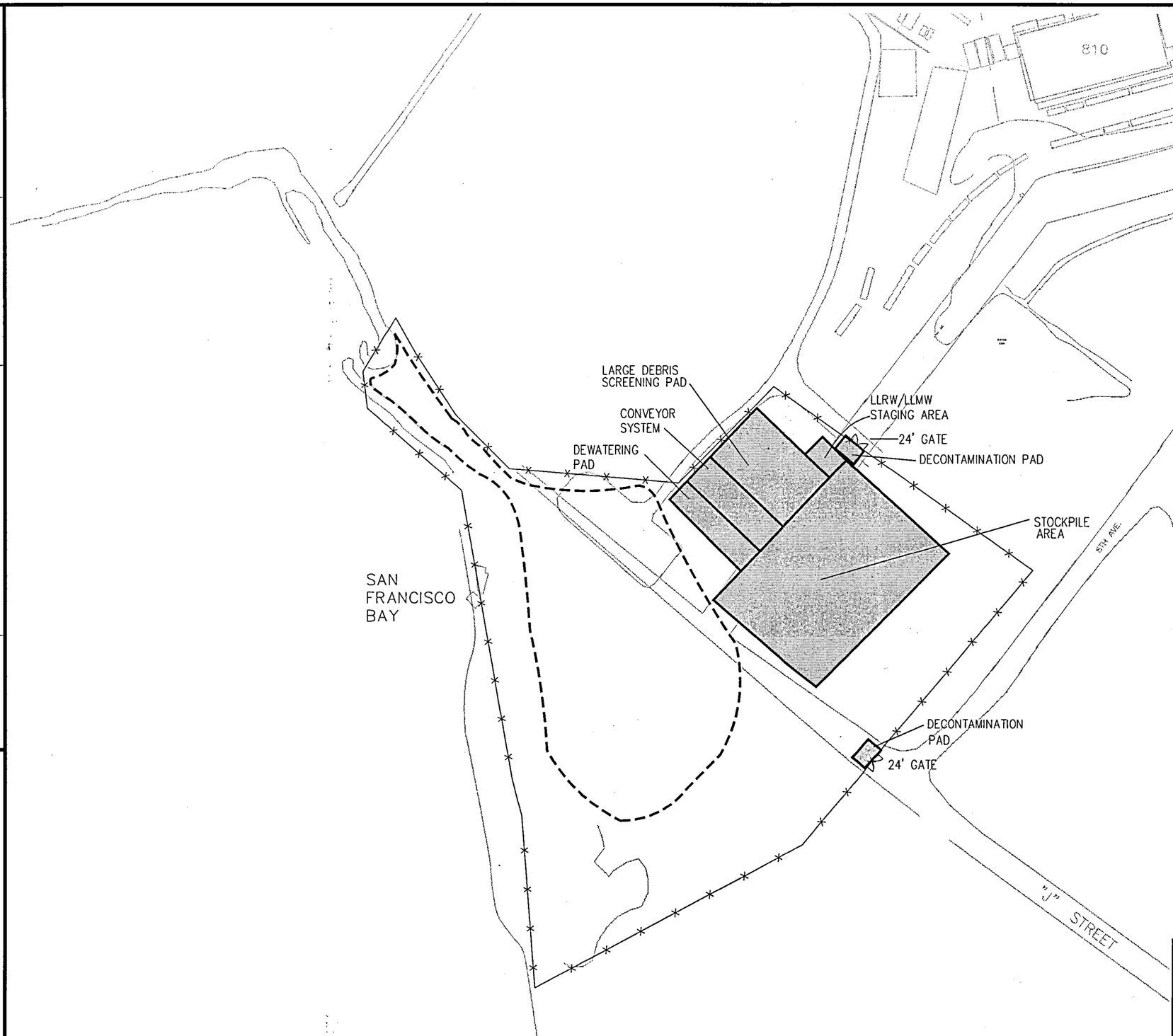

LEGEND

- - - - PCB HOT SPOT EXCAVATION BOUNDARY

—x—x— 6-FOOT TEMPORARY FENCE

LLMW LOW-LEVEL MIXED WASTE

LLRW LOW-LEVEL RADIOACTIVE WASTE

NOTES:

LOCATIONS AND SIZES OF CONTAINMENT AND STAGING AREAS ARE SUBJECT TO CHANGE
EXCAVATION BOUNDARY MAY BE REVISED BASED ON PCB AND/OR TPH PRE-EXCAVATION CHARACTERIZATION SAMPLING

N

80' 0 80' 160'

SCALE: 1" = 160'

FIGURE 5-3
PCB HOT SPOT-SITE LAYOUT

HUNTERS POINT SHIPYARD, SAN FRANCISCO

TETRA TECH EC, INC.

DRAWING NO: 05144253.DWG

DCN: FWSD-RAC-05-1442

CTO: 0084

APPROVED BY: UTM

CHECKED BY: LB

REV: 0

DRAWN BY: KLD

DATE: 11/10/05

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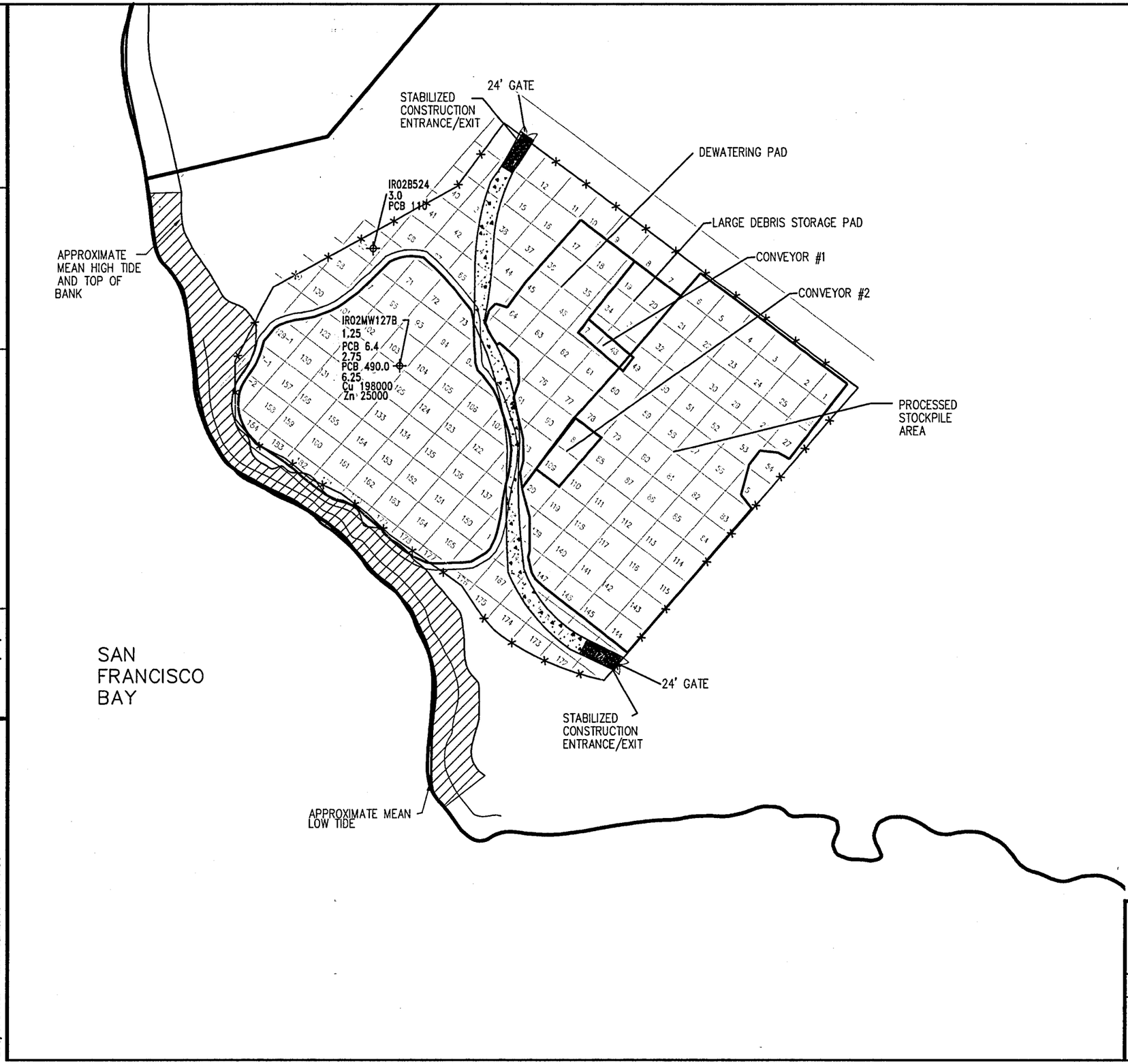

LEGEND

- STEEPLY SLOPING BANK
- EDGE OF EXCAVATION SLOPE
- BOTTOM OF EXCAVATION
- PARCEL BOUNDARY
- FENCE
- IR02MW127B — BORING/MONITORING WELL IDENTIFICATION
- 1.25 — DEPTH (FEET)
- PCB 6.4 — PCB CONCENTRATION IN mg/kg
- Cu 198000 — COPPER CONCENTRATION IN mg/kg
- Zn 25000 — ZINC CONCENTRATION IN mg/kg

NOTES:

LOCATIONS AND SIZES OF CONTAINMENT AND STAGING AREAS ARE SUBJECT TO CHANGE

N

80' 0 80' 160'

SCALE: 1" = 160'

FIGURE 5-4

PCB HOT SPOT WITHIN IR-02
NORTHWEST AND CENTRAL EXCAVATION

HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

TETRA TECH EC, INC.

DRAWING NO: 05144254.DWG

DCN: FWSD-RAC-05-1442

CTO: 0084

APPROVED BY: BKM

CHECKED BY: LB

REV: 0

DRAWN BY: KLD

DATE: 11/10/05

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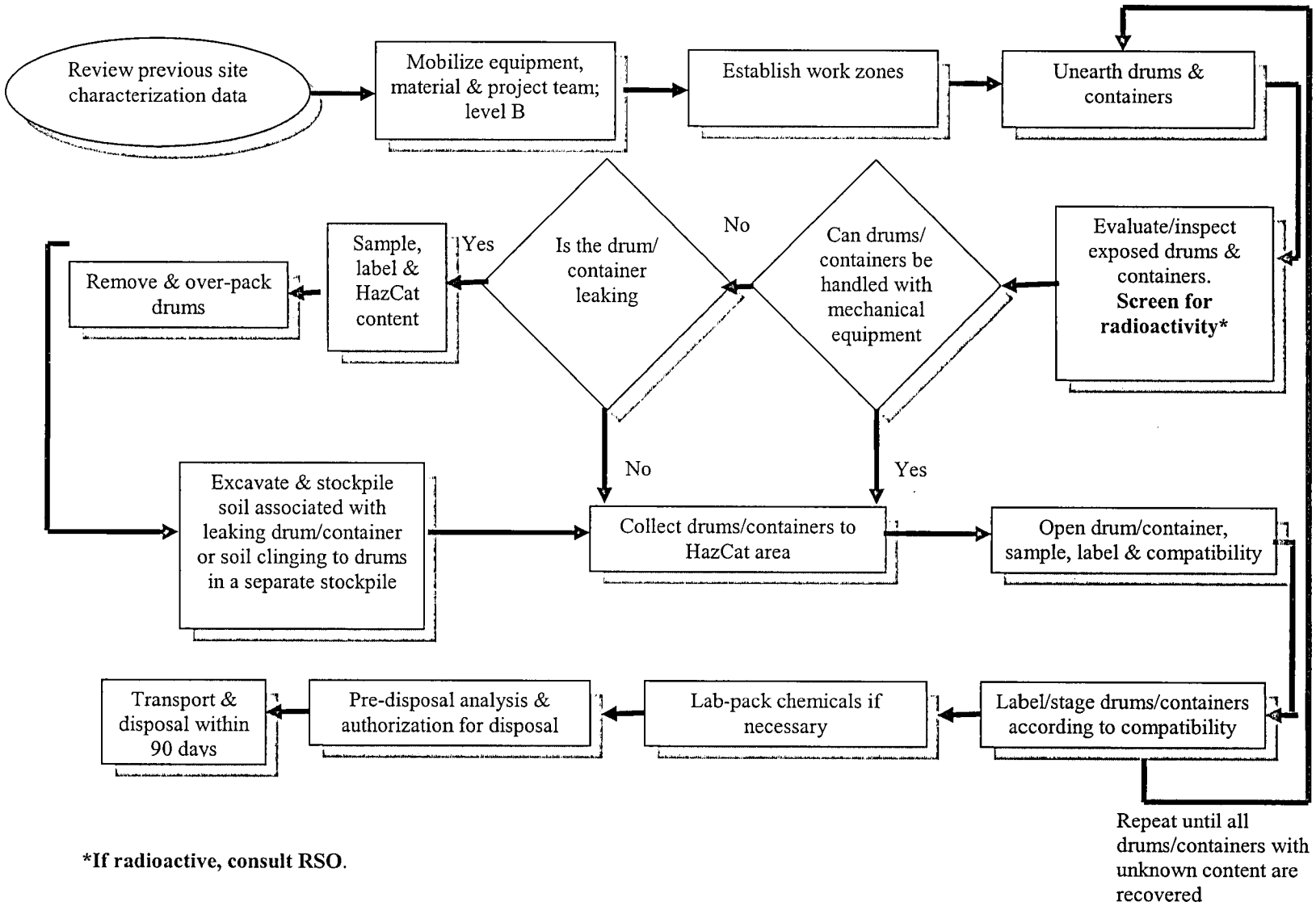
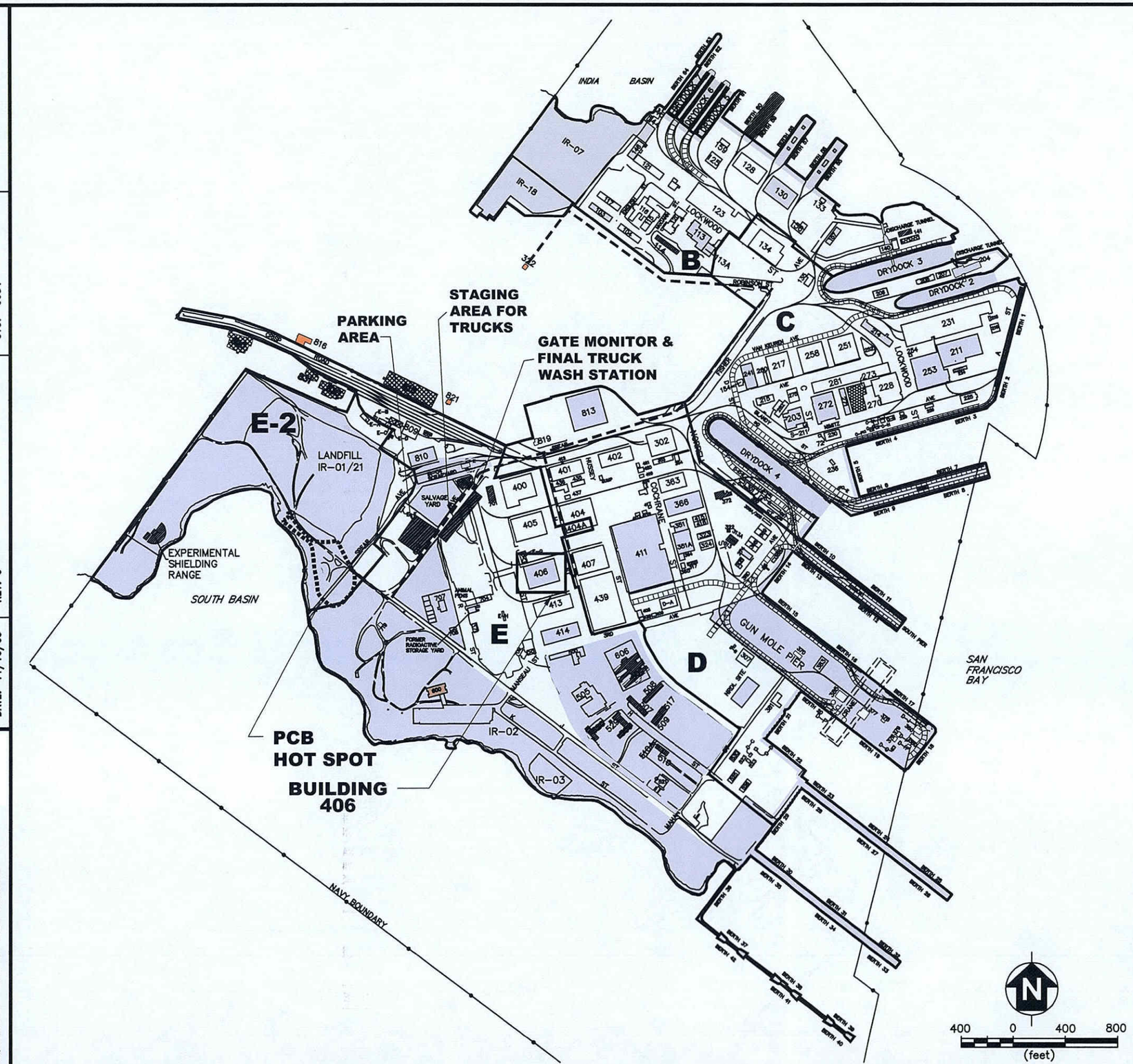
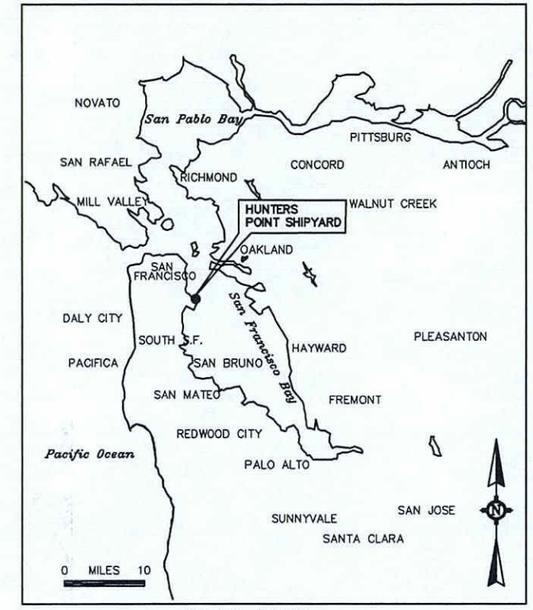
FIGURE 5-5

DECISION FLOWCHART – BURIED DRUMS, BOTTLES, JARS AND CONTAINERS WITH UNKNOWN CONTENT



***If radioactive, consult RSO.**





KEY MAP

- NAVY PROPERTY BOUNDARY (OFFSHORE)
- TRAFFIC ROUTES
- PCB HOT SPOT EXCAVATION BOUNDARY
- PARCEL BOUNDARY
- IMPACTED BUILDINGS OR SITES
- DEMOLISHED IMPACTED BUILDINGS/STRUCTURES
- DEMOLISHED BUILDINGS/STRUCTURES
- IMPACTED SITES THAT HAVE OBTAINED REGULATORY RELEASE
- IMPACTED FUDS SITES
- NON-IMPACTED BUILDINGS WITHIN AN IMPACTED SITE, RADIOLOGICAL PRECAUTIONS MAY BE REQUIRED

NOTES

IMPACTED SITES ARE SITES THAT HAVE KNOWN RADIOLOGICAL CONTAMINATION OR WHERE SITE HISTORY INDICATES THAT RADIOLOGICAL CONTAMINATION MAY BE PRESENT.

CONTAINERIZED RADIOLOGICAL MATERIAL WILL BE STORED IN A DESIGNATED AND POSTED RADIOACTIVE MATERIAL STORAGE AREA LOCATED INSIDE BUILDING 406.

FIGURE 6-1

PCB HOT SPOT-TRUCK TRAFFIC ROUTE MAP

HUNTERS POINT SHIPYARD-SAN FRANCISCO, CA

TETRA TECH EC, INC.

DRAWING NO: 05144261.DWG
DCN: FWSD-RAC-05-1442
CTO: 0084
APPROVED BY: UTM
CHECKED BY: LB
REV: 0
DRAWN BY: KLD
DATE: 11/10/05

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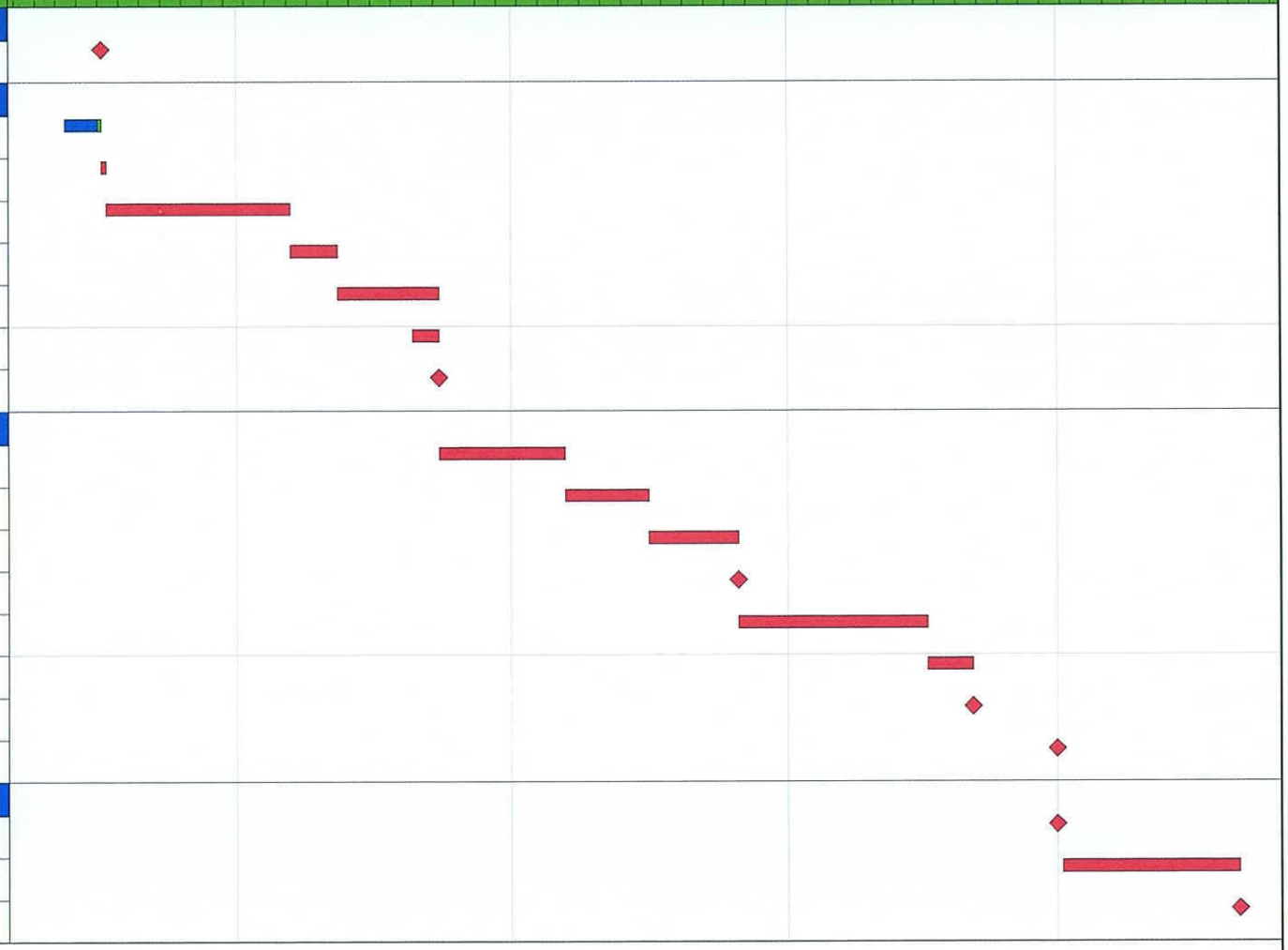
Activity Description	Orig Dur
Pre-Construction Submittals	
Submit Draft-Final Work Plan	0
Construction	
Setup and Test Conveyor	6
Subsurface Characterization (Hand Auger)	2
Excavate, Screen and Stockpile	32
Post-Excavation Sampling	10
Backfill, Grading & Site Restoration	18
Demobilization	5
Construction Demobilization	0
Post Construction Submittals	
Prep Pre-Draft Removal Action Completion Report	30
Pre-Draft RACR to Navy for Review	20
Prepare Draft RACR and Submit to Agencies	20
Submit Draft RACR to Agencies	0
Agency Review of Draft RACR	43
Prepare Draft-Final RACR	11
Submit Draft-Final RACR	0
Submit Final RACR	0
Job Closeout	
Technical Completion	0
Project Closeout	42
Project Completion	0



Start Date	13FEB04
Finish Date	31MAY06
Data Date	16MAY05
Run Date	16MAY05 14:32

Early Bar
Progress Bar
Critical Activity

© Primavera Systems, Inc.

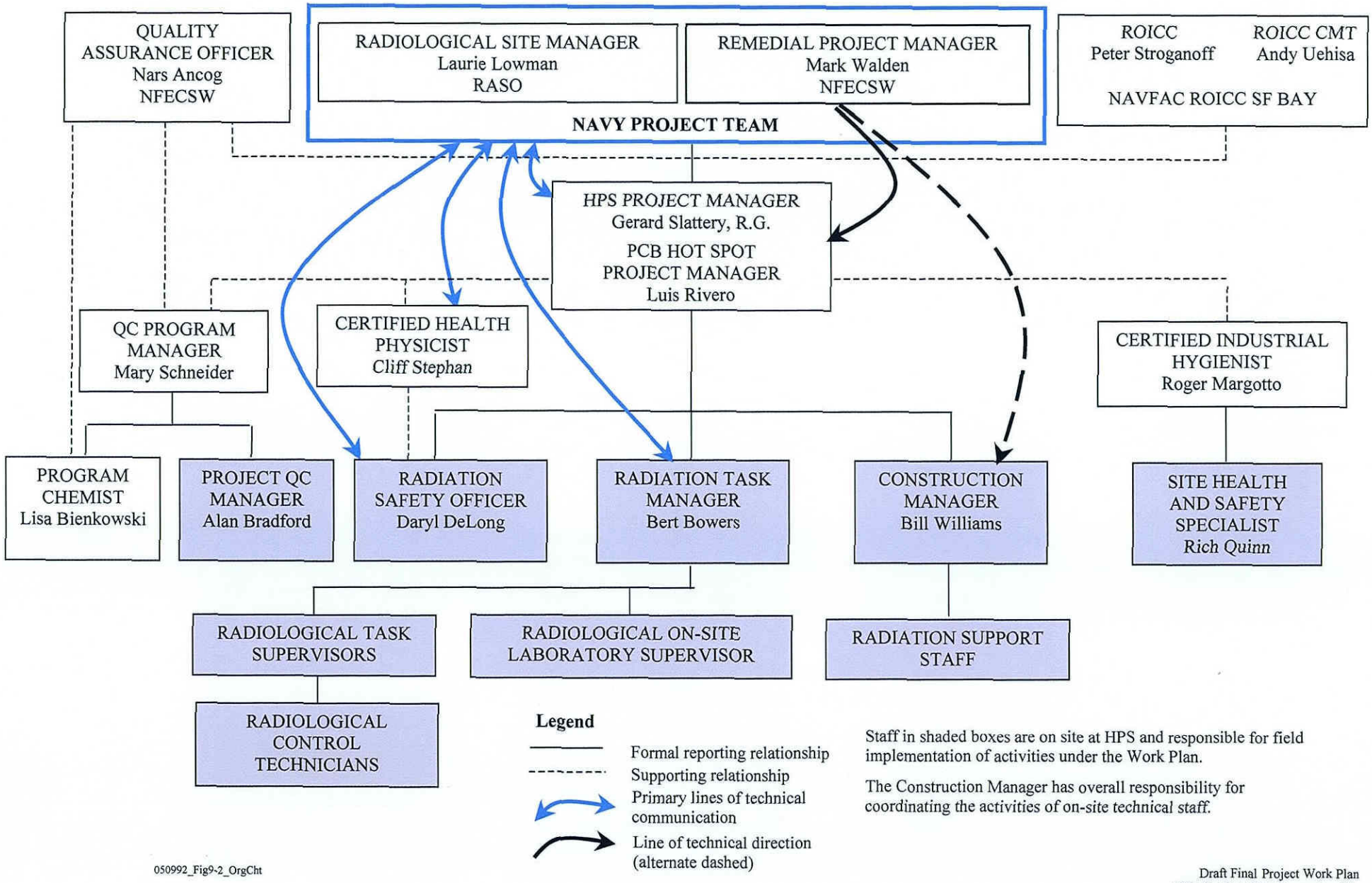
Tetra Tech FW, Inc.
CTO 84 - TCRA and Radiation Screening
for Parcels E & E-2 PCB Hot Spot Soil Excavating
Hunters Point Shipyard

Figure 9-1
Project Schedule

TETRA TECH FW, INC.

FIGURE 9-2

PROJECT ORGANIZATION CHART



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

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

050992_Fig9-2_OrgCht

APPENDIX A

SAMPLING AND ANALYSIS PLAN

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

CONTRACT NO. N68711-98-D-5713
CTO NO. 0084

APPENDIX A

FINAL

SAMPLING AND ANALYSIS PLAN

(Field Sampling Plan and Quality Assurance Project Plan)
Revision 0
November 10, 2005

PCB HOT SPOT SOIL EXCAVATION SITE
PARCELS E AND E-2, HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: FWSD-RAC-05-1442

REGISTERED GEOLOGIST
GERARD L. SLATTERY
No. 5038
STATE OF CALIFORNIA

TETRA TECH EC, INC
1230 Columbia Street, Suite 500
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Gerard L. Slattery, P.G. 5038
Professional Geologist — Date: 11/3/05

Lisa Bienkowski
Program Chemist — Date: 11/3/05

Narciso A. Ancog
NAVFAC SW Quality Assurance Officer — Date: 11/9/2005

DRAFT ADDENDUM 1 TO THE DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) PCB HOT SPOT SOIL EXCAVATION SITE PARCELS E AND E-2

DATED 21 SEPTEMBER 2005

THIS RECORD IS ENTERED IN THE DATABASE AND FILED AS

RECORD NO. AR_N00217_004169

FINAL ADDENDUM 1 TO THE DRAFT FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) PCB HOT SPOT SOIL EXCAVATION SITE PARCELS E AND E-2

DATED 03 OCTOBER 2005

THIS RECORD IS ENTERED IN THE DATABASE AND FILED AS

RECORD NO. AR_N00217_004170

AR_N00217_004137
HUNTERS POINT
SSIC NO. 5090.3.A

FINAL ADDENDUM 1 TO THE FINAL SAMPLING AND ANALYSIS PLAN (FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN) PCB HOT SPOT SOIL EXCAVATION SITE PARCELS E AND E-2

DATED 18 MAY 2006

THIS RECORD IS ENTERED IN THE DATABASE AND FILED AS

RECORD NO. AR_N00217_000948

TABLE OF CONTENTS

PAGE

LIST OF TABLES ..... A.v

LIST OF FIGURES ..... A.v

ABBREVIATIONS AND ACRONYMS ..... A.vi

ELEMENTS OF EPA QA/R-5 IN RELATION TO THIS SAP ..... A.x

1.0 INTRODUCTION A.1-1
- 1.1 SCOPE AND OBJECTIVES A.1-2
- 1.2 REGULATORY OVERSIGHT A.1-3

2.0 BACKGROUND A.2-1

3.0 MAPS A.3-1

4.0 SAMPLING STRATEGY A.4-1
- 4.1 RADIOLOGICAL SCREENING AND EXCAVATED MATERIAL SAMPLING A.4-1
- 4.2 PRE-EXCAVATION CHARACTERIZATION SAMPLING A.4-3
- 4.3 POST-EXCAVATION SAMPLING A.4-4
- 4.4 WASTE CHARACTERIZATION SAMPLING A.4-6
- 4.5 IMPORT MATERIAL SAMPLING A.4-8
- 4.6 BUILDING 115 SAMPLING A.4-8

5.0 REQUEST FOR ANALYSIS A.5-1
- 5.1 ANALYTICAL METHODS A.5-1
- 5.2 SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES A.5-3
- 5.3 FIELD QUALITY CONTROL SAMPLES A.5-3
  - 5.3.1 Field Duplicates A.5-3
  - 5.3.2 Equipment Rinsate Samples A.5-3
  - 5.3.3 Source Blank Samples A.5-4

6.0 FIELD METHODS AND SAMPLING PROCEDURES A.6-1
- 6.1 SCREENED SOIL AND EXCAVATED MATERIALS SAMPLING PROCEDURES A.6-1
- 6.2 PRE-EXCAVATION CHARACTERIZATION SAMPLING PROCEDURES A.6-1
- 6.3 POST-EXCAVATION SAMPLING PROCEDURES A.6-2
- 6.4 WASTE CHARACTERIZATION SAMPLING PROCEDURES A.6-3
  - 6.4.1 Stockpile Sampling A.6-4
  - 6.4.2 Solid or Wipe Sampling Procedures A.6-5
  - 6.4.3 Bin Sampling Procedures A.6-6
  - 6.4.4 Wastewater Sampling Procedures A.6-7
  - 6.4.5 CONTAINER CONTENT SAMPLING PROCEDURES A.6-7

TABLE OF CONTENTS
(Continued)

PAGE

6.5 IMPORT MATERIAL SAMPLING PROCEDURES A.6-8
6.6 RADIOLOGICAL SCREENING OF SAMPLING EQUIPMENT A.6-9
6.7 DECONTAMINATION PROCEDURES A.6-9
6.8 SAMPLE NUMBER A.6-10
6.9 SAMPLE LABELING A.6-10
6.10 FIELD DOCUMENTATION A.6-10
6.10.1 Chain-of-Custody A.6-11
6.10.2 Custody Seals A.6-12
6.10.3 Field Logbooks A.6-12
6.10.4 Document Corrections A.6-13
6.11 SAMPLE PACKAGING AND SHIPMENT A.6-13
6.11.1 Radiological Samples A.6-13
6.11.2 Chemical Samples A.6-13
6.12 BUILDING 115 SAMPLING A.6-14
7.0 PROJECT ORGANIZATION A.7-1
7.1 POINTS OF CONTACT A.7-1

8.0 QUALITY ASSURANCE OBJECTIVES A.8-1
8.1 DATA QUALITY OBJECTIVES A.8-1
8.2 ANALYTICAL DATA QUALITY OBJECTIVES A.8-1
8.2.1 Quality Control Criteria A.8-2
8.2.2 Proposed Reporting Limits A.8-3
8.2.3 Project Quality Control Limits A.8-3

9.0 ANALYTICAL QUALITY CONTROL PROCEDURES (OFF-SITE LABORATORY) A.9-1
9.1 LABORATORY QUALIFICATION A.9-1
9.2 LABORATORY SAMPLE CUSTODY AND DOCUMENTATION A.9-1
9.2.1 Corrections to Custody Documentation A.9-2
9.3 LABORATORY QUALITY CONTROL PROCEDURES A.9-2
9.4 LABORATORY QUALITY CONTROL SAMPLES A.9-2
9.4.1 Calibration A.9-2
9.4.2 Instrument/Calibration Blanks (applicable to chemical analyses only) A.9-3
9.4.3 Method Blanks A.9-3
9.4.4 Laboratory Control Samples A.9-3
9.4.5 Matrix Spike and Matrix Spike Duplicate A.9-4
9.4.6 Duplicates A.9-4
9.5 PREVENTIVE MAINTENANCE A.9-4

TABLE OF CONTENTS
(Continued)

PAGE

9.6 DATA REVIEW A.9-5
9.6.1 Analyst Review A.9-5
9.6.2 Peer Review A.9-5
9.6.3 Technical Review A.9-5
9.6.4 Management Review A.9-6
9.6.5 Quality Assurance Review A.9-6
9.7 DELIVERABLES A.9-6
9.7.1 Hard-copy Deliverables A.9-6
9.7.2 Electronic Deliverables A.9-8

10.0 ANALYTICAL QUALITY CONTROL PROCEDURES (ON-SITE LABORATORY) A.10-1
10.1 LABORATORY QUALIFICATION A.10-1
10.2 LABORATORY SAMPLE CUSTODY AND DOCUMENTATION A.10-1
10.3 LABORATORY QUALITY CONTROL PROCEDURES A.10-2
10.4 LABORATORY QUALITY CONTROL SAMPLES A.10-2
10.4.1 Calibration A.10-2
10.4.2 Instrument/Calibration Backgrounds A.10-2
10.4.3 Method Backgrounds A.10-2
10.5 PREVENTIVE MAINTENANCE A.10-3
10.6 DATA REVIEW A.10-3
10.6.1 Analyst Review A.10-3
10.6.2 Technical Review A.10-3
10.6.3 Management Review A.10-3
10.6.4 Quality Assurance Review A.10-3
10.7 DELIVERABLES A.10-4
10.7.1 Hard-copy Deliverables A.10-4
10.7.2 Electronic Deliverables A.10-4

11.0 DATA QUALITY MANAGEMENT A.11-1
11.1 DOCUMENTATION TYPES A.11-1
11.1.1 Field Operation Records A.11-2
11.1.2 Laboratory Records A.11-2
11.1.3 Data Handling Records A.11-3
11.2 DATA ASSESSMENT A.11-3
11.2.1 Data Verification A.11-3
11.2.2 Data Validation A.11-4
11.2.3 Data Evaluation A.11-4
11.2.4 Data Quality Assessment A.11-5
11.3 REPORTING A.11-5

TABLE OF CONTENTS
(Continued)

PAGE

12.0 QUALITY ASSURANCE OVERSIGHT A.12-1
12.1 FIELD AUDITS A.12-1
12.1.1 Corrective Action A.12-1
12.2 OFF-SITE LABORATORY AUDITS A.12-1
12.2.1 Corrective Action A.12-2

13.0 SAP REVISION OR AMENDMENT A.13-1

14.0 REFERENCES A.14-1

ATTACHMENTS

Attachment 1 Sampling Standard Operating Procedure (SOP)

LIST OF TABLES

Table A.4-1	Chemical Cleanup Goals
Table A.4-2	Radiological Remedial Objectives
Table A.5-1	Sample Containers, Preservatives, and Holding Times
Table A.6-1	Material and Equipment Surface Contamination Limits
Table A.6-2	Sample Identification Matrix
Table A.7-1	Personnel and Responsibilities
Table A.8-1	Summary of Data Quality Objectives
Table A.8-2	Proposed Reporting Limits
Table A.8-3	Proposed Quality Control Acceptance Criteria

LIST OF FIGURES

Figure A.3-1	Hunters Point Shipyard and PCB Hot Spot Soil Excavation Site - Location Map
Figure A.3-2	PCB Hot Spot Pre-excavation Characterization Sampling Plan
Figure A.4-1	Pre-excavation Sampling Strategy Decision Tree
Figure A.4-2	Post-excavation Sampling Strategy Decision Tree for Bottom Samples
Figure A.4-3	Post-excavation Sampling Strategy Decision Tree for Perimeter Samples
Figure A.7-1	Project Organization Chart

ABBREVIATIONS AND ACRONYMS

α	alpha
β	beta
γ	gamma
°C	degrees Celsius
%R	percent recovery
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
BART	Bay Area Rapid Transit
bgs	below ground surface
BHC	benzene hexachloride
BRAC	Base Realignment and Closure
Cal/EPA	California Environmental Protection Agency
CARB	California Air Resources Board
CCV	continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
cm^2	square centimeter
COC	chain-of-custody
^{137}Cs	cesium-137
CSO	Caretaker Site Office
CTO	Contract Task Order
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DHS	Department of Health Services
DoD	Department of Defense
DOE	Department of Energy
DON	Department of the Navy
DOT	Department of Transportation
DPH	Department of Public Health

ABBREVIATIONS AND ACRONYMS
(Continued)

dpm	disintegrations per minute
DQO	data quality objective
DTSC	Department of Toxic Substances Control
EDD	electronic data deliverable
EML	Environmental Measurements Laboratory
EPA	U.S. Environmental Protection Agency
EWI	Environmental Work Instruction
GC/MS	gas chromatograph/mass spectrometer
GPS	global positioning system
HCl	hydrochloric acid
HDPE	high-density polyethylene
HNO_3	nitric acid
HPS	Hunters Point Shipyard
ICAL	initial calibration
ICP-AES	inductively coupled plasma-atomic emission spectrometer
IDW	investigation-derived waste
IPE	industrial process equipment
L	liter
LCS	laboratory control sample
LLMW	low-level mixed waste
LLRW	low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDA	minimum detectable activity
mg/kg	milligram per kilogram
mg/L	milligrams per liter
mL	milliliter
MS	matrix spike
MSD	matrix spike duplicate
N/A	not applicable
NaI	sodium iodide

ABBREVIATIONS AND ACRONYMS
(Continued)

NAVFAC SW	Naval Facilities Engineering Command, Southwest
NAVSEA	Naval Sea Systems Command
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NE	none established
NEDD	Naval Electronic Data Deliverable
NFECSW	Southwest Division, Naval Facilities Engineering Command
NFESC	Naval Facilities Engineering Service Center
NWT	New World Technology, Inc.
PAH	polynuclear aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCB	polychlorinated biphenyl
PCB Hot Spot	PCB Hot Spot soil excavation site
pCi/g	picocuries per gram
pCi/L	picocuries per liter
PMO	Program Management Office
PRG	Preliminary Remediation Goal
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
^{226}Ra	radium-226
RAC	Remedial Action Contract
RASO	Radiological Affairs Support Office
RCT	Radiological Control Technician
RL	reporting limit
ROC	radionuclide of concern
ROICC	Resident Officer in Charge of Construction
RPD	relative percent difference
RPM	Remedial Project Manager
RRO	radiological remedial objective
RSO	Radiological Safety Officer

ABBREVIATIONS AND ACRONYMS
(Continued)

SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
^{90}Sr	strontium-90
STLC	Soluble Threshold Limit Concentration
SVOC	semivolatile organic compound
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	time-critical removal action
TPH-extractable	total extractable petroleum hydrocarbons
TPH-purgeable	total purgeable petroleum hydrocarbons
TPH	total petroleum hydrocarbons
TtEMI	Tetra Tech EM, Inc.
TtEC	Tetra Tech EC, Inc.
TTLC	Total Threshold Limit Concentration
VOA	volatile organic analysis
VOC	volatile organic compound
WB	California Water Board
WET	Waste Extraction Test

ELEMENTS OF EPA QA/R-5 IN RELATION TO THIS SAP

EPA QA/R-5 QAPP Element [a]		Tetra Tech EC, Inc. SAP	
A1	Title and Approval Sheet	Title and Approval Sheet	
A2	Table of Contents	Table of Contents	
A3	Distribution List	Distribution List	
A4	Project/Task Organization	7.0	Project Organization
A5	Problem Definition/Background	2.0	Background
A6	Project/Task Description	1.1	Scope and Objectives
A7	Quality Objectives and Criteria	8.0	Quality Assurance Objectives
A8	Special Training/Certification	11.2.2	Data Validation
A9	Documents and Records	11.0	Data Quality Management
B1	Sample Process Design	4.0	Sampling Strategy
B2	Sampling Methods	6.0	Field Methods and Sampling Procedures
B3	Sample Handling and Custody	6.11 9.2	Sample Packaging and Shipment and Laboratory Sample Custody and Documentation
B4	Analytical Methods	5.0	Request for Analysis
B5	Quality Control	5.3 9.0 10.0	Field Quality Control Samples Analytical Quality Control Procedures (Off-site Laboratory) Analytical Quality Control Procedures (On-site Laboratory)
B.6	Instrument/Equipment Testing, Inspection, and Maintenance	9.5 and 10.5	Preventive Maintenance
B7	Instrument/Equipment Calibration and Frequency	9.4.1 and 10.4.1	Calibration
B8	Inspection/Acceptance of Supplies and Consumables	11.1	Documentation Types
B9	Non-Direct Measurements	11.0	Data Quality Management
B10	Data Management	11.1	Documentation Types
C1	Assessment and Response Actions	12.0	Quality Assurance Oversight
C2	Reports to Management	12.0	Quality Assurance Oversight
D1	Data Review, Verification, and Validation	9.6 and 10.6 11.2.3	Data Review Data Evaluation
D2	Verification and Validation Methods	11.2.2	Data Validation
D3	Reconciliation with User Requirements	Table A.8-1	Summary of Data Quality Objectives

Notes:

[a] EPA. 2001. *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS.* March.

EPA - U.S. Environmental Protection Agency
QA - quality assurance
QAPP - Quality Assurance Project Plan
SAP - Sampling and Analysis Plan

1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) establishes the sampling, analytical, and quality assurance (QA) procedures and methods to be implemented for the time-critical removal action (TCRA) for the polychlorinated biphenyl (PCB) Hot Spot soil excavation site (PCB Hot Spot), located primarily within Parcel E-2, with a portion in Parcel E, at Hunters Point Shipyard (HPS), San Francisco, California. The Department of the Navy (DON), represented by the Base Realignment and Closure Program Management Office (BRAC PMO) West, Naval Facilities Engineering Command, Southwest (NAVFAC SW), and the Radiological Affairs Support Office (RASO), is directing this removal action in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This SAP has been prepared for NAVFAC SW by Tetra Tech EC, Inc. (TtEC) under Remedial Action Contract (RAC) No. N68711-98-D-5713, Contract Task Order (CTO) No. 0084.

Based on the results gathered during the sediment and soil data gaps investigation [Tetra Tech EM, Inc. (TtEMI), 2003], the DON has determined that this site contains PCBs and petroleum hydrocarbons requiring a response action. The *Final Historical Radiological Assessment, Volume II* (HRA) also identifies that the site is radiologically impacted [Naval Sea Systems Command (NAVSEA), 2004].

The DON has initiated a TCRA for the extraction of soils containing PCB concentrations greater than 1 milligram per kilogram (mg/kg) in the upper 3 feet of soil or greater than 100 mg/kg below 3 feet, total petroleum hydrocarbons (TPH) concentrations greater than 3,500 mg/kg, or any radioactive contaminants that may be present in the PCB Hot Spot area above the radiological remedial objectives (RROs).

In addition to the TCRA, the DON has tasked TtEC with performing waste consolidation activities at Building 115 located in Parcel B. This will consist of sampling the industrial process equipment (IPE)/piping to determine if the equipment contains PCBs, disposing of the paint containers, and, if necessary, disposing of liquid in two sumps at the building and ceiling tile labeled as potentially containing PCBs. Samples will be collected from IPE, paint container contents, sump liquids, and ceiling tiles for chemical analysis.

The SAP will be used as a reference document by all field and laboratory personnel engaged in the sampling and analysis for this program. Included in this SAP are field sampling procedures, QA/quality control (QC) requirements, and data gathering methods that will be used during the TCRA. Data quality objectives (DQOs) are also provided in this document. The QA elements of this SAP were prepared in accordance with the *EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5, QAMS* [U.S. Environmental Protection Agency (EPA), 2001] to ensure that

all data collected are precise, accurate, representative, complete, and comparable to meet their intended use.

Low-level radioactive waste (LLRW) and low-level mixed waste (LLMW) generated during this project will be handled through the DON's LLRW Disposal Program in accordance with applicable regulatory guidelines and *Environmental Work Instruction (EWI) #8, 3EN2.8, Low-Level Radioacitve Waste (LLRW) Disposal Program* [Southwest Division, Naval Facilities Engineering Command (NFECSW), 2001a] and in conjunction with a certified waste broker. Disposal of LLRW or LLMW will not be performed by TtEC for this project.

1.1 SCOPE AND OBJECTIVES

The DON has initiated this TCRA for the extraction of soils containing PCB concentrations greater than 1 mg/kg for the horizontal extent of contamination and down to 3 feet below ground surface (bgs), PCB concentrations greater than 100 mg/kg for the vertical extent of contamination exceeding 3 feet, TPH concentrations greater than 3,500 mg/kg, or radioactive contaminants in excess of the RROs that may be present at the PCB Hot Spot. A TCRA is called for to prevent a potential release that could occur as a result of erosion, weathering, seismic events, or biological activity. The cleanup goals and RROs for this TCRA have been established to protect public health and the environment by setting standards for the physical removal and disposition of chemical and radioactive contaminants. The planned removal action for the contaminated soils within PCB Hot Spot incorporates in situ radiological surveys, identification and removal of radioactive material, pre-excavation characterization sampling, protection or removal of existing site features, soil and debris excavation, ex situ screening of excavated soils, segregation of contaminated soil and debris, stockpiling of excavated soil and debris, post-excavation sampling of the excavated area, backfill placement and compaction with import materials, site restoration, and waste management/classification, storage, and disposal. Any sandblast grit encountered during excavation activities will be handled in accordance with a RASO-approved Work Instruction specifically written to govern this material. Any firebricks encountered during excavation activities will be segregated because they contain naturally occurring radioactive materials and will require special disposal. The proposed excavation boundary for the PCB Hot Spot will be further delineated following pre-excavation characterization sampling.

In addition to the TCRA, the DON has tasked TtEC with performing waste consolidation activities at Building 115 located in Parcel B. This will consist of sampling the IPE/piping to determine if the equipment contains PCBs, disposing of the paint containers, and, if necessary, disposing of liquid in two sumps at the building and ceiling tile labeled as potentially containing PCBs. Samples will be collected from IPE, paint container contents, sump liquids, and ceiling tiles for chemical analysis.

The objectives of this SAP are to provide guidance for the field sampling activities at PCB Hot Spot and Building 115; to describe and establish consistent field sampling procedures; to establish data gathering, handling, and documentation methods; and to define QA/QC measures to ensure consistency and confidence in the data obtained. The various sampling activities that will be performed during the TCRA and Building 115 field activities and are discussed in this SAP include the following:

- Screening of the area to identify surface and near-surface (less than 12 inches bgs) radioactive materials (Section 4.1)
- Collection of soil samples for PCB and TPH analysis via field screening test kits to further characterize and outline the footprint of the proposed excavation area (Section 4.2)
- Performance of post-excavation soil sampling following completion of excavation activities to verify that PCB, TPH, and radioactive contaminants have been removed (Section 4.3)
- Ex situ screening of excavated materials via a conveyor system to confirm removal of radioactive contaminant concentrations above the RROs (Section 4.1)
- Sampling of soils that have cleared the radiation survey detectors on the conveyor system to ensure that the residual radioactive contaminant concentrations are below the RROs (Section 4.1)
- Completion of characterization sampling of stockpiles and wastes generated during excavation activities (Section 4.4)
- Sampling import backfill material (Section 4.5)
- Sampling IPE and other potential waste materials at Building 115 (Section 4.6)

1.2 REGULATORY OVERSIGHT

The DON, represented by BRAC PMO, RASO, and NAVFAC SW, is the lead agency responsible for the removal action. The EPA is the lead regulatory agency, with state regulatory oversight provided by the California Department of Toxic Substances Control (DTSC) and the California Water Board (WB), San Francisco Bay Region, with radiological support provided by the California Department of Health Services (DHS).

2.0 BACKGROUND

Site location, description, and background for PCB Hot Spot are detailed in Section 2.0 of the Work Plan.

Building 115 is located in Parcel B in the northwest quadrant of HPS at cross streets McCann and Lockwood. Figure A.3-1 illustrates the location of Building 115, which was used by the DON as a submarine training facility. The area of concern in Building 115 is Room 102 located in the southeast corner of the building, which contains three pieces of potentially PCB-contaminated IPE/piping, ceiling tile labeled as potentially containing PCBs, a small sump containing what appears to be water, and paint containers (presumed left by tenants) located in a submerged area approximately 4 feet deep located in the center of the room. (Access is through a hatch-type door in the floor.) In addition, a sump located outside the building in the southeast corner contains what appears to be rainwater.

3.0 MAPS

Figures relevant to the site location and proposed sampling locations are as follows:

- Figure A.3-1, Hunters Point Shipyard and PCB Hot Spot Soil Excavation Site - Location Map
- Figure A.3-2, PCB Hot Spot Proposed Pre-excavation Characterization Sampling Plan

4.0 SAMPLING STRATEGY

This section provides a brief description of the approaches that will be used to collect samples from within PCB Hot Spot. Tables A.4-1 and A.4-2 present the chemical cleanup goals and RROs established for this project.

4.1 RADIOLOGICAL SCREENING AND EXCAVATED MATERIAL SAMPLING

Prior to the start of the excavation, radiological surface surveys of unsaturated material will be performed to identify surface and near-surface (less than 12 inches bgs) radioactive material. The radiological surface survey will consist of a high-density gamma scan performed with sodium iodide (NaI) detectors and supported by global positioning system (GPS) equipment. The high-density survey process will result in a 100 percent scan survey. Section 5.7 of the Work Plan contains additional details and guidelines for performing radiological surveys that will be used to identify locations of radioactive material for removal. Subsequent to the surface scan, near-surface radioactive contamination identified during the scan will be removed and stored on site (pending off-site disposal), as described in Section 5.7 of the Work Plan.

After the surface radiological screen and contamination removal is complete, the initial 12-inch lift of material within the boundary of PCB Hot Spot will be removed. Subsequent soil/debris removal will occur following the same iterative process – radiological survey, radiological contamination removal, and excavation – for each 12-inch lift. However, in situ radiological surveys will not be performed in portions of the excavation extending below groundwater.

Excavated soil/debris will be run through a vibrating grizzly and conveyor system, which features an array of beta/gamma detectors for ex situ radiological screening. If necessary, the soil/debris will be placed on dewatering pads prior to the placement in the grizzly/conveyor system. The vibrating grizzly feeder is designed to separate large debris. Large debris will be segregated and transported to the large debris screening pad and surveyed for radioactive contamination. The soil passing through the grizzly will be placed on the conveyor and fed through the array of gamma/beta detectors, where ex situ radiation screening will be performed to identify radioactively contaminated materials that may not have been detected during the in situ surveys of each lift, and to detect beta-emitting sources that may be present. The conveyor system is described in Section 5.13.4 of the Work Plan.

Soil removed from the conveyor system due to an alarm trip or manually due to an elevated radiation reading will be surveyed by the assigned Radiological Control Technician (RCT) to identify radiological material. If a point source is found, it will be handled as specified in Section 5.13.4.1 of the Work Plan. If no point source can be found, the soil removed from the

conveyor will be managed as potential LLRW and placed into an appropriate waste container for subsequent characterization and disposal.

The RCT will collect soil samples from the conveyor system at a rate of two composite samples per 50-foot by 50-foot lift for analysis at New World Technology, Inc.'s (NWT's) on-site laboratory (see Section 6.1). The samples will be analyzed by gamma spectroscopy. Gamma spectroscopy results will be compared to the RROs listed in Table A.4-2 of this SAP.

Materials saturated with free-phase product will be placed on the dewatering pad and spread out in lifts not to exceed 6 inches for scanning as this type of material is not appropriate to process through the conveyor system. Radiological surveys will be performed as described in Section 5.13 of the Work Plan. A minimum of one sample will be collected for each 14 cubic yards of material at the location exhibiting the highest gamma radiation measurement. Additional samples may be collected at locations where the investigation level of 3 sigma is exceeded. These samples will be analyzed by the on-site laboratory by gamma spectroscopy.

Radioactive materials that are identified during survey activities will be collected, segregated, and stored in appropriate containers for subsequent characterization and disposal. Soil/materials that are determined by surveying or sampling to contain radioactive materials and/or contamination that requires disposal as LLRW will be stored in bins for subsequent characterization and disposal.

The radionuclides of concern (ROCs) for this project are cesium-137 (^{137}Cs), radium-226 (^{226}Ra), and strontium-90 (^{90}Sr). The on-site gamma spectroscopy analysis will evaluate the specific activity of ^{137}Cs and ^{226}Ra. Ten percent of the samples will be sent to an off-site laboratory for ^{90}Sr analysis, which cannot be performed on site. The sampling procedure for the collection of soil samples following ex situ radiological survey is detailed in Section 6.1.

Ten percent of the samples will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and minimum detectable activities (MDAs) that are within 20 percent of one another. Results from these samples will be considered acceptable if the results are within 20 percent. If the difference between the results is greater than 20 percent, then the data from both laboratories will be reviewed to evaluate the difference. Alpha spectroscopy will be performed by the off-site laboratory on samples if elevated levels of ^{137}Cs and/or ^{90}Sr are identified during laboratory analysis.

4.2 PRE-EXCAVATION CHARACTERIZATION SAMPLING

After initial radiological screening is completed as described in Section 4.1, pre-excavation characterization sampling will be conducted. Currently, the proposed PCB Hot Spot excavation footprint, or area containing PCB concentrations greater than the cleanup goals, has been estimated based on limited data, as shown in Figure A.3-2. Pre-excavation characterization sampling will be conducted to better define the boundaries of PCB Hot Spot and will include soil sampling (via hand-augering) at pre-selected locations (see Figure A.3-2) to evaluate the lateral extent of the contamination.

Due to the limited amount of available data, a 25-foot by 25-foot grid will be overlaid on the proposed excavation footprint. Sampling points along the perimeter of PCB Hot Spot are located on the nodes of the 25-foot by 25-foot grid to better delineate the excavation boundary. Samples will be collected at the node of each grid from zero to 6 inches bgs and 30 to 36 inches bgs. The sample collection and analysis strategies are presented in Figure A.4-1, Pre-excavation Sampling Strategy Decision Tree. Along the western boundary, pre-excavation sampling will be conducted where practical due to the presence of the riprap wall. No samples will be collected from within the excavation footprint since the entire footprint will be excavated. Sampling locations and depths may be modified from those shown in Figure A.3-2 to account for existing site conditions such as soil staining, riprap, and existing utilities. Sampling procedures for the collection of soil samples (via hand-augering) are detailed in Section 6.2.

Field test kits will be used as screening tools to evaluate PCB and TPH concentrations in samples collected at each grid node to further refine the excavation boundary. PCB field test kits will be chosen to screen for all the PCB aroclors, particularly aroclor 1260, which is the predominant aroclor detected at PCB Hot Spot based on historical data. The PCB field test kits will also be chosen to detect PCBs above the cleanup goal of 1 mg/kg. TPH field test kits will be chosen to look for petroleum hydrocarbons in the weathered gasoline to motor oil range, which are the hydrocarbons identified above 3,500 mg/kg at PCB Hot Spot based on historical data. Subsequently, ten percent of the samples screened by the field test kits will be sent to an off-site laboratory to assess the correlation of the field screening results with standard laboratory method results. Laboratory methods will include PCBs by EPA Method 8082 and TPH by EPA Method 8015B for gasoline, diesel, and motor oil, which are the analytical laboratory methods that most closely correlate to the parameters the field test kits are detecting. One significant factor in comparing the field test kit and analytical laboratory results is the percent moisture content of the sample. Field test kits report semi-quantitative results based on wet weight and analytical laboratories report quantitative results based on dry weight. This factor will be taken into consideration when correlating results. Field personnel will select a range of samples for off-site laboratory analysis, including samples with high concentrations, samples with no detections, samples with low percent moisture, and samples with high percent moisture. At any time during this project, samples may be sent off site for laboratory analysis instead of using field test kits if

the TtEC Project Chemist determines the correlation between the field screening and laboratory results to be inconclusive.

On-site radiological analysis data will also be used to establish the boundary of the excavation. The on-site gamma spectroscopy analysis will evaluate the specific activity of ^{137}Cs and ^{226}Ra. Ten percent of the samples will be sent to an off-site laboratory for ^{90}Sr analysis, which cannot be performed on site. In addition, ten percent of the samples will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and MDAs that are within 20 percent of one another. Results from these samples will be considered acceptable if the results are within 20 percent. If the difference between the results is greater than 20 percent, then the data from both laboratories will be reviewed to evaluate the difference. Alpha spectroscopy will be performed by the off-site laboratory on samples if elevated levels of ^{137}Cs and/or ^{90}Sr are identified during laboratory analysis.

Additional sample locations may be placed in stepped-out or -in grids to further refine the limits of the excavation area as described in Figure A.4-1. The locations of the sampling points will be surveyed in the field. If large concrete, rock, metal, or other forms of resistance are encountered during hand-augering, the sampling at that location will be terminated, a new location will be selected within a 5-foot radius of the original location, and the coring will resume at the new location.

4.3 POST-EXCAVATION SAMPLING

Once pre-excavation sampling has been completed and the boundary of the excavation has been established, excavation of the entire footprint area down to 3 feet bgs will be conducted. In addition, areas of the footprint that indicate visual contamination at 3 feet bgs or where historical data (as depicted in Figure 2-1 of the Work Plan) indicate areas above the cleanup goals, these areas will be overexcavated until 1) visual contamination is removed; or 2) historical data indicates that areas are below cleanup goals; or 3) the maximum safe depth to which the excavation can be extended below groundwater is reached.

Following completion of excavation activities, a 50-foot by 50-foot grid will be established along the excavation bottom, including sloped sidewalls. One discrete post-excavation soil sample will be collected at a randomly located point within each grid cell from the bottom. The sample collection and analysis strategies are presented in Figure A.4-2, Post-excavation Sampling Strategy Decision Tree for Bottom Samples. PCB and TPH field test kit and on-site radiological analyses will be conducted on the discrete sample and the resulting data will be used as a screening tool to indicate the need for further excavation of areas still above cleanup goals or RROs. One post-excavation soil sample will be collected per grid once field screening indicates

that cleanup goals and RROs have been achieved, and this post-excavation sample will be sent off site for PCB and TPH laboratory analysis. In addition, for grids excavated to a depth of 7.5 feet bgs or less, a sample will be collected at approximately 8 feet bgs to evaluate vertical extent of contamination that could be present at depth and determine if further over-excavation is necessary.

Following completion of excavation/over-excavation activities along the bottom, one sample will also be collected from the perimeter sidewall every 50 linear feet in areas where the perimeter sidewall extends to 3 feet bgs. This sample will be collected at a random location within the 50-foot perimeter sidewall interval. An additional sample will be collected within each 50-foot interval where the perimeter sidewall extends below 3 feet bgs. This sample will be collected at the location below 3 feet bgs that is most likely to exhibit contamination based on field observations, historical data, and available analytical data generated under this SAP. Perimeter sidewall samples will be analyzed as described in Figure A.4-3, Post-excavation Sampling Strategy Decision Tree for Perimeter Samples. PCB and TPH field test kit and on-site radiological analyses will be conducted on the perimeter sidewall samples, and the resulting data will be used as a screening tool to indicate the need for further excavation of areas still above cleanup goals or RROs. Post-excavation soil samples will be collected once field screening indicates that cleanup goals and RROs have been achieved, and these samples will be sent off site for PCB and TPH laboratory analysis. ROC analysis on the post-excavation samples will be performed by the on-site radiological laboratory. Once post-excavation samples are below cleanup goals and RROs, then those post-excavation samples will also be analyzed for pesticides, Title 22 metals, and polynuclear aromatic hydrocarbons (PAHs). The data from these additional analyses will be considered during the Parcels E and E-2 Feasibility Study.

Since the off-site chemical laboratory results will be used as the final indicator that the area is below cleanup goals, post-excavation samples analyzed by the field test kits for PCBs or TPH will not be sent off site for confirmation or correlation comparisons. The field screening data will solely be used to determine the extent of the over-excavation that may be required. In addition, if the percent moisture in the soil exceeds 30 percent, then field test kits will not be performed and the sample will be sent off site for PCB and TPH analysis and this sample will be considered the post-excavation sample.

Prior to backfilling the excavation, systematically located post-excavation samples will also be collected after establishing a grid consisting of 2,000 square meter cells over PCB Hot Spot. Sixteen systematically located samples will be collected from each grid cell. The samples will be analyzed by the on-site laboratory using gamma spectroscopy. Gamma spectroscopy results will be compared to the RROs listed in Table A.4-2 of this SAP. Ten percent of the samples will be sent to an off-site laboratory for ^{90}Sr analysis, which cannot be performed on site. The sampling procedure for the collection of soil samples is detailed in Section 6.3.

Ten percent of the samples analyzed by the on-site radiological laboratory will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and MDAs that are within 20 percent of one another. Results from these samples will be considered acceptable if the results are within 20 percent. If the difference between the results is greater than 20 percent, then the data from both laboratories will be reviewed to evaluate the difference. Alpha spectroscopy will be performed by the off-site laboratory on samples if elevated levels of ^{137}Cs and/or ^{90}Sr are identified during laboratory analysis. In addition to collecting and analyzing samples from the excavation bottom and perimeter sidewalls, a 100 percent high density gamma scan will be performed at these areas.

The sampling procedures for the collection of post-excavation samples are detailed in Section 6.3.

4.4 WASTE CHARACTERIZATION SAMPLING

Wastes generated during excavation activities may require characterization for disposal, including excavated and stockpiled soils that do not contain radioactive contaminants, radioactively contaminated materials (including LLMW), discrete radioactive point sources, and wastewater from dewatering, decontamination, and possible well abandonment activities. Large debris may also require characterization if there is evidence that elevated PCB concentrations may be present on the material. In addition, if drums, bottles, jars and small containers with unknown contents are unearthed during excavation activities, then the unknown contents will be sampled and analyzed to determine safety measures and procedures needed to inspect, handle, remove, and dispose of them. Waste characterization sampling procedures are detailed in Section 6.4.

Stockpiled soil that does not contain radioactive material concentrations will be sampled to characterize the soil for disposal. Soil samples will be collected from the radiologically cleared stockpile at a frequency of one sample per 500 cubic yards. A minimum of five samples will be collected from any stockpile smaller than 2,500 cubic yards. The samples will be sent to an off-site laboratory and analyzed for volatile organic compounds (VOCs); semivolatile organic compounds (SVOCs), including PAHs; pesticides; PCBs; total purgeable petroleum hydrocarbons (TPH-purgeable); total extractable petroleum hydrocarbons (TPH-extractable); and Title 22 metals. Asbestos, Soluble Threshold Limit Concentration (STLC), and Toxicity Characteristic Leaching Procedure (TCLP) will be added as applicable. Additional analyses may be added based on disposal facility requirements. Radiological analyses will not be performed on this soil as this soil was evaluated for radiological contamination before being stockpiled.

Large debris may be sampled to assess the presence of PCBs prior to off-site disposal. Sample of porous debris items will be performed by collecting a solid sample of the material. Sampling of non-porous debris items will be performed by wipe sampling. The decision to collect debris

samples and the frequency will be based on the professional judgment of the project team taking into consideration the available analytical data from the area surrounding the debris and visual observations in the field.

Soil that is identified as radioactively contaminated (including LLMW) will be stored in B-25 boxes or bins that are up to approximately 20 cubic yards in size and sampled to characterize the soil for disposal. A sample may be collected from each excavator bucket of soil prior to the material being placed in the bin if the material going into the bin is identified as radioactive (by on-site field instruments) but a point source was not located and removed. This sample will be analyzed by the on-site laboratory by gamma spectroscopy. When the bin is full, a five-point composite sample will be collected from each bin. These samples may be analyzed to meet the requirements of the disposal facility. These analyses may include VOCs; SVOCs, including PAHs; pesticides; PCBs; herbicides; Title 22 metals; TPH-purgeable; TPH-extractable; pH; ignitability; reactivity; paint filter test; and radionuclides as well as asbestos, STLC, and TCLP. Additional analyses may be added based on disposal facility requirements. If VOCs and/or TPH-purgeable are analyzed, EnCores™ samples will be collected from the first location of the five-point composite.

For radioactive materials recovered from the site, on-site gamma spectroscopy will be performed to confirm the radionuclide identity and to measure waste activity. This will be done to support proper waste characterization and packaging for disposal.

Water from dewatering materials, decontamination, or well abandonment generated during excavation activities will be stored on site in Baker tanks or other appropriate containers prior to sampling for disposal. One water sample per tank will be collected and analyzed for VOCs; SVOCs, including PAHs; pesticides; PCBs; Title 22 metals; TPH-purgeable; and TPH-extractable. (If other containers such as drums are used to contain wastewater, then the frequency of samples collected for characterization will be determined by the TtEC Project Chemist.) Radiological analysis using on-site gamma spectroscopy will also be performed on the samples. Additional analyses may be requested to meet the requirements of the disposal facility.

Drums, bottles, jars and small containers with unknown contents that are unearthed during the excavation activities will be first screened by field instruments for radioactivity and then sampled and analyzed for the presence of radioactive materials. One sample will be collected per container and sent to an off-site laboratory for gamma spectroscopy and gross alpha/beta analysis. Additional analysis such as ^{90}Sr or alpha spectroscopy may be requested based upon review of the sample results. Once the containers are sampled for radioactivity, the containers will undergo "HazCating" or "waste compatibility screening," which is defined as a series of rapid, qualitative chemical and physical tests conducted to determine potential hazards, handling precautions, storage criteria, and disposal classification of the material in question.

Ten percent of samples will be randomly selected to be sent to an off-site radiological laboratory for gamma spectroscopy analysis for QA purposes. Data from the on-site and off-site gamma spectroscopy analysis will be compared for samples that have count times and MDAs that are within 20 percent of one another. Results from these samples will be considered acceptable if the difference between the results is within 20 percent. If the difference between the results is greater than 20 percent, the data from both laboratories will then be reviewed to evaluate the discrepancy. ^{90}Sr analyses and alpha spectroscopy will be performed on samples if elevated levels of ^{137}Cs are identified during on-site laboratory gamma spectroscopy analysis.

LLRW will be disposed of through the DON LLRW Program in accordance with *Environmental Work Instruction (EWI) #8, 3EN2.8, Low-Level Radioactive Waste (LLRW) Disposal Program* (NFECSW, 2001a) by a certified waste broker.

4.5 IMPORT MATERIAL SAMPLING

Clean imported fill material from the Bay Area Rapid Transit (BART) pile, which has been certified clean by the DON, will be used for the backfill material. Because it has been certified clean, no additional sampling and analysis will be performed on the BART pile soils.

If additional fill materials need to be imported, fine materials will be sampled. In accordance with the procedures described in Section 6.5, four randomly located material samples will be collected from each imported material source prior to use and analyzed by an off-site laboratory for VOCs; SVOCs, including PAHs; pesticides; PCBs; Title 22 metals; and TPH-extractable. In addition, these samples will be analyzed by the on-site radiological laboratory for ROCs. Frequency and analyses of import material was selected following the guidelines established by DTSC. In addition to these analyses, a current certificate should be obtained from the facility providing the material to ensure that the material does not contain asbestos. If the facility cannot provide a certificate, asbestos analysis will then be required, unless this same material has been sampled by TtEC within the last year and is below the required limit for asbestos.

4.6 BUILDING 115 SAMPLING

Building 115 contains four types of potential waste streams that will be sampled and analyzed for waste characterization purposes.

The first waste stream is composed of three pieces of IPE/piping, which may contain hydraulic oil. One sample of the oil from each piece of equipment will be obtained and analyzed for PCBs, ignitability, and total extractable petroleum hydrocarbons (TPH-extractable). If oil is not present or a sample not obtainable, then one wipe sample will be collected from each piece of equipment from the interior of the equipment where the oil would have been stored. If the interior of the equipment is not accessible without cutting into the system, then an exterior wipe sample will be

collected from an area where leakage may have occurred. Wipe samples will be analyzed for PCBs.

The second waste stream is composed of stained dust/soil/sludge that is contained beneath the pieces of IPE. One sample will be collected from this material and analyzed for PCBs, metals, and SVOCs.

The third waste stream is one sump on the exterior of the building and another inside the building, which are believed to contain water. One liquid sample will be collected from the sumps and analyzed at a minimum for VOCs, SVOCs, pesticides, PCBs, metals, TPH-extractable, and ignitability. Additional analyses may be added if the water is to be discharged to the sanitary sewer.

The fourth waste stream is boxed ceiling tiles that may contain PCBs. A solid sample of one representative tile will be collected and analyzed for PCBs. If more than one type of tile is present, a sample will be collected from a representative tile of each type.

5.0 REQUEST FOR ANALYSIS

This section describes the analytical methods, sample containers, and preservative requirements. Additionally, field QC samples to be collected for this project will be discussed in this section.

5.1 ANALYTICAL METHODS

The following EPA analytical methods [*Test Methods for Evaluating Solid Waste, Physical Chemical Methods, SW-846,* Third Edition and final updates (EPA, 1986)]; the *Gamma Emitting Radionuclides by Gamma Ray Spectrometry, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA/600/4-80-032* (EPA, 1980); and the *Environmental Measurements Laboratory (EML) Procedures Manual, HASL-300* [Department of Energy (DOE), 1997] will be used to analyze samples during this project:

Field Screening (Soil Samples)

- PCB field screening by EPA Method 4020
- TPH field screening by EPA Method 9074

On-site Laboratory (Soil and Water Samples)

- Gamma spectroscopy analysis by C1402-98 Standard Guide for High-Resolution Gamma-Ray Spectrometry or by on-site laboratory Standard Operating Procedures (SOPs)

Off-site Laboratory (Soil Samples)

- Gamma spectroscopy by EPA Method 901.1M (modified for solids) or equivalent
- ^{90}Sr by DOE Sr-01/Sr-02 Method or equivalent
- Alpha spectroscopy by DOE HASL-300 Method or equivalent
- Gross Alpha and Beta by EPA Method 9310 or equivalent
- VOCs by EPA Method 8260B [EPA Method 5035/8260B for soil samples; if EnCore samples for EPA Method 5035 are not able to be used due to the type of media (i.e., saturated soil or a soil matrix that does not break into small enough pieces to fit into an EnCore), then EPA Method 5030B will be used]
- SVOCs, including PAHs by EPA Method 8270C
- Pesticides by EPA Method 8081A
- PCBs by EPA Method 8082
- Herbicides by EPA Method 8151A

- TPH-purgeable by EPA Method 8015B [(EPA Method 5035/8015B for soil samples; if EnCore samples for EPA Method 5035 are not able to be used due to the type of media (i.e., saturated soil or a soil matrix that does not break into small enough pieces to fit into an EnCore), then EPA Method 5030B will be used]
- TPH-extractable by EPA Method 8015B
- Title 22 metals by EPA Method 6010B/6020/7000
- pH by EPA Method 9045C
- Ignitability by EPA Method 1010
- Reactivity by SW-846 Chapter 7.3.3 for cyanide and 7.3.4 for sulfide
- Paint filter test by EPA Method 9095
- Asbestos by California Air Resources Board (CARB) Method 435 as required
- STLC by California Waste Extraction Test (WET) as required
- TCLP by EPA Method 1311 as required

Off-site Laboratory (Wastewater Samples)

- Gamma spectroscopy by EPA Method 901.1 or equivalent
- ^{90}Sr by EPA Method 905.0 or equivalent
- Alpha spectroscopy by DOE HASL-300 Method or equivalent
- Gross Alpha and Beta by EPA Method 9310 or equivalent
- VOCs by EPA Method 8260B
- SVOCs, including PAHs, by EPA Method 8270C
- Pesticides by EPA Method 8081A
- PCBs by EPA Method 8082
- TPH-purgeable by EPA Method 8015B
- TPH-extractable by EPA Method 8015B
- Title 22 metals by EPA Method 6010B/6020/7000
- Ignitability by EPA Method 1010

Off-site Laboratory (Solid/Wipe Samples from Debris)

- PCBs by EPA Method 8082

On-site testing using the following HazCat screening tests:

- Water reactivity (air or water reactive)
- Miscibility (aqueous vs. organic solubility)

- Flammability and explosivity
- pH
- Presence of sulfide and cyanide
- Presence of significant halogen content
- Presence of oxidizers and peroxides

5.2 SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

A list of the sample containers, preservatives, and holding time requirements for each analytical method is provided in Table A.5-1.

5.3 FIELD QUALITY CONTROL SAMPLES

Field QC samples will be collected and analyzed during the project to assess the consistency and performance of the sampling program. Field QC samples for this project may include field duplicates, equipment rinsates and source blank samples. Trip blanks will not be collected for this project, as VOC analysis for aqueous samples is only being conducted on waste characterization samples, and field QC samples are not applicable to the collection of waste characterization samples. Field QC samples will also not be collected for field screening samples.

5.3.1 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 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. For radiological samples, field duplicates are only applicable to water samples. However, the only water samples collected for this project are for waste characterization. Therefore, field duplicates for radiological samples will not be collected for this project.

5.3.2 Equipment Rinsate Samples

Equipment rinsate samples will be collected only if reusable sampling equipment is used. Rinsate samples consist of analyte-free, reagent-grade water collected from the final rinse of the equipment decontamination process. 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, collected at a frequency of one per each day of sampling, will help determine the effectiveness of the decontamination procedure and potential for cross-contamination during sampling events. Equipment rinsate samples are only applicable to samples collected for chemical analysis. Therefore, rinsates will not be collected for radiological samples.

5.3.3 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 5.3.2. 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 proposed reporting limits (RLs) discussed in Section 8.2.2. 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 RLs. Source blank samples will only be collected if equipment rinsate samples are to be collected for this project.

6.0 FIELD METHODS AND SAMPLING PROCEDURES

The following sections provide the sampling procedures and sample handling protocols to be used for this project.

6.1 SCREENED SOIL AND EXCAVATED MATERIALS SAMPLING PROCEDURES

Samples of excavated ex situ screened soil will be collected as follows:

1. Soil samples will be collected from the conveyor system at a rate of two composite samples per 50-foot by 50-foot lift.
2. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
3. Samples will be collected as specified in the TtEC SOP HPO-Tt-009, Sampling for Radiological Surveys, presented in Attachment 1.
4. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
5. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.
6. Samples will be analyzed on site by gamma spectroscopy.

6.2 PRE-EXCAVATION CHARACTERIZATION SAMPLING PROCEDURES

Soil samples for chemical and radiological screening will be collected along the boundary of the excavation footprint as follows:

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
2. Soil samples will be collected from the nodes of the grid.
3. A sampler will be assembled (with a stainless steel liner) by aligning both sides of the barrel and then screwing the drive shoe on the bottom and the heavier headpiece on top. The sampler will be placed in a perpendicular position on the material to be sampled. The sampler will be driven by using a slide hammer to collect a sample at zero to 6 inches bgs. It is important not to drive past the bottom of the headpiece because this will result in compression of the sample. The sampler will be withdrawn and opened by unscrewing the drive shoe and head and splitting the barrel. The liner containing the sample will be immediately removed from the sampler. The ends of the sampler liner shall be covered with Teflon film and sealed with plastic caps.
4. The hand-auger will be used to access 30 inches bgs; the sampler will then be driven from 30 to 36 inches as described in Step 3.

5. If field conditions do not permit sampling by the method described in Step 3, then grab samples will be collected into pre-cleaned sample containers using a hand-auger or similar device.
6. Two sample containers will be collected per sample location. One container will be used for field test kits and the other for on-site radiological testing. If the sampling methodology described above does not generate enough sample to fill two containers, then a location immediately adjacent to the original will be sampled at the same depths as the original sample to ensure adequate sample volume collection.
7. Samples will be field screened as described in Figure A.4-1. Field test kit manufacturer's instructions will be followed.
8. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
9. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.
10. Samples for radiological analysis will be transferred to the on-site laboratory, and samples to be analyzed by field test kits will be stored at 4±2 degrees Celsius (°C) until analyzed.
11. To correlate the accuracy of the field test kits, 10 percent of the soil samples will be sent to an off-site laboratory for PCBs and TPH analysis.

6.3 POST-EXCAVATION SAMPLING PROCEDURES

Randomly located chemical and radiological post-excavation samples will be collected as follows:

1. The proposed excavation area will be divided into 50-foot by 50-foot grids. One discrete post-excavation soil sample per grid will be collected from random locations on the bottom of the excavation. One discrete random sample will also be collected from the perimeter sidewall every 50 linear feet in portions of the excavation extending to 3 feet bgs.
2. A random-number generator will be used to determine the x and y coordinates for each random bottom grid and perimeter sidewall. The x and y coordinates will represent the sample location for that grid and perimeter sidewall.
3. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
4. Two grab sample containers will be collected per sample location. One container will be used for field test kits and the other for on-site radiological testing. For samples collected at 2.5- to 3-foot increments below ground, hand-auger procedures described in Section 6.2 will be used.
5. Samples will be screened as described in Figures A.4-2 and A.4-3. Field test kit manufacturer's instructions will be followed.

6. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
7. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.
8. Samples for radiological analysis will be transferred to the on-site laboratory and samples to be analyzed by field test kits will be stored at 4±2 °C until analyzed. If the percent moisture in the soil exceeds 30 percent, then field test kits will not be performed and the sample will be sent off site for PCB and TPH analysis.
9. Biased perimeter sidewall sample locations will be selected in the field as described in Section 4.3. These samples will be collected following steps 3 through 8 above.
10. Once field test kits (or off site analysis) and on-site laboratory results indicate that a grid is below cleanup goals and RROs, then one discrete sample will be recollected from the bottom of the grid as described in steps 2 through 4 for off-site laboratory analysis of PCBs and TPH. In addition, for grids excavated to 7.5 feet bgs or less, a sample will be collected at approximately 8 feet bgs using a hand-auger or similar device for on-site radiological analysis and off-site PCB and TPH analysis.

Systematically located radiological post-excavation samples will be collected as follows:

1. After post-excavation sampling is complete, PCB Hot Spot will have a grid superimposed consisting of 2,000 square meter cells. One soil sample will be collected at each of 16 systematically located sample points within each grid cell.
2. A random number generator will be used to select the x and y coordinates of the starting point for the distribution of the systematic samples within the first grid cell. The 16 samples will be collected within the grid cell at locations distributed 11 meters apart from one another. The distribution of sampling locations established in the first grid cell will be maintained in each subsequent grid cell.
3. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
4. Radiological samples will be collected as specified in the TtEC SOP HPO-Tt-009, Sampling for Radiological Surveys, presented in Attachment 1.
5. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
6. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.
7. Samples will be analyzed on site by gamma spectroscopy.

6.4 WASTE CHARACTERIZATION SAMPLING PROCEDURES

Soil and wastewater will be generated during field activities and will require proper disposal. No sampling of discrete radiological devices is described since these devices will be analyzed in their entirety to characterize them for disposal. Sampling of these wastes will be performed as follows

for chemical analysis. Where required, samples for radiological analysis will be collected as specified in the TtEC SOP HPO-Tt-009, Sampling for Radiological Surveys, presented in Attachment 1.

6.4.1 Stockpile Sampling

Samples of the stockpiled and excavated material will be collected as follows:

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

$$V = A * H/27$$

Where: V = volume in cubic yards

A = Area of the base of the stockpile in square feet calculated using one of the following formulas:

Rectangular = length * width
Square = length * width
Triangular = ½ base * height
Circular = 3.14 * radius * radius
Oval = 3.14 * long radius * short radius

H = average height of the stockpile in feet

27 = conversion factor for cubic feet to cubic yards

2. The stockpile will be divided into the number of sections equivalent to the number of samples to be collected.
3. The sample locations will be determined by generating random numbers.
4. A hand-auger or similar device will be used to access each x, y, and z coordinate. Due to limitations in accessing deep depths in a large stockpile, z-coordinates may be limited to 10 feet.
5. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
6. Grab samples will be collected into sample jars that will be filled completely. An additional sample container may be collected to ensure sufficient sample quantity for analyses. For VOC and/or TPH-purgeable analysis, EnCore samples will be collected from the sample jar as follows:
   a. Holding the coring body, the plunger rod will be pushed down until the small o-ring rests against the tabs. This will ensure that the plunger will move easily.
   b. The locking lever on the EnCore T-handle will be depressed. The coring body, with the plunger end first, will be placed into the open end of the T-handle, aligning the slots of the coring body with the locking pins in the T-handle. The coring body will be twisted clockwise to lock the pins in the slots. The sampler

will be checked to ensure that it is locked in place. The sampler will now be ready for use.

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

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

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

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

g. This procedure will be performed until three EnCore samples are collected for each VOC sample and three for each TPH-purgeable sample. All three EnCore samples for each analysis may be placed in one aluminum bag for consolidation purposes.

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

7. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.

8. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.

6.4.2 Solid or Wipe Sampling Procedures

Solid samples of debris materials will be collected as follows:

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

2. Material will be sampled destructively by cutting, chipping, slicing, scraping, breaking up, and so forth.

3. One glass jar will be used to collect material if pieces are small enough. If pieces are large, the material will be cut into pieces that are able to fit into one quart-size resealable bags or one gallon-size resealable bag. Both jars and bags should be filled to capacity to provide the laboratory with enough volume for analyses.

4. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.

Wipe samples will be collected according to the following procedures:

1. A manila folder will be used to make a 100-square centimeter (cm^2) cutout [typically 10-centimeter (cm) by 10-cm] for each area to be wiped. A new manila folder cutout will be used for each area.
2. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples at each location.
3. Tweezers will be used to place the gauze pad into a glass jar. Metal tweezers should be used for all other wipes. Once the gauze pad is in the container, the pad will be saturated with the appropriate solvent listed in Table A.5-1.
4. Tweezers will be used to remove the saturated gauze pad from the container. The cutout will be placed on the area to be wiped. The surface inside the cutout will be wiped vertically using one side of the gauze pad and then horizontally using the other side of the pad. The pad will be placed back into the container. For gauze pads with hexane or methylene chloride, the wiping should be performed quickly once the pad is exposed to the air.
5. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.
6. Steps 1 through 5 will be repeated for each cutout. If disposable tweezers are not available, then the tweezers will be rinsed with the appropriate solvent between samples.

6.4.3 Bin Sampling Procedures

Soil bin samples will be collected as follows:

1. The bin will be divided into five sections, corresponding to the number of samples to be collected.
2. The sample locations will be determined by generating random numbers.
3. A hand-auger or similar device will be used to access each x, y, and z coordinate.
4. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
5. Grab samples will be collected into sample jars that will be filled completely. For VOC and/or TPH-purgeable analysis, EnCore samples will be collected as described in Step 6 of Section 6.4.1 at the first of the five locations. An additional sample container may be collected to ensure sufficient sample quantity for analyses.
6. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
7. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.

6.4.4 Wastewater Sampling Procedures

1. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting wastewater samples.
2. Wastewater samples will be collected using a disposable bailer or similar device. Samples will be transferred from the bailers to pre-preserved, pre-cleaned sample containers.
3. Vials for VOC and/or TPH-purgeable analysis will be filled as follows:
   a. The water samples will be carefully collected into 40-milliliter (mL) volatile organic analysis (VOA) vials using techniques to minimize aeration.
   b. The vial will be filled up to the lid until a positive meniscus is formed.
   c. The vial will be capped immediately, but slowly.
   d. The sample will be checked for the presence of air bubbles.
   e. If an air bubble is present, the collected sample will be discarded and resampled using a new vial.
   f. The previous steps will be repeated until an air bubble-free sample is collected.
4. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
5. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.

6.4.5 Container Content Sampling Procedures

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

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

Samples of material from the containers will be collected in accordance with TtEC SOP HPO-Tt-009, Sampling for Radiological Surveys (Attachment 1), for sampling of radiological materials.

For liquids, samples will be extracted through the bunghole if there is one on the container. If the container contains mostly solid material rather than liquids, the entire top of the container will be removed to sample the contents.

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

Samples will be numbered, labeled, documented, and packaged according to procedures in Sections 6.8 to 6.11.

At the same time the sample is collected for the off-site laboratory analysis, an aliquot will be collected in a labeled test tube and transferred to the HazCat area (Building 271) where the HazCat Technician(s) will carry out waste compatibility screening. The parameters described in Section 5.1 will be tested according to the manufacturer's instructions for the HazCat kit. The results of the HazCat tests will be recorded on a field form and subsequently evaluated to categorize similar types of wastes together for disposal purposes.

6.5 IMPORT MATERIAL SAMPLING PROCEDURES

For verification sampling of any necessary import materials, unless already certified, backfill samples will be collected as follows for chemical analysis. Samples for radiological analysis will be collected as specified in the TtEC SOP HPO-Tt-009, Sampling for Radiological Surveys, presented in Attachment 1. If the site where the backfill is being imported from is accessible, samples will then be collected from the site; if the site is not accessible, a sample of the material will then be sent to the TtEC project site, and samples will be collected as follows.

1. Only soil and fine materials will be sampled. Four samples per borrow area or quarry will be collected.
2. The sample locations will be determined by generating random numbers.
3. A hand-auger or similar device will be used to access each x, y, and z coordinate. Due to limitations in accessing deep depths in a large stockpile, z-coordinates will be limited to 10 feet.
4. Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting soil samples at each location.
5. Grab samples will be collected into sample containers that will be filled completely. For VOC analysis, EnCore samples will be collected as described in Step 6 of Section 6.4.1. An additional sample container may be collected to ensure sufficient sample quantity for analyses.

6. Sampling equipment will be screened and decontaminated per Sections 6.6 and 6.7 between each sample acquisition.
7. Sample numbering, labeling, documentation, and packaging procedures will be followed as described in Sections 6.8 to 6.11.

6.6 RADIOLOGICAL SCREENING OF SAMPLING EQUIPMENT

Prior to decontamination, sampling equipment will be screened using a hand-held alpha/beta survey meter. If radioactive contamination exceeding the release limits for equipment and materials identified in Table A.6-1 is detected, the equipment and local area will be secured and the Radiological Safety Officer (RSO) will be notified.

6.7 DECONTAMINATION PROCEDURES

Decontamination of non-disposable sampling equipment that has been screened as discussed in Section 6.6 will be performed to prevent the introduction of extraneous material into samples and to prevent cross-contamination between samples. All sampling equipment will be decontaminated by steam cleaning or by washing with a nonphosphate detergent such as Liquinox® or equivalent. Decontamination water will be collected in approved Department of Transportation (DOT) containers and characterized per Section 4.4 for disposal.

The following steps will be applied for the general decontamination of non-disposable sampling equipment:

1. **Wash with nonphosphate detergent and water solution** — This step will reduce the amount of gross contamination from the equipment. Use of a container, approximately 75 percent full of solution, is suggested for this step. This detergent solution will be prepared as directed by the manufacturer.
2. **Rinse with potable water** — This step will rinse all the detergent solution away from equipment. Use of a container, approximately 75 percent full of potable water, is suggested for this step. Periodic changing of this water is required.
3. **Rinse with deionized water** — This step will rinse the equipment of detergent solution and potable water residues. Use of a container, stainless steel Hudson-type sprayer, or Nalgene™ squeeze bottle while holding equipment over a container is suggested for this step.
4. **Radiological screening of equipment** — When dry, survey the post-decontaminated equipment using a hand-held alpha/beta survey meter. If radioactive contamination exceeding the release limits identified in Table A.6-1 is detected, immediately secure the equipment and local area and notify the RSO.

If equipment rinsate samples are to be collected, laboratory reagent-grade water will be used as an additional rinse after Step 4. Water that is falling off the sampling equipment as is it being rinsed with the reagent-grade water will be collected in appropriate sample bottles and analyzed for the same parameters as the field samples.

6.8 SAMPLE NUMBER

The sample number will be recorded in the field logbook, on the labels, and chain-of-custody (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. Each sample collected for chemical or radiological analyses will be identified as described in Table A.6-2.

6.9 SAMPLE LABELING

Sample labels are necessary to prevent misidentification of samples. Sample labels for chemical analysis will be filled out in indelible black or blue ink and affixed to sample containers at the time of sample collection. 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)
- Sampler's initials
- Analyses required
- Preservative (if any)

For radiological analysis, sample containers may be placed on the detector in the instrument or other containers may be small; therefore, a label on the side of the container is not appropriate. Instead, sample container lids will be labeled using permanent markers. If a plastic bag is used to collect samples, then the sample bag will be directly marked with indelible ink. When this sample is then transferred to a container, the lid of the container will be labeled. If containers are too small to fit all of the above sample information, at a minimum, the container will be labeled with the 3-character designation of the consecutive sample number (for example, 004).

6.10 FIELD DOCUMENTATION

In order to maintain the integrity and traceability of samples, all information pertinent to field sampling will be recorded in a field logbook. Samples will be properly labeled, custody-sealed (for chemical samples) prior to being transported to the laboratory and will be accompanied by completed COC documentation. Associated documentation will be recorded in indelible black or blue ink.

6.10.1 Chain-of-Custody

To establish the documentation necessary to trace sample possession from the time of collection through analysis, a COC record will be completely filled out and will accompany every sample. A new COC record will be filled out when samples are selected to be sent for off-site laboratory analysis. Samples will be delivered to the laboratory for analysis as soon as practical.

At a minimum, information detailing the following will be recorded on the COC record:

- Project name (PCB Hot Spot)
- Project location/Site ID (Hunters Point Shipyard)
- Project number (1990.084D)
- Purchase order number (only applicable for off-site laboratory samples)
- Sample ID
- Sampler name
- Sampler signature
- Project contact (radiological project manager for on-site laboratory samples and TtEC Project Chemist for off-site laboratory samples)
- Airbill number (if applicable)
- Date (of sample collection)
- Time (of sample collection to the nearest minute, 24-hour clock)
- Sample type (matrix – 's' for soil, 'w' for water/liquid)
- Turnaround time (not applicable for on-site laboratory)
- Sample location codes (maximum of 20-character length description of where sample was collected)
- Sample depth in feet (start, end)
- QC type:

  REG: regular sample

  FD: field duplicate

  ER: equipment rinsate

  SMQC: source blank
- Composite description (if applicable)
- Laboratory name
- Number of sample containers
- Laboratory ID (not applicable for on-site laboratory and off-site laboratory will complete upon receipt of samples)

- Analyses required
- Comments
  - Matrix spike/matrix spike duplicate (MS/MSD) samples
  - Observations specific to sample
- Transfer signature (to relinquish samples)
  - The sampler will be the first person to relinquish sample possession
- Courier/laboratory representative signature (for commercial carrier, record name of commercial carrier here)
- Date/time (of custody transfer)
- Laboratory instructions
- Data package requirement -Level III or IV (not applicable to on-site laboratory)

6.10.2 Custody Seals

Sample custody seals are used to detect unauthorized tampering of samples from the time of sample collection to the time of analysis.

The seals will be signed or initialed and dated by the sampler. The seals will be placed on the sample containers and shipping containers in such a way that they must be broken in order to open the containers. Seals will be affixed to containers before the samples leave the custody of the sampling personnel.

Custody seals will not be used for radiological samples collected as the seal would interfere with the analysis since the container may be placed on the instrument.

6.10.3 Field Logbooks

A permanently bound field logbook with consecutively numbered pages, used for sampling activities only, will be assigned to this project. Entries will be recorded in indelible black or blue ink. At the end of each workday, the logbook pages will be signed by the responsible sampler, and any unused portions of the logbook pages will be crossed out, signed, and dated.

If it is necessary to transfer the logbook to another person, the person relinquishing the logbook will sign and date the last page used, and the person receiving the logbook will sign and date the next page to be used.

At a minimum, the logbook will contain the following information:

- Project name and site location
- Date and time

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

6.10.4 Document Corrections

Changes or corrections on project documentation will be made by crossing out the erroneous item with a single line and 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 should be entered legibly and in a way to clearly correspond to the crossed-out item.

6.11 SAMPLE PACKAGING AND SHIPMENT

Sample packaging procedures for radiological and chemical samples are as follows.

6.11.1 Radiological Samples

Sampling packaging and shipping will be performed in accordance with the SOP in Attachment 1.

6.11.2 Chemical Samples

Immediately after sample labeling, custody seals will be affixed to each sample container. Each container will be placed in double-resealable plastic bags to protect the samples from moisture. For VOA vials and EnCore samples, the custody seal will be placed on the outside of the first resealable bag; then the containers will be placed in a second resealable bag. This will prevent any contact with the adhesive from the custody seal and the samples. VOA vials will be wrapped

with bubble wrap (if transported by a commercial carrier), placed in a resealable bag, and then placed in another resealable bag following application of a custody seal over the first bag.

Samples will be stored at 4±2 °C until field test kit analysis or transportation to an off-site laboratory for chemical analysis. Samples will be shipped in coolers with sufficient ice to keep the samples at 4±2 °C. Each cooler will be shipped with a temperature blank. A temperature blank is a container filled with tap water and stored in the cooler during sample collection and transportation. The temperature of the cooler will be recorded by the laboratory on the COC record immediately upon receipt of the samples. Sample cooler drain spouts will be taped from the inside and outside of the cooler to prevent any leakage.

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

6.12 BUILDING 115 SAMPLING

Wipe and solid material sampling procedures are described in Section 6.4.2. The solid material sampling procedures will also be used to collect oil and tile samples. The collection of a wastewater sample is described in Section 6.4.4.

7.0 PROJECT ORGANIZATION

This section identifies the key individuals from the DON and TtEC who are responsible for the oversight and/or implementation of the proposed field activities. The project organization chart is shown in Figure A.7-1. The responsibilities of the team members associated with the sampling activities are presented in Table A.7-1.

7.1 POINTS OF CONTACT

The following is a list of the key contacts for the project:

Agency	Contact	Project Title
NAVFAC SW BPMOW.MW 1455 Frazee Road, Suite 900 San Diego, CA 92108-4310	Jose Payne (619) 532-0962	DON Remedial Project Manager (RPM)
NAVSEA DET RASO Building 1971 NWS P.O. Drawer 260 Yorktown, VA 23691-0260	Laurie Lowman (757) 887-4692	Radiological Site Manager
NAVSEA DET RASO Building 1971 NWS P.O. Box Drawer 260 Yorktown, VA 23691-0260	Matthew Slack (757) 887-4692	Assistant Radiological Site Manager
NAVFAC SW 1220 Pacific Highway San Diego, CA 92131-5190	Narciso Ancog (619) 532-3046	Quality Assurance Officer
NAVFAC SW ROICC San Francisco Bay Area 2450 Saratoga Ave., Building 110, Suite 200 Alameda, CA 94501-7545	Peter Stroganoff (510) 749-5941	Resident Offier in Charge of Construction (ROICC)
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8.0 QUALITY ASSURANCE OBJECTIVES

The overall QA objectives of this SAP are to outline procedures for the collection and assessment of data that are within acceptable ranges of precision, accuracy, representativeness, completeness, and comparability (PARCC) to meet the project DQOs. The DQOs associated with environmental data are a function of the sampling plan rationale and the procedures used to collect the samples, as well as the analytical methods and instrumentation used. However, uncertainty cannot be eliminated entirely from environmental data.

8.1 DATA QUALITY OBJECTIVES

The DQO process is a seven-step planning approach based on scientific methods that are designed to ensure that the type, quantity, and quality of environmental data used for decision making are appropriate for the intended application. The DQO process, as defined by the EPA, consists of the following seven steps that are designed to provide a systematic approach to resolving issues that pertain to this remediation project (EPA, 2000):

- Stating the Problem
- Identifying the Decisions
- Identifying Inputs to the Decisions
- Defining the Boundaries
- Developing a Decision Rule
- Specifying Limits on the Decision Error
- Optimizing Sampling Design

The DQOs are summarized in Table A.8-1.

8.2 ANALYTICAL DATA QUALITY OBJECTIVES

Analytical data will be obtained using published, standard methods in a state of California DHS-certified and Naval Facilities Engineering Service Center (NFESC)-evaluated off-site laboratory. Additional state certifications may also be required for radiological testing as required by the disposal facility. DHS certification and NFESC evaluation is not required for the on-site radiological laboratory. Analytical DQOs will be assessed through measures of PARCC parameters. The analytical methods used, proposed RLs (or MDA for radiological analyses), and project QC criteria are also detailed in this document.

8.2.1 Quality Control Criteria

QC criteria definitions are as follows:

- **Precision** — a 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. For this project, a laboratory control sample (LCS) will be used to determine the precision of the analytical method. Total precision is the measurement of the variability associated with the entire sampling and analysis process. It is determined by analysis of duplicate field samples and measures variability introduced by both the laboratory and field operations. Field duplicate, laboratory duplicate, and MSD samples will be used to assess field and analytical precision, and the precision measurement will be determined using the relative percent difference (RPD) between the duplicate sample results. The formula for calculating the RPD is as follows:

  RPD = 100 x 2 x (result - duplicate result)/(result + duplicate result)

- **Accuracy** — 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 of analytes spiked into a LCS against a control limit. Surrogate compound recoveries are also used to assess accuracy and method performance for each sample analyzed. The formula for calculating accuracy uses the following equation to determine percent recovery (%R) of specific analytes.

  %R = 100 x (spiked sample result - unspiked sample result)/amount of spike added

- **Representativeness** — 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. Representativeness is a qualitative parameter mostly concerned with the proper design of the sampling program.

- **Completeness** — 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 aqueous samples and 90 percent for soil samples and is determined using the following equation:

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

- **Comparability** — a qualitative parameter expressing the confidence with which one data set can be compared with another. Sample data should be comparable with other measurements for similar samples and sample conditions. The objective for the QA/QC program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field

conditions encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats.

8.2.2 Proposed Reporting Limits

Proposed RLs/MDAs for this project for the off-site laboratory are presented in Table A.8-2. These limits are proposed as the laboratory(s) selected for this project may have exceptions to these limits. These exceptions will be acceptable provided the laboratory RLs/MDAs are below action level criteria listed in Table A.8-2.

8.2.3 Project Quality Control Limits

Proposed precision and accuracy QC limits for each method for the off-site laboratory are presented in Table A.8-3. These limits are proposed as the laboratory(s) selected for this project may have exceptions to these limits.

9.0 ANALYTICAL QUALITY CONTROL PROCEDURES (OFF-SITE LABORATORY)

This section describes laboratory qualification, sample custody and documentation, QC procedures, QC samples, preventative maintenance, data review, and deliverables for the off-site laboratories. (Analytical QC procedures for the on-site radiological laboratory are presented in Section 10.0).

9.1 LABORATORY QUALIFICATION

The analytical laboratories selected to analyze samples for this project will be, at a minimum, certified by the California DHS for all of the analytical methods required for the project. Additional state certifications may also be required for off-site radiological testing as required by the disposal facility. In addition, the laboratory must successfully complete the NFESC Laboratory Evaluation Program prior to sampling activities and maintain current status throughout the duration of the project.

The laboratory selected for the project must be capable of providing the required project QC and data deliverables required by this SAP.

9.2 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. A sample is considered to be in one's custody if it meets any of the following criteria:

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

The samples will be delivered to the person in the laboratory authorized to receive samples (referred to as the sample custodian). Upon receipt of a sample, the sample custodian will inspect the condition of the sample (including the temperature of the cooler as applicable) and the custody seal, reconcile the information on the sample label against that on the COC record, assign a unique laboratory tracking number, log the sample in the laboratory logbook, and store the sample in a secured sample storage room.

The TtFW Project Chemist will be informed immediately of any inconsistencies between the COC record and the sample containers received. Any deviations from accepted sample handling procedures will be documented, and the TtFW Project Chemist will be informed.

9.2.1 Corrections to Custody Documentation

Changes or corrections on any 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.

9.3 LABORATORY QUALITY CONTROL PROCEDURES

The analytical laboratory must have written SOPs defining the instrumentation, instrumentation maintenance, tuning, calibration, method detection, RLs, MDAs, QC requirements, blank requirements, and step-by-step procedures for each analytical method. The SOPs must be available to the analysts performing the work. The SOPs must meet or exceed the requirements of the analytical methods cited in this SAP and in the *Quality Systems Manual for Environmental Laboratories* [Department of Defense (DoD), 2000]. The laboratory must maintain logs of all activities that have an impact on the quality of the laboratory results.

Any portion of the method that is 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 TtFW Project Chemist.

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 TtFW Project Chemist.

9.4 LABORATORY QUALITY CONTROL SAMPLES

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

9.4.1 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.

Initial calibrations (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.

Continuing calibrations verify that the instrument performance has remained within the limits set at the time of the ICAL. The frequency of continuing calibrations is specified in referenced methods.

9.4.2 Instrument/Calibration Blanks (applicable to chemical analyses only)

Instrument blanks are run to ensure that analytes from previous runs are out of the system and do not contaminate succeeding runs. Instrument blanks must be run following calibration runs, before sample analyses are performed, and after samples containing high concentrations of potentially interfering materials are found.

Target analytes must not appear in the instrument blanks at concentrations greater than half the required RLs/MDAs. If the laboratory consistently observes contaminants in the instrument blanks, the laboratory must investigate the source of the contamination and eliminate it, if possible.

9.4.3 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 RLs/MDAs. 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 RLs/MDAs 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.

9.4.4 Laboratory Control Samples

LCSs are purchased samples containing known concentrations of specific target analytes. LCSs can also be prepared by spiking known amounts of target analytes into a well-characterized blank matrix. The matrix will be analyte-free, laboratory reagent-grade water for water samples and clean sand or equivalent for soil samples.

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. For chemical analysis, if insufficient quantity of sample is available for the MS/MSD, the LCS will be prepared and analyzed in

duplicates. All analytes in the LCS must meet recovery criteria. If the criteria are not met, the entire batch of samples must be reprepared, together with a new LCS, and reanalyzed.

9.4.5 Matrix Spike and Matrix Spike Duplicate

The MS/MSD serves to determine whether matrix effects are affecting recoveries. For inorganic and aqueous radiological analyses, only a single MS may be performed per batch. (MS is not applicable to soil samples for radiological analyses.) A MS/MSD is prepared by spiking a known amount of solution to two portions of a sample being run in a batch. Once the spike is added to the MS/MSD samples, these samples are carried through the complete sample preparation process along with the other samples in the batch. The MS/MSD recoveries are compared against each other and against the known amount of the spike. From this data, both accuracy and precision can be determined. The laboratory will perform a MS/MSD for chemical analyses at a frequency of one per 20 project samples per matrix. To prepare a project-specific MS/MSD, field personnel will collect additional sample volumes as necessary at a frequency of one per 20 samples. Field personnel will designate samples for MS/MSD analysis on the COC record.

9.4.6 Duplicates

Two types of duplicates, field and laboratory, will be performed. Field duplicates are two samples that are duplicates of each other. The purpose of field duplicates is to measure the consistency of field sampling. The field duplicate is treated the same as the other field samples, and identification is withheld from the laboratory. Field duplicates will be collected at a frequency of one for every ten samples per matrix. Field duplicates will not be applicable to the collection of screening, waste characterization, or radiological samples.

The laboratory duplicate is created by the laboratory, where two aliquots are intentionally taken from the same sample and analyzed in parallel. This analysis serves to measure the precision of laboratory operations. Duplicate analyses will be applied only for inorganic analyses.

9.5 PREVENTIVE 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.

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.

9.6 DATA REVIEW

All data reported by the laboratory must be reviewed in accordance with the SOPs and as described in the following subsections.

9.6.1 Analyst Review

Each analyst that generates a data set is responsible for ensuring that 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.

9.6.2 Peer Review

One hundred percent of all data sets must be reviewed by an independent peer analyst. Peer reviews must be performed by an analyst that is qualified to perform the subject analytical method. The peer review must be comprehensive and include the following:

- Check 100 percent of manual entries for transcription errors
- Check 100 percent of manual calculations for accuracy
- Spot-check computer calculations to verify program validity
- Check for compliance with method- and project-specific QC requirements
- Check for completeness of raw data or supporting materials
- Confirm spectral assignments
- Check descriptions of deviations from method or project requirements
- Check for appropriate use of significant figures and rounding
- Check reported values for dilutions
- Evaluate reasonableness of results

9.6.3 Technical Review

Technical reviews by the responsible supervisor or designated alternate must be performed on 100 percent of reported data. The same individual may not perform peer and technical reviews on the same data set. The technical review must include the following:

- Check for compliance with method- and project-specific requirements
- Check the completeness of the reported information

- Check the information in the report narrative
- Evaluate the reasonableness of the results

If the responsible supervisor is the only qualified peer reviewer for a method, the requirement for the technical review is waived.

9.6.4 Management Review

One hundred percent of all data must receive management approval prior to release. The scope and content of management's review is at the laboratory's discretion. Authority to release data may be delegated to a technical supervisor or other party, if the term of the delegated authority is documented in the QA program file.

9.6.5 Quality Assurance Review

QA reviews of data from each section of the laboratory must be conducted on a routine basis. Annually, at least 10 percent of data reports generated using each analytical method must be reviewed by a member of the QA staff. The QA reviews must include the following:

- Check for compliance with required QC practices
- Check for compliance with approved SOPs
- Check for compliance with method and project requirements

QA data reviews may be conducted after the subject data have been reported to TtFW.

9.7 DELIVERABLES

The following sections describe the deliverable documents that will be submitted to TtFW by the analytical laboratory.

9.7.1 Hard-copy Deliverables

Two copies of the hard-copy data will be submitted to TtFW by the laboratory. The report pages will be sequentially numbered. The report will contain a table of contents referencing individual sections in the data package, 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 TtFW samples will be cross-referenced to the associated QC samples. When revisions to data reports are required, the revised pages will be stamped with the notation "amended or revised report."

To allow third-party validation, two types of data packages will be required. They will be referred to as EPA Level III-equivalent or IV-equivalent packages. For this project, TtFW will

request that 80 percent of the data be submitted in an EPA Level III-equivalent data package and 20 percent submitted in an EPA Level IV-equivalent data package. (For waste characterization samples, 100 percent of the data will be submitted in an EPA Level III-equivalent data package.) All data packages will be assembled in the following sequence:

- Cover page (with laboratory service identification number, TtFW project name, and TtFW project number)
- Original COC records (including cooler temperature and sample condition)
- Sample receipt forms
- Cross-reference table
- Case narrative
- Radiological raw data sequence:
  - Sample result forms, including method blanks
  - Sample raw data after each result form (EPA Level IV only)
  - QC summaries (raw data for EPA Level IV only)
  - ICAL
  - Calibration checks, including related continuing calibration verifications (CCVs)
  - Instrument run log
  - Sample preparation log
- Organic raw data sequence (by test):
  - Sample result forms, including method blanks
  - Sample raw data after each result form (EPA Level IV only)
  - Surrogate summaries (surrogate results may appear on the sample result forms)
  - QC summaries including internal standards, LCS, MS/MSD (raw data for EPA Level IV only)
  - Tune data [gas chromatograph/mass spectrometer (GC/MS) only]
  - ICAL
  - Daily calibration checks, including related CCVs
  - Resolution check standards (GC/MS and pesticides) (if applicable)
  - Instrument run log
  - Sample preparation log
- Inorganic raw data sequence:
  - Sample results forms, including method blanks
  - Sample raw data (EPA Level IV only)
  - QC summaries

- ICAL
- Daily calibration checks, including all related CCVs
- Calibration blanks, including all related continuing calibration blanks
- Interference check standards A and B for inductively coupled plasma-atomic emission spectrometer (ICP-AES) only
- QC raw data (EPA Level IV only)
- Post-digestion (analytical) spike results
- Method of standard additions
- ICP-AES serial dilutions
- Instrument run log
- Sample preparation log

9.7.2 Electronic Deliverables

The electronic data deliverable (EDD) will be in ASCII format. This will be compatible with the Naval Electronic Data Deliverable (NEDD) standard as described in *Environmental Work Instruction (EWI) EVR.6, Environmental Data Management and Required Electronic Delivery Standards (*NFECSW, 2005). The laboratory will verify that the EDD and the hard-copy reports are identical. Both the EDD and the hard-copy report will present results to two or three significant figures. For radiological results, three significant figures will be used for all results. For organic results, two significant figures will be used for all results. For inorganic results, two significant figures will be used for results less than 10, and three significant figures will be used for results greater than 10. Results for QC analyses (method blanks, MS/MSD, LCS, and duplicates) will be reported up to three significant figures. The EDD for each sample delivery group is due at the same time as the hard-copy report, 21 calendar days (up to 60 calendar days for radiological analysis) after the last sample of the sample delivery group has been delivered to the laboratory.

10.0 ANALYTICAL QUALITY CONTROL PROCEDURES (ON-SITE LABORATORY)

This section describes laboratory qualification, sample custody and documentation, QC procedures, QC samples, preventative maintenance, data review, and deliverables for the on-site laboratory.

10.1 LABORATORY QUALIFICATION

The analytical laboratory selected to analyze samples for this project will be capable of performing on-site radiological testing required for this project. California DHS certification and NFESC evaluation are not required for the on-site radiological laboratory per written confirmation to TtFW from DHS and EPA.

The on-site laboratory used for the project must be capable of providing the required turnaround times, project QC, and data deliverables required by this SAP.

10.2 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. A sample is considered to be in one's custody if it meets any of the following criteria:

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

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

Changes or corrections on any 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.

10.3 LABORATORY QUALITY CONTROL PROCEDURES

The analytical laboratory must have written SOPs defining the instrumentation, calibration, method detection, and QC requirements. The SOPs must be available to the analysts performing the work. The SOPs must meet or exceed the requirements of the analytical methods cited in this SAP. The laboratory must maintain logs of all activities that have an impact on the quality of the laboratory results.

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.

10.4 LABORATORY QUALITY CONTROL SAMPLES

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

10.4.1 Calibration

All instruments and equipment must be calibrated in accordance with the manufacturer's requirements and/or laboratory SOPs. Each instrument must be calibrated with the standard appropriate to the type of instrument and the calibration range established for the method.

ICALs are performed when the method is first used and again whenever the continuing calibrations fail to meet their respective acceptance criteria. In addition, if the instrument undergoes significant maintenance, the ICAL must be repeated. Calibration of all equipment will be performed in accordance with NWT's laboratory SOPs.

Continuing calibrations verify that the instrument performance has remained within the limits set at the time of the ICAL. The frequency of continuing calibrations is specified in referenced methods.

10.4.2 Instrument/Calibration Backgrounds

Daily instrument backgrounds are run to ensure that contaminants from previous runs are out of the system and do not contaminate succeeding runs. Instrument backgrounds are performed before sample analyses are performed, and after samples containing high concentrations of potentially interfering materials are found.

10.4.3 Method Backgrounds

Method backgrounds are performed on a daily basis in the same manner as the samples, using the same container geometry used for samples. The purpose of the method backgrounds is to ensure that the equipment is free of contaminants that could interfere with the analysis.

10.5 PREVENTIVE MAINTENANCE

All instruments must be maintained in accordance with the manufacturers' recommended procedures. 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. All vendor maintenance documentation will be kept and filed on site with individual instruments.

10.6 DATA REVIEW

All data reported by the laboratory must be reviewed in accordance with the SOPs and as described in the following subsections.

10.6.1 Analyst Review

Each analyst that generates a data set is responsible for ensuring that 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.

10.6.2 Technical Review

Technical reviews by the responsible supervisor or designated alternate must be performed on 100 percent of reported data. The technical review must include the following:

- Check for compliance with method- and project-specific requirements
- Check the completeness of the reported information
- Check the information in the report narrative
- Evaluate the reasonableness of the results

10.6.3 Management Review

Laboratory data will be reviewed by a Radiation Task Manager or their qualified designee prior to release to DON. Written documentation of the delegation of authority to release data to DON will be placed in the QA file.

10.6.4 Quality Assurance Review

QA reviews of data from the laboratory will be conducted. The QA reviews will include the following:

- Check for compliance with required QC practices
- Check for compliance with approved SOPs
- Check for compliance with method and project requirements

QA data reviews may be conducted after the subject data have been reported to TtFW.

10.7 DELIVERABLES

The following sections describe the deliverable documents that will be submitted to TtFW by the analytical laboratory.

10.7.1 Hard-copy Deliverables

Hard-copy data will be submitted to TtFW by the laboratory. If revisions to data reports are required, the revised pages will be stamped with the notation "amended or revised report."

10.7.2 Electronic Deliverables

The on-site laboratory will provide TtFW with a spreadsheet or equivalent of the results of the radiological analysis.

11.0 DATA QUALITY MANAGEMENT

It is important that complete and relevant data and documentation are properly maintained and provided to the appropriate agencies. The methods for maintaining, tracking, and managing project documentation and records (hard-copy and electronic media) to provide a complete, defensible record of the condition of each site remediated are described in this section. The DON will receive summaries of data as collected, plus draft and final data reports. The data management system will ensure that sufficient data and information are properly maintained and available to ensure an independent evaluation of the results of the survey, including repeating measurements at some future date.

Sample collection, field measurement, and laboratory analytical result data will, to the extent practical, be recorded both electronically and on paper. Data and information reported on paper will be recorded using indelible ink. Records of field-generated data will be reviewed for completeness, consistency, and accuracy. Electronically recorded data will be compared to paper records of the same data sets to ensure consistency and to resolve discrepancies noted. Electronic copies of original electronic data sets will be preserved on a retrievable data storage device. No data reduction, filtering, or management will be performed on the original electronic versions of data sets. Two main types of data sets include:

- Hard-copy Data – Relevant raw data and documentation, including, but not limited to, logbooks, data sheets, electronic files, and final reports, will be maintained for 7 years by the laboratories. The records custodian will be notified 30 days before disposal of any relevant laboratory records. The project's prime contractor will maintain copies of COC records and laboratory deliverables for 30 years after which time, the records may be disposed. Off-site laboratory reports will be logged in upon receipt and filed in chronological order.
- Electronic Data – Two types of electronic data will be generated for radiological surveys performed. Electronic spreadsheets will be used to summarize radiological screening data and on-site laboratory analytical results. In addition, off-site laboratories will provide EDDs as described in Section 9.7.2. Both types of electronic data will be uploaded, as applicable, into a Microsoft Access database which is based on the NEDD format. The uploaded data will be processed to compare the fields against a list of required values. If any errors are returned by the program, the file will be manually edited or regenerated by the laboratory as applicable.

11.1 DOCUMENTATION TYPES

Three types of documentation that that will be maintained and assessed are: (1) field operation records; (2) laboratory records; and (3) data handling records.

11.1.1 Field Operation Records

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

- Field measurement records – These records show that the proper measurement protocol was performed in the field. At a minimum, this documentation will include the names of the persons conducting the activity, measurement identification, measurement locations, measurement results, maps and diagrams, equipment and SOPs used, 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 – These records identify the samples, samplers, date of sampling, date of transfers, and receivers. COC records will be used to document the collection of all samples when they are transferred to on-site or off-site laboratories for analysis.
- QC measurement records – QC measurement records document the performance of QC measurement in the field and includes calibration and standards' traceability documentation that can be used to provide reproducible reference points to which similar measurements can be correlated. These records will contain information on the frequency, condition, level of standards, and instrument calibration history.
- Deficiency and problem identification reports – These reports document problems and deficiencies encountered, as well as provide 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 noncompliance.

11.1.2 Laboratory Records

The following list describes some of the laboratory-specific records that may be compiled when available and appropriate:

- Laboratory measurement results and sample data – These records contain information on the sample analysis used to verify that prescribed analytical methods and SOPs were followed. Information contained in these records includes the number of samples, sample identification, sample measurement results, any deviations from the SOPs, time of day, and date.
- Sample management records – Sample management records document sample receipt, handling and storage, and scheduling of analysis. These records will verify that sample tracking requirements were maintained, reflect anomalies in the samples (receipt of damaged samples), and note proper log-in of samples into the laboratory.

- Test 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 measurement 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.

11.1.3 Data Handling Records

Data handling records document protocols used in data reduction, verification, and evaluation. Data reduction involves data transformation processes such as converting raw data into reportable quantities and units, using significant figures, and calculating measurement uncertainties. Reports of data entered into electronic data management systems will be reviewed by the appropriate supervisory personnel knowledgeable of and with access to the original data to verify data transcription accuracy in accordance with approved SOPs. Record copies of surveys, sampling, and analytical data (and their supporting data) will be protected and maintained in project record files.

11.2 DATA ASSESSMENT

Assessment of survey data is used to evaluate whether the data meet the objectives of the survey, and whether the data are sufficient to determine compliance with release limits. The assessment process consists of four phases: data verification; data validation and data evaluation (for off-site laboratory data); and data quality assessment. TtFW will take a graded approach to the assessment process so that the level of effort associated with the assessment of HPS data will be consistent with the objectives of the project.

11.2.1 Data Verification

Data verification ensures that the requirements stated in the planning documents are implemented as prescribed. It compares the collected data with the prescribed activities documented in the SOPs. Data verification activities include inspections, QC checks, surveillance, technical reviews, performance evaluations, and audits as determined appropriate. Verification will be performed on sets of data produced for the final release of facilities, land areas, and other structures.

11.2.2 Data Validation

All sample data with the exception of waste characterization samples, on-site laboratory data, and PCB field screening data will be validated by an independent data validation company. Data will be validated at 80 percent EPA Level III and 20 percent EPA Level IV. The validation will be in accordance with the 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-94/013* (EPA, 2004a), *Environmental Work Instruction (EWI) #1, 3EN2.1, Chemical Data Validation* (NFECSW, 2001b), and the QC criteria specified in the referenced methods and in this SAP. Currently, there are no standards for data validation of radiological analyses. Therefore, guidance documents on validation of radiological data and modified functional guidelines will be used by the validator. Data not meeting method and/or SAP specifications will be flagged as estimated ("J") or rejected ("R").

The data validation company will have the following qualifications:

1. A minimum of 5 years of experience in the environmental data validation business
2. Prior experience on DON RAC or Comprehensive Long-term Environmental Action projects
3. DON data validation experience
4. Active peer review program

Personnel must have the following qualifications:

1. Data Reviewer:
   - Bachelor of science degree or higher in chemistry or a physical science
   - 5 years of combined experience with approximately 2 years in data validation and 3 years conducting laboratory analysis in an environmental laboratory using the EPA-approved methods being validated
2. Peer Reviewer:
   - Bachelor of science degree or higher in chemistry or a physical science
   - 5 years of combined experience with approximately 2 years in data validation and 3 years conducting laboratory analysis in an environmental laboratory using the EPA-approved methods being validated

11.2.3 Data Evaluation

Following third-party validation, data will be further evaluated by the TtFW Project Chemist. During this process, the Project Chemist will determine which of the advisory data qualifiers provided by the independent data validator will be retained or removed. The evaluation of data

will be based on method requirements and the results of the QC samples, the level of contamination of samples indicated by the method blanks analysis, and the overall indication of interference due to contamination. The following data qualifiers will be used in the report:

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

Data qualifying will be used to alert end users to uncertainties associated with the data. The evaluation flags will be entered into a special field in the electronic database. Thus, when data processing is complete, the data for each analyte will have the flag designated by the laboratory and the flag designated by the evaluator, as appropriate.

11.2.4 Data Quality Assessment

DQA is a scientific and statistical evaluation that indicates if the data are of the right type, quality, and quantity to support their intended use. DQA provides the assessment needed to decide if the planning objectives are achieved.

11.3 REPORTING

The TtFW Project Chemist will ensure that analytical data are reported. Analytical results will be provided in a timely manner in accordance with contractual requirements. Reports and documents generated from the sampling event and analytical process (COC records, analytical reports) will be submitted to the TtFW Project Chemist. Analytical reports from laboratory information management systems, copies of appropriate logbook pages, copies of QA files, and spreadsheets, are acceptable formats. Subsequently, the reports and documents generated from the sampling event will be compiled in an acceptable report format to the DON.

12.0 QUALITY ASSURANCE OVERSIGHT

QA oversight for this project will include system audits of field activities and of the laboratories performing analysis.

12.1 FIELD AUDITS

The TtFW and NFECSW QA Officers may schedule audits of field activities at any time to evaluate the execution of sample collection, identification, and control in the field. The audit 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. The auditor will verify that the proper sample containers are used, the preservatives are added or are already present in the container, and the documentation of the sampling operation is adequate.

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.

In addition, analytical procedures performed by the on-site laboratory may be inspected to ensure compliance with SOPs.

12.1.1 Corrective Action

Nonconformance identified during the field audit will be recorded on a Nonconformance Report. All nonconformance and corrective actions will be processed in accordance with TtFW Procedure QC-3. This procedure is presented in Attachment 5 of the *Final Contractor Quality Control Program Plan* (TtFW, 2004).

The TtFW QC Program Manager will monitor corrective action documentation, verify implementation of the corrective action, track and analyze the corrective action, and closeout corrective action documentation upon completion of the corrective action.

12.2 OFF-SITE LABORATORY AUDITS

Off-site laboratories selected to perform the analyses are required to have successful completion of the NFESC laboratory evaluation process throughout the project. This process consists of a laboratory QA plan review, performance evaluation samples, a data package review, and an on-

site audit. Because of this requirement, TtFW will not perform an on-site audit or visit, unless it is deemed necessary.

Laboratory oversight by TtFW will include a thorough review of the preliminary report and hard-copy data packages. The information that may be obtained from the data packages consists of the following:

- Correctness of COC procedures
- Adherence to method holding times
- Proposed RLs/MDAs
- Spiking levels, frequency, and recovery
- Accuracy of analytical methods through the LCSs and surrogates

12.2.1 Corrective Action

The laboratory will have a QA/QC and corrective action program that addresses all out-of-control situations. Following completion of analyses, laboratory personnel will verify compliance with the minimum QC requirements of the project and the laboratory QA/QC plan. If any of the parameters fall outside the control limits, corrective action will be implemented.

Initial corrective action is to verify that no obvious calculation errors have occurred. If appropriate, reanalysis will be performed. If the reanalysis confirms the initial out-of-control limits result, the chemist will notify the laboratory supervisor, who will initiate the corrective action process. Corrective actions may include, but are not limited to, the following:

- Verification of dilution factors
- Examination of sample for nonhomogeneity
- Verification of sample preparation
- Checking of standard preparation logbook
- Verification of instrument performance
- Checking of reagent-grade water purity
- Monitoring chemist's method performance for procedure verification

Notification and prompt involvement of the TtFW Project Chemist in the corrective action process are absolutely necessary in determining an appropriate resolution. Corrective action records will document all steps taken in the corrective action process, beginning with a description of the problem and ending with a final resolution. A copy of the corrective action report will be sent to the TtFW Project Chemist immediately and will be maintained in the project files at TtFW.

All corrective action reports will be maintained by the laboratory in a project file and delivered to TtFW as part of the hard-copy deliverable.

13.0 SAP REVISION OR AMENDMENT

When circumstances arise that impact the original project DQOs, such as a significant change in work scope, this SAP will be revised or amended. The modification process will be based on EPA guidelines, direction from the DON and QA Officer, and will be in conjunction with *Environmental Work Instruction (EWI) #2, 3EN2.2, Review, Approval, Revision, and Amendment of Sampling and Analysis Plans (SAPs)* (NFECSW, 2001c).

14.0 REFERENCES

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TABLES

TABLE A.4-1

CHEMICAL CLEANUP GOALS

Contaminant	Soil Cleanup Goal (Open Space)
Polychlorinated Biphenyls (PCBs)	1 mg/kg (soil to 3 feet bgs) 100 mg/kg (soil greater than 3 feet bgs)
Total Petroleum Hydrocarbons (including gasoline through motor oil range)	3,500 mg/kg

Notes:

bgs – below ground surface
mg/kg – milligrams per kilogram
NFECSW – Southwest Division, Naval Facilities Engineering Command

Source:

(NFECSW, 2005)

TABLE A.4-2

RADIOLOGICAL REMEDIAL OBJECTIVES*

Contaminant	Soil Remedial Objectives[a]
Radium-226	1 pCi/g > background, not to exceed 2 pCi/g total[b]
Cesium-137	0.13[c] pCi/g
Strontium-90	42.3[a] pCi/g

Notes:

[a] Except where noted, values are EPA PRGs for soil for outdoor worker (EPA, 2004b). The on-site and off-site laboratory will ensure that the MDA meets the listed RROs by increasing sample size or counting time as necessary. The MDA is defined as the lowest net response level, in counts, that can be seen with a fixed level of certainty, customarily 95 percent. The MDA is calculated per sample by considering background counts, amount of sample used, and counting time.

[b] Limit established between the EPA and DON.

[c] Decay-corrected PRG for outdoor worker soil reuse provided by EPA Region IX.

* Radiological remedial objectives for water generated as a result of remedial activities will be negotiated with regulators, and therefore, are currently not available.

DON – Department of the Navy
EPA – U.S. Environmental Protection Agency
MDA – minimum detectable activity
pCi/g – picocuries per gram
PRG – Preliminary Remediation Goal
RRO – radiological remedial objective

TABLE A.5-1

SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Analyte	Analytical Method	Container	Preservative	Holding Time *
SOIL SAMPLES				
PCBs	EPA Method 4020 (field screening test)	Stainless steel, acetate, or equivalent liner or glass jar	Cool, 4±2°C	As soon as possible (field determination)
TPH	EPA Method 9074 (field screening test)			
Gamma-emitting radionuclides (on-site laboratory)	C1402-98 Standard Guide for High-resolution Gamma-ray Spectrometry and/or on-site laboratory SOPs	250-mL or 500-mL plastic container	None	N/A
Gamma-emitting radionuclides	EPA Method 901.1M or equivalent	250-mL or 500-mL plastic or glass container	None	6 months
Strontium-90	DOE Method Sr-01/Sr-02 or equivalent	250-mL or 500-mL plastic or glass container	None	6 months
Alpha spectroscopy	DOE HASL-300 Method or equivalent	250-mL or 500-mL plastic or glass container	None	6 months
Gross alpha and beta	EPA Method 9310 or equivalent	250-mL or 500-mL plastic or glass container	None	6 months
VOCs	EPA Method 5035/8260B[1]	Three 5 gram EnCore™ samplers	Cool, 4±2°C	48 hours for analysis or laboratory preservation for EnCore samples; analysis within 14 days of preservation
TPH-purgeable	EPA Method 5035/8015B[1]	Three 5 gram EnCore samplers	Cool, 4±2°C	48 hours for analysis or laboratory preservation for EnCore samples; analysis within 14 days of preservation
SVOCs	EPA Method 8270C	Acetate (or equivalent) liner or glass jar	Cool, 4±2°C	14 days to extraction and 40 days to analyze
Pesticides	EPA Method 8081A		Cool, 4±2°C	14 days to extraction and 40 days to analyze
PCBs	EPA Method 8082		Cool, 4±2°C	14 days to extraction and 40 days to analyze
Herbicides	EPA Method 8151A		Cool, 4±2°C	14 days to extraction and 40 days to analyze

TABLE A.5-1

SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Analyte	Analytical Method	Container	Preservative	Holding Time *
TPH-extractable	EPA Method 8015B		Cool, 4±2°C	14 days to extraction and 40 days to analyze
Title 22 Metals	EPA Method 6010B/6020/7000		Cool, 4±2°C	6 months, except for mercury which is 28 days
pH	EPA Method 9045C		Cool, 4±2°C	Analyze as soon as possible
Ignitability	EPA Method 1010		Cool, 4±2°C	28 days
Reactive cyanide and sulfide	SW-846 Chapter 7.3.3 and 7.3.4		Cool, 4±2°C	28 days
Paint filter test	EPA Method 9095		Cool, 4±2°C	28 days
Asbestos	CARB 435		None	N/A

TABLE A.5-1

SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Analyte	Analytical Method	Container	Preservative	Holding Time *
WATER SAMPLES				
Gamma-emitting radionuclides (on-site laboratory)	C1402-98 Standard Guide for High-resolution Gamma-ray Spectrometry and/or on-site laboratory SOPs	250-mL or 500-mL plastic container	None	N/A
Gamma-emitting radionuclides	EPA Method 901.1 or equivalent	Two 1-L HDPE or glass	pH ≤ 2 w/ HNO_3	6 months
Strontium-90	EPA Method 905.0 or equivalent	Two 1-L HDPE or glass	pH ≤ 2 w/ HNO_3	6 months
Alpha spectroscopy	DOE HASL-300 Method or equivalent	Two 1-L HDPE or glass	pH ≤ 2 w/ HNO_3	6 months
Gross alpha and beta	EPA Method 9310 or equivalent	Two 1-L HDPE or glass	None	6 months
VOCs	EPA Method 8260B	Three 40-mL VOA vials	pH ≤2 w/ HCl Cool, 4±2°C	14 days to analyze
SVOCs	EPA Method 8270C	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
Pesticides	EPA Method 8081A	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
PCBs	EPA Method 8082	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
TPH-purgeable	EPA Method 8015B	Three 40-mL VOA vials	pH ≤2 w/ HCl Cool, 4±2°C	14 days to analyze
TPH-extractable	EPA Method 8015B	Two 1-L glass ambers	Cool, 4±2°C	7 days to extraction and 40 days to analyze
Title 22 Metals	EPA Method 6010B/6020/7000	One 500-mL HDPE	pH ≤ 2 w/ HNO_3	6 months, except for mercury which is 28 days
Ignitability	EPA Method 1010	One 250-mL HDPE	Cool, 4±2°C	28 days

TABLE A.5-1

SAMPLE CONTAINERS, PRESERVATIVES, AND HOLDING TIMES

Analyte	Analytical Method	Container	Preservative	Holding Time *
WIPE SAMPLES				
PCBs	EPA Method 8082	One gauze pad	Hexane Cool, 4±2°C	14 days to extract and 40 days to analyze

Notes:

[1] If solid samples cannot be collected with the EnCore samples, then EPA Method 5035 will be replaced with EPA Method 5030B, and the liner or jars will be used for volatile analysis.

* Holding time is defined as the time by which the analyses should be completed. Holding times have not been established for radiological sample analysis; however, 6 months is usually used as a recommended holding time.

°C - degrees Celsius
CARB - California Air Resources Board
DOE - Department of Energy
EPA - U.S. Environmental Protection Agency
HCl - hydrochloric acid
HDPE - high-density polyethylene
HNO_3 - nitric acid
L - liter
mL - milliliter
N/A - not applicable
PCB - polychlorinated biphenyl
SOP - Standard Operating Procedure
SVOC - semivolatile organic compound
TPH - total petroleum hydrocarbons
VOA - volatile organic analysis
VOC - volatile organic compound

TABLE A.6-1

MATERIAL AND EQUIPMENT SURFACE CONTAMINATION LIMITS

Radionuclide	Removable (dpm/100 cm^2)	Fixed (dpm/100 cm^2)
Radium-226	20 α	100 α
Strontium-90	200 β^-	1,000 β^-
Cesium-137	1,000 β^-, γ	5,000 β^-,γ

Notes:

These limits are for the release of equipment and materials and are based on *Regulatory Guide 1.86* (Atomic Energy Commission, 1974).

Types of radiation: α - alpha, γ - gamma, β^- - beta

cm^2 – square centimeters

dpm – disintegrations per minute

TABLE A.6-2

SAMPLE IDENTIFICATION MATRIX

Non-Radiological Samples

SAMPLE ID																				
Position																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
7	2	-																		→ Project CTO No.
8	4	-																		
		-	M	D	R						-									→ Designation of Site ID
		-	M	S	A						-									
		-	I	R	0	2					-									
		-	B	I	N						-									
		-	W	Q	1						-									→ Water Quality Sample Points
					2															
					3															
					4															
					5															
					6															
					7															
					8															
		-	B	A	C	K	F	I	L	L	-									→ Import Fill
											-	0	0	1						→ Consecutive Sample No.s
											-	0	1	0						
											-	1	0	0						

- CTO 72
- CTO 84 PCB Hot Spot
- Metal Debris Reef
- Metal Slag Area
- IR02
- Bin Samples (Bldg 406 or 211)

TABLE A.6-2

SAMPLE IDENTIFICATION MATRIX

Radiological Samples

SAMPLE ID Position																					
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20		
7	2																			→ Project CTO No.	- CTO 72
8	4																				- CTO 84
		N																		→ Radiological Subcontractor	- New World Technology
		M																			- MKM Engineering
			M	D	R															→ Designation of Site ID	- Metal Debris Reef
			M	S	A																- Metal Slag Area
			P	C	B																- PCB Hot Spot
			I	R	0	2															- IR-02
			3	5	1	A															- Building ID Number
							P													→ Additional Source ID	- Pile
								0	0	1											- Pile Number
								0	1	0											- Pile Number
								1	0	0											- Pile Number
							G													→	- Grid
								0	0	1											- Grid Number
								0	1	0											- Grid Number
								1	0	0											- Grid Number
							S	P													- Stockpile
									0	0	1										- Stockpile Number
									0	1	0										- Stockpile Number
									1	0	0										- Stockpile Number
							B													→	- Bin
								1	2	3	4	5	6	7	8						- Bin ID Number
							S	U												→	- Survey Unit
									3	A	2										- Survey Unit Number
												S	W								- Side Wall
												F	B								- Fire Brick
												L	T								- Limited Trench
												S	B	G							- Sand Blast Grit
												P	E								- Post Excavation
																-	0	0	1	→ Consecutive Sample No.s	
																-	0	1	0		
																-	1	0	0		

WORK WITH SAMPLE ID ABOVE

ADDITIONAL SAMPLE INFORMATION

"-001" represents pile/grid/stockpile number
(not consecutive sample number)

LOCATION Position																				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
P	I	L	E	-	0	0	1													
G	R	I	D	-	0	0	1													
S	T	O	C	K	P	I	L	E	-	0	0	1								
B	I	N	-	1	2	3	4	5	6	7	8									
S	U	3	A	2																
				→	-	S	W													Side Wall
				→	-	F	B													Fire Brick
				→	-	L	T													Limited Trench
				→	-	S	B	G												Sand Blast Grit
				→	-	P	E													Post Excavation
				→	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Additional Information - as required

SAMPLE ID Position																					
7	2																			→ Project CTO No.	- CTO 72
8	4																				- CTO 84
		-	T																	→ Radiological Subcontractor	- Tetra Tech EC
				-	M	D	R													→ Designation of Site ID	- Metal Debris Reef
				-	M	S	A														- Metal Slag Area
								-	O	S	C									→ Water Sample Location	- Outside Silt Curtain
								-	I	S	C										- Inside Silt Curtain
												-	0	0	1					→ Consecutive Sample No.s	
												-	0	1	0						
												-	1	0	0						

TABLE A.7-1

PERSONNEL AND RESPONSIBILITIES

Key Position	Responsibility
Quality Assurance Officer	• Reviewing and approving Sampling and Analysis Plan • Providing DON oversight of the TtEC Quality Assurance Program • Acting as point of contact for all 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
Project Chemist	• 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 • Coordinating data validation of off-site laboratory data • Reviewing data validation reports • Preparing analytical reports and supporting report preparation
Remedial Project Manager	• Integrating CERCLA issues at HPS with ongoing radiological activities • Coordinating with RASO and RPMs of other projects being performed in radiologically impacted area to ensure that the 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 • Logs all variances to planning documents and ensures timely follow-up and approval by the DON

TABLE A.7-1

PERSONNEL AND RESPONSIBILITIES

Key Position	Responsibility
Radiological Site Manager	• Reviewing and approving 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 requirements • Recommending changes in TtEC scope to the RPM, as appropriate • Supporting public meetings
Project Manager	• 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-Specific Health and Safety Plan • 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

TABLE A.7-1

PERSONNEL AND RESPONSIBILITIES

Notes:

CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
DON - Department of the Navy
HPS - Hunters Point Shipyard
MARSSIM - Multi-Agency Radiation Survey and Site Investigation Manual
QC - quality control
RASO - Radiological Affairs Support Office
RPM - Remedial Project Manager
TtEC - Tetra Tech EC, Inc.

TABLE A.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	**Decisions**	**Inputs to the Decisions**	**Boundaries of the Study**	**Decision Rules**	**Limits on Decision Errors**	**Optimize the Sampling Design**
The DON has determined upon review of previous site history and investigations that the site contains PCB, petroleum hydrocarbon, and radiological contaminants in soils and debris thus requiring a TCRA. 1. Prior to commencement of the TCRA, an initial radiological survey of the site will be conducted to identify surface and near-surface radioactive materials for subsequent removal and off-site disposal. 2. Pre-excavation characterization soil samples will be collected via hand-augering to fill data gaps along the perimeter of the excavation boundary,	1. Are radioactive materials identified during the initial radiological survey? 2. Do the PCB, TPH, and ROC pre-excavation characterization soil samples define clean grids based on cleanup goals and RROs listed in Tables A.4-1 and A.4-2? 3. Are radioactive materials identified during the in situ radiological survey of each subsurface soil lift? 4a. Are the TPH, PCB and ROC results for the grid post-excavation sampling below the cleanup goals or RROs listed in Table A.4-1 and A.4-2? 4b. Does the radiological survey of the excavation indicate areas with greater than 3 sigma over background?	Previous investigation PCB results and radiological results from the soil samples collected within the PCB Hot Spot boundaries. Results from the: 1. Initial radiological survey 2. Pre-excavation soil samples 3. In situ radiological survey of each 12-inch lift of soil 4. Post-excavation sampling and the post-excavation radiological survey 5. Ex situ screening of excavated material	Project duration is anticipated to be from early to mid 2005. 1. Section 5.10 of the Work Plan discusses the details of performing the pre-excavation radiological survey. 2. Figure A.3-2 of the SAP illustrates the PCB Hot Spot excavation boundary and the proposed sampling locations. 3. Section 5.13 of the Work Plan discusses the details of performing the radiological survey of each 12-inch soil lift. 4a. Post-excavation samples for PCB, TPH, and ROCs will be collected from random location in each 50-foot by 50-foot grid within the bottom of the excavation, from approximately 8 feet	1. If radioactive materials are identified during the field survey, the sources and soil surrounding the source will be removed from within the excavation boundaries. If radioactive materials are not identified, then pre-excavation characterization sampling will commence. 2. If the PCB and TPH field test kit results and the on-site radiological results define a clean grid, then 1) step-in sampling will be conducted if known contamination (determined from prior investigations or results from this investigation) is greater than 12.5 feet away, or 2) the bounds of the excavation will be established halfway into the clean grid adjacent to the next grid, which has known contamination. If the results do not define a clean grid, then step-out samples will be collected.	The pre-excavation characterization sampling plan (Figure A.3-2) was designed to generate sufficient data to better define the lateral extent of the area of PCB soils that exceed the cleanup criterion of 1 mg/kg. The initial and subsequent radiological surveys will be performed in accordance with the Work Plan and survey protocols will be carefully followed to limit errors. To limit decision errors, analytical method requirements and project-specific DQOs were	1. The details of the initial radiological survey are discussed in Section 5.7 of the Work Plan. 2. Pre-excavation characterization samples will be collected at zero (0) to 6 and 30 to 36 inches bgs via a grid system (25-foot by 25-foot) to further characterize the extent of PCB, TPH, and ROC contamination. The soil from each sample will be field surveyed for radiological contamination using an alpha/beta scintillation detector. Soil samples from each sample will be collected and screened for PCBs and TPH using the field screening method, EPA Method 4020 and 9074, respectively. Soil samples will also be analyzed by the on-site radiological laboratory

TABLE A.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	**Decisions**	**Inputs to the Decisions**	**Boundaries of the Study**	**Decision Rules**	**Limits on Decision Errors**	**Optimize the Sampling Design**
as identified in the previous investigations. 3. Radiological surveys of each 12-inch lift of soil will be performed prior to excavating that lift to identify subsurface radioactive materials within soil to be excavated. 4. After excavation is complete, (1) post-excavation sampling will be performed via a grid system, (2) soil will be analyzed for chemicals and ROCs and (3) a radiological survey will be performed. 5. Excavated soils will be passed through a conveyor system for ex situ screening to identify radioactively contaminated materials that may not have been detected during the surface	5. Are radioactive materials detected during the ex situ screening of the excavated material?		bgs for grids less than or equal to 7.5 feet bgs,,from a random location every 50 linear feet along the perimeter sidewall above 3 feet bgs, and at biased locations from every 50 linear feet along the perimeter sidewall where the excavation extended below 3 feet bgs. 4b. The bottom and/or perimeter sidewall will be further excavated if evidence of concentrations greater than 3,500 mg/kg of TPH, 100 mg/kg PCB (excavation bottom or perimeter sidewalls below 3 feet bgs), 1 mg/kg PCB (excavation bottom or perimeter sidewalls above 3 feet bgs), or ROCs above the RROs are present. 4c. Perimeter sidewall soil samples per the random 50 linear feet	Step-out samples will be collected until a clean 25-foot by 25-foot grid is found to be below cleanup goals and RROs. See Figure A.4-1 for an illustration of the decision tree sampling strategy for pre-excavation characterization sampling. 3. If radioactive materials are identified during the survey of each 12-inch lift, the sources and soil surrounding the source will be removed. If radioactive materials are not identified, then excavation of the surveyed lift will commence. 4. If (1) the TPH, PCB, or ROC results for the grid post-excavation soil samples are above the cleanup goals or RROs listed in Table A.4-1 and/or A.4-2, and/or (2) radiological surveys in the grid detect areas with radiation greater than 3 sigma over background,	established. Published analytical method and laboratory-specific performance requirements are the primary determiners of DQOs for precision and accuracy. Field crews will review the SAP before collection of samples. The laboratory performing the analysis will be given a copy of the SAP before analysis of samples. Third-party data validation will be performed on all samples, except for waste characterization samples, on-site laboratory data,	by gamma spectroscopy. In addition, soil that exceeds greater than 3 sigma of the mean background will be treated as a potentially radiological waste and may be analyzed by the on-site laboratory for confirmation. 3. The details of the radiological survey of each 12-inch lift are discussed in Section 5.13 of the Work Plan. 4a. One random post-excavation soil samplewill be collected on a 50-foot by 50-foot grid system along the bottom; one sample will be collected at approximately 8 feet bgs for grids less than or equal to 7.5 feet bgs; one random sample will be collected every 50 linear feet along the perimeter sidewall above 3 feet bgs; and

TABLE A.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	**Decisions**	**Inputs to the Decisions**	**Boundaries of the Study**	**Decision Rules**	**Limits on Decision Errors**	**Optimize the Sampling Design**
survey and to ensure that no beta- emitting sources are present.			will also be analyzed for pesticides, Title 22 metals, and PAHs, once post-excavation samples along the perimeter are below cleanup goals and RROs. 4d. The complete excavation footprint will be radiologically surveyed as described in Section 5.14 of the Work Plan. 4e. Systematically located post-excavation samples will be collected and analyzed for ROCs, with 16 samples collected in each 2000 square meter area of the excavation. 5. The RCT will collect soil samples from the conveyor system at a rate of two composite samples per 50-foot by 50-foot lift.	then the grid will be excavated deeper in 1-foot increments as described in Section 5.13 of the Work Plan and resampled. This process will continue until the results are below the cleanup goals and RROs or until the maximum safe limits of the excavation are reached. If none of these conditions are encountered, then no further action will be required and the excavation will be backfilled. See Figures A.4-2 and A.4-3 for an illustration of the sampling strategy for post-excavation samples. 5. If radioactive materials are detected during ex situ screening of the excavated material, it will be handled as specified in Section 5.13 of the Work Plan and the material from that grid will be placed into an appropriate waste container for disposal. If no radioactive materials are detected during secondary	and PCB field screening data samples. Sampling and analysis protocols will be carefully followed to limit errors.	one biased sample will be collected every 50 linear feet along the perimeter sidewall that extends below 3 feet bgs. In addition, one discrete soil sample will be collected from each grid at approximately 8 feet bgs. Systematic post-excavation soil samples for radiological contaminants will also be collected after establishing a grid consisting of 2,000 square meter cells over the PCB Hot Spot area. Sixteen systematically located samples will be collected from each grid cell. Post-excavation soil samples will be analyzed for PCBs, TPH and ROCs. Samples from along the perimeter will also be analyzed for pesticides, Title 22 metals, and PAHs once the post-excavation samples along the perimeter are

TABLE A.8-1

SUMMARY OF DATA QUALITY OBJECTIVES

STEP 1	STEP 2	STEP 3	STEP 4	STEP 5	STEP 6	STEP 7
Statement of Problem	**Decisions**	**Inputs to the Decisions**	**Boundaries of the Study**	**Decision Rules**	**Limits on Decision Errors**	**Optimize the Sampling Design**
				screening the soil will be stockpiled for subsequent characterization and disposal.		below the cleanup goals and RROs. Systematic post-excavation soil samples will be analyzed for ROCs. 4b. The entire exposed soil area will be gamma scanned to assess potential radiological contamination as discussed in Section 5.14 of the Work Plan. 5. Two composite samples per 50-foot by 50-foot lift will be collected from the conveyor system.

Notes:

bgs - below ground surface
DON - Department of the Navy
DQO - data quality objective
mg/kg - milligrams per kilogram
PAH - polynuclear aromatic hydrocarbon
PCB - polychlorinated biphenyl
RCT - Radiological Control Technician
ROC - radionuclide of concern
RRO - radiological remedial objective
SAP - Sampling and Analysis Plan
TCRA - time-critical removal action
TPH - *total petroleum hydrocarbons*

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/ Method	Analyte	Soil				
		RL	Unit	Cleanup Goals for Soil Sampling	Action Levels for Import Material[a]	Action Levels for IDW[b]
PCB Field Screening Test Kit EPA Method 4020	PCBs	< 1	mg/kg	1 (soil to 3 feet bgs) 100 (soil greater than 3 feet bgs)	N/A	N/A
TPH Field Screening Test Kit EPA Method 9074	TPH	< 3,500	mg/kg	3,500	N/A	N/A
Radionuclides EPA Method 901.1M or equivalent	Cesium-137	*	pCi/g	0.13	0.13	**
	Radium-226	*	pCi/g	2	2	**
Strontium-90 DOE Sr-01/Sr-02 Method or equivalent	Strontium-90	*	pCi/g	42.3	42.3	NE
Alpha Spectroscopy DOE HASL-300 Method or equivalent	Alpha-emitters	*	pCi/g	N/A	N/A	NE
Gross alpha and beta EPA Method 9310 or equivalent	Gross alpha and beta	*	pCi/g	N/A	N/A	NE
VOCs EPA Method 5035/8260B	1,1,1-Trichloroethane	5	µg/kg	N/A	1,200,000	NE
	1,1,2,2-Tetrachloroethane	5	µg/kg	N/A	930	NE
	1,1,2-Trichloroethane	5	µg/kg	N/A	1,600	NE
	1,1-Dichloroethane	5	µg/kg	N/A	6,000	NE
	1,1-Dichloroethene	5	µg/kg	N/A	410,000	NE
	1,2-Dichloroethane	5	µg/kg	N/A	600	NE
	1,2-Dichloropropane	5	µg/kg	N/A	740	NE
	2-Hexanone	10	µg/kg	N/A	NE	NE
	Acetone	20	µg/kg	N/A	54,000,000	NE
	Benzene	5	µg/kg	N/A	1,400	NE
	Bromodichloromethane	5	µg/kg	N/A	1,800	NE
	Bromoform	5	µg/kg	N/A	220,000	NE
	Bromomethane	10	µg/kg	N/A	13,000	NE
	Carbon tetrachloride	5	µg/kg	N/A	550	NE
	Chlorobenzene	5	µg/kg	N/A	530,000	NE
	Chloroethane	10	µg/kg	N/A	6,500	NE
	Chloroform	5	µg/kg	N/A	2,000	NE
	Chloromethane	10	µg/kg	N/A	160,000	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/ Method	Analyte	Soil				
		RL	Unit	Cleanup Goals for Soil Sampling	Action Levels for Import Material[a]	Action Levels for IDW[b]
	cis-1,2-Dichloroethene	5	µg/kg	N/A	150,000	NE
	cis-1,3-Dichloropropene	5	µg/kg	N/A	1,800 [c]	NE
	Dibromochloromethane	5	µg/kg	N/A	2,600	NE
	Ethylbenzene	5	µg/kg	N/A	400,000	NE
	Methyl ethyl ketone (MEK) or 2-butanone	10	µg/kg	N/A	110,000,000	NE
	Methyl tert-butyl ether (MTBE)	5	µg/kg	N/A	70,000	NE
	Methylene chloride	20	µg/kg	N/A	21,000	NE
	Methyl isobutyl ketone (MIBK) or 4-methyl-2-pentanone	10	µg/kg	N/A	47,000,000	NE
	Styrene	5	µg/kg	N/A	1,700,000	NE
	Tetrachloroethene	5	µg/kg	N/A	1,300	NE
	Toluene	5	µg/kg	N/A	520,000	NE
	trans-1,2-Dichloroethene	5	µg/kg	N/A	230,000	NE
	trans-1,3-Dichloropropene	5	µg/kg	N/A	1,800 [c]	NE
	Trichloroethene	5	µg/kg	N/A	6,500	2,040,000
	Vinyl acetate	50	µg/kg	N/A	1,400,000	NE
	Vinyl chloride	10	µg/kg	N/A	750	NE
	Xylenes (Total)	5	µg/kg	N/A	420,000	NE
SVOCs EPA Method 8270C	1,2,4-Trichlorobenzene	330	µg/kg	N/A	220,000	NE
	1,2-Dichlorobenzene	330	µg/kg	N/A	600,000	NE
	1,3-Dichlorobenzene	330	µg/kg	N/A	600,000	NE
	1,4-Dichlorobenzene	330	µg/kg	N/A	7,900	NE
	2,4,5-Trichlorophenol	330	µg/kg	N/A	62,000,000	NE
	2,4,6-Trichlorophenol	330	µg/kg	N/A	25,000	NE
	2,4-Dichlorophenol	330	µg/kg	N/A	1,800,000	NE
	2,4-Dimethylphenol	330	µg/kg	N/A	12,000,000	NE
	2,4-Dinitrophenol	670	µg/kg	N/A	1,200,000	NE
	2,4-Dinitrotoluene	330	µg/kg	N/A	1,200,000	NE
	2,6-Dinitrotoluene	330	µg/kg	N/A	620,000	NE
	2-Chloronaphthalene	330	µg/kg	N/A	23,000,000	NE
	2-Chlorophenol	330	µg/kg	N/A	240,000	NE
	2-Methylphenol	330	µg/kg	N/A	31,000,000	NE
	2-Nitroaniline	670	µg/kg	N/A	1,800,000	NE
	2-Nitrophenol	670	µg/kg	N/A	NE	NE
	3,3'-Dichlorobenzidine	670	µg/kg	N/A	3,800	NE
	3-Nitroaniline	670	µg/kg	N/A	82,000	NE
	4,6-Dinitro-2-methylphenol	330	µg/kg	N/A	62,000	NE
	4-Bromophenyl phenyl ether	330	µg/kg	N/A	NE	NE
	4-Chloro-3-methylphenol	330	µg/kg	N/A	NE	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/ Method	Analyte	Soil				
		RL	Unit	Cleanup Goals for Soil Sampling	Action Levels for Import Material[a]	Action Levels for IDW[b]
	4-Chloroaniline	330	µg/kg	N/A	2,500,000	NE
	4-Chlorophenyl phenyl ether	330	µg/kg	N/A	NE	NE
	4-Methylphenol	670	µg/kg	N/A	3,100,000	NE
	4-Nitroaniline	670	µg/kg	N/A	82,000	NE
	4-Nitrophenol	330	µg/kg	N/A	NE	NE
	bis(2-Chloroethoxy)methane	330	µg/kg	N/A	NE	NE
	bis(2-Chloroethyl) ether	330	µg/kg	N/A	580	NE
	bis(2-Chloroisopropyl)ether	330	µg/kg	N/A	7,400	NE
	bis(2-Ethylhexyl)phthalate	330	µg/kg	N/A	120,000	NE
	Butyl benzylphthalate	330	µg/kg	N/A	100,000,000	NE
	Di-n-butylphthalate	330	µg/kg	N/A	62,000,000	NE
	Di-n-octylphthalate	330	µg/kg	N/A	25,000,000	NE
	Dibenzofuran	330	µg/kg	N/A	1,600,000	NE
	Diethyl phthalate	330	µg/kg	N/A	100,000,000	NE
	Dimethyl phthalate	330	µg/kg	N/A	100,000,000	NE
	Hexachlorobenzene	330	µg/kg	N/A	1,100	NE
	Hexachlorobutadiene	670	µg/kg	N/A	22,000	NE
	Hexachlorocyclopentadiene	330	µg/kg	N/A	3,700,000	NE
	Hexachloroethane	330	µg/kg	N/A	120,000	NE
	n-Nitroso-di-n-propylamine	330	µg/kg	N/A	250	NE
	n-Nitrosodiphenylamine	330	µg/kg	N/A	350,000	NE
	Nitrobenzene	670	µg/kg	N/A	100,000	NE
	Pentachlorophenol	330	µg/kg	N/A	9,000	17,000
	Phenol	66	µg/kg	N/A	100,000,000	NE
	Acenapthene	66	µg/kg	N/A	29,000,000	NE
	Acenaphthylene	66	µg/kg	N/A	NE	NE
	Anthracene	66	µg/kg	N/A	100,000,000	NE
	Benzo[a]anthracene	66	µg/kg	N/A	2,100	NE
	Benzo[a]pyrene	66	µg/kg	N/A	210	NE
	Benzo[b]fluoranthene	66	µg/kg	N/A	2,100	NE
	Benzo[g,h,i]perylene	66	µg/kg	N/A	NE	NE
	Benzo[k]fluoranthene	66	µg/kg	N/A	1,300	NE
	Chrysene	66	µg/kg	N/A	13,000	NE
	Dibenz[a,h]anthracene	66	µg/kg	N/A	210	NE
	Fluoranthene	66	µg/kg	N/A	22,000,000	NE
	Fluorene	66	µg/kg	N/A	26,000,000	NE
	Indeno[1,2,3-cd]pyrene	66	µg/kg	N/A	2,100	NE
	Naphthalene	66	µg/kg	N/A	4,200	NE
	Phenanthrene	66	µg/kg	N/A	NE	NE
	Pyrene	3.3	µg/kg	N/A	29,000,000	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/ Method	Analyte	Soil				
		RL	Unit	Cleanup Goals for Soil Sampling	Action Levels for Import Material[a]	Action Levels for IDW[b]
Pesticides EPA Method 8081A	4,4-DDD	3.3	µg/kg	N/A	10,000	1,000 [d]
	4,4-DDE	3.3	µg/kg	N/A	7,000	1,000 [d]
	4,4-DDT	1.7	µg/kg	N/A	7,000	1,000 [d]
	alpha-BHC	1.7	µg/kg	N/A	360	NE
	Aldrin	1.7	µg/kg	N/A	100	1,400
	beta-BHC	1.7	µg/kg	N/A	1,300	NE
	delta-BHC	30	µg/kg	N/A	NE	NE
	Chlordane	3.3	µg/kg	N/A	6,500	2,500
	Dieldrin	3.3	µg/kg	N/A	110	8,000
	Endosulfan sulfate	1.7	µg/kg	N/A	NE	NE
	Endosulfan I	3.3	µg/kg	N/A	3,700,000 [e]	NE
	Endosulfan II	3.3	µg/kg	N/A	3,700,000 [e]	NE
	Endrin	3.3	µg/kg	N/A	180,000	200
	Endrin Aldehyde	3.3	µg/kg	N/A	NE	NE
	Endrin Ketone	1.7	µg/kg	N/A	NE	NE
	gamma-BHC (Lindane)	1.7	µg/kg	N/A	1,700	4,000
	Heptachlor	1.7	µg/kg	N/A	380	4,700 [f]
	Heptachlor epoxide	17	µg/kg	N/A	190	4,700 [f]
	Methoxychlor	59	µg/kg	N/A	3,100,000	100,000
	Toxaphene	9.6	µg/kg	N/A	1,600	5,000
PCBs EPA Method 8082	Aroclor 1016	19	µg/kg	N/A	740 [g]	NE
	Aroclor 1221	9.6	µg/kg	N/A	740 [g]	NE
	Aroclor 1232	9.6	µg/kg	N/A	740 [g]	NE
	Aroclor 1242	9.6	µg/kg	N/A	740 [g]	NE
	Aroclor 1248	9.6	µg/kg	N/A	740 [g]	NE
	Aroclor 1254	9.6	µg/kg	N/A	740 [g]	NE
	Aroclor 1260	80	µg/kg	N/A	740 [g]	NE
	Total PCBs	20	mg/kg	1 (horizontal contamination) 100 (vertical contamination)	NE	NE
Herbicides by EPA Method 8151A	2,4-D	20	µg/kg	N/A	N/A	100,000
	2,4,5-TP (Silvex)	80	µg/kg	N/A	N/A	10,000
	2,4,5-T	5	µg/kg	N/A	N/A	NE
	2,4-DB	5	µg/kg	N/A	N/A	NE
TPH EPA Method 8015B	TPH-Gasoline (C6-C10)	0.2	mg/kg	N/A	NE	NE
	TPH-Diesel (C10-C24)	1	mg/kg	N/A	NE	NE
	TPH-Motor Oil (C24-C36)	5	mg/kg	N/A	NE	NE
	Total TPH	N/A	mg/kg	3,500	NE	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/ Method	Analyte	Soil				
		RL	Unit	Cleanup Goals for Soil Sampling	Action Levels for Import Material[a]	Action Levels for IDW[b]
Title 22 Metals EPA Method 6010B/6020/7000	Antimony	3	mg/kg	N/A	410	500
	Arsenic	0.25	mg/kg	N/A	0.25	500
	Barium	0.5	mg/kg	N/A	67,000	10,000
	Beryllium	0.1	mg/kg	N/A	1,900	75
	Cadmium	0.25	mg/kg	N/A	450	100
	Chromium	0.5	mg/kg	N/A	450	2,500
	Cobalt	1	mg/kg	N/A	1,900	8,000
	Copper	5	mg/kg	N/A	41,000	2,500
	Lead	1.5	mg/kg	N/A	800	1,000
	Mercury	0.25	mg/kg	N/A	310	20
	Molybdenum	1	mg/kg	N/A	5,100	3,500
	Nickel	1	mg/kg	N/A	20,000	2,000
	Selenium	0.25	mg/kg	N/A	5,100	100
	Silver	0.25	mg/kg	N/A	5,100	500
	Thallium	0.25	mg/kg	N/A	67	700
	Vanadium	0.5	mg/kg	N/A	1,000	2,400
	Zinc	10	mg/kg	N/A	100,000	5,000
pH by EPA Method 9045C	pH	N/A	No units	N/A	N/A	NE
Ignitability by EPA Method 1010	Ignitability	N/A	Degrees Celsius	N/A	N/A	> 60
Reactivity by SW-846, Chapters 7.3.3 and 7.3.4	Cyanide	0.25	mg/kg	N/A	N/A	NE
	Sulfide	22.2	mg/kg	N/A	N/A	NE
Paint filter test by EPA Method 9095	Paint filter test	N/A	No units	N/A	N/A	NE
Asbestos CARB Method 435	Asbestos	0.25	%	N/A	0.25[h]	0.25[h]

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/Method	Analyte	Water [1]				
		Proposed RL	Unit	Radiological Limits	STLC Limit	TCLP Limit
Radionuclides EPA Method 901.1 or equivalent	Cesium-137	*	pCi/L	119	NE	NE
	Radium-226	*	pCi/L	5	NE	NE
Strontium-90 EPA Method 905.0 or equivalent	Strontium-90	*	pCi/L	8	NE	NE
Alpha Spectroscopy DOE HASL-300 Method or equivalent	Alpha-emitters	*	pCi/L	NE	NE	NE
Gross Alpha and Beta EPA Method 9310 or equivalent	Gross alpha and beta	*	pCi/L	NE	NE	NE
VOCs EPA Method 8260B	1,1,1-Trichloroethane	5	µg/L	N/A	NE	NE
	1,1,2,2-Tetrachloroethane	5	µg/L	N/A	NE	NE
	1,1,2-Trichloroethane	5	µg/L	N/A	NE	NE
	1,1-Dichloroethane	5	µg/L	N/A	NE	NE
	1,1-Dichloroethene	5	µg/L	N/A	NE	700
	1,2-Dichloroethane	5	µg/L	N/A	NE	500
	1,2-Dichloropropane	5	µg/L	N/A	NE	NE
	2-Hexanone	50	µg/L	N/A	NE	NE
	Acetone	50	µg/L	N/A	NE	NE
	Benzene	0.5	µg/L	N/A	NE	500
	Bromodichloromethane	5	µg/L	N/A	NE	NE
	Bromoform	5	µg/L	N/A	NE	NE
	Bromomethane	5	µg/L	N/A	NE	NE
	Carbon tetrachloride	5	µg/L	N/A	NE	500
	Chlorobenzene	5	µg/L	N/A	NE	100,000
	Chloroethane	5	µg/L	N/A	NE	NE
	Chloroform	5	µg/L	N/A	NE	6,000
	Chloromethane	5	µg/L	N/A	NE	NE
	cis-1,2-Dichloroethene	5	µg/L	N/A	NE	NE
	cis-1,3-Dichloropropene	5	µg/L	N/A	NE	NE
	Dibromochloromethane	5	µg/L	N/A	NE	NE
	Ethylbenzene	0.5	µg/L	N/A	NE	NE
	Methyl ethyl ketone (MEK) or 2-butanone	50	µg/L	N/A	NE	200,000
	Methyl tert-butyl ether (MTBE)	1	µg/L	N/A	NE	NE
	Methylene chloride	10	µg/L	N/A	NE	NE
	Methyl isobutyl ketone (MIBK) or 4-methyl-2-pentanone	50	µg/L	N/A	NE	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/Method	Analyte	Water [i]				
		Proposed RL	Unit	Radiological Limits	STLC Limit	TCLP Limit
	Styrene	5	µg/L	N/A	NE	NE
	Tetrachloroethene	5	µg/L	N/A	NE	700
	Toluene	0.5	µg/L	N/A	NE	NE
	trans-1,2-Dichloroethene	5	µg/L	N/A	NE	NE
	trans-1,3-Dichloropropene	5	µg/L	N/A	NE	NE
	Trichloroethene	5	µg/L	N/A	204,000	500
	Vinyl acetate	50	µg/L	N/A	NE	NE
	Vinyl chloride	5	µg/L	N/A	NE	200
	Xylenes (Total)	1.5	µg/L	N/A	NE	NE
SVOCs EPA Method 8270C	1,2,4-Trichlorobenzene	10	µg/L	N/A	NE	NE
	1,2-Dichlorobenzene	10	µg/L	N/A	NE	NE
	1,3-Dichlorobenzene	10	µg/L	N/A	NE	NE
	1,4-Dichlorobenzene	10	µg/L	N/A	NE	7,500
	2,4,5-Trichlorophenol	10	µg/L	N/A	NE	400,000
	2,4,6-Trichlorophenol	10	µg/L	N/A	NE	2,000
	2,4-Dichlorophenol	10	µg/L	N/A	NE	NE
	2,4-Dimethylphenol	10	µg/L	N/A	NE	NE
	2,4-Dinitrophenol	50	µg/L	N/A	NE	NE
	2,4-Dinitrotoluene	10	µg/L	N/A	NE	130
	2,6-Dinitrotoluene	10	µg/L	N/A	NE	NE
	2-Chloronaphthalene	10	µg/L	N/A	NE	NE
	2-Chlorophenol	10	µg/L	N/A	NE	NE
	2-Methylphenol	10	µg/L	N/A	NE	200,000 [j]
	2-Nitroaniline	20	µg/L	N/A	NE	NE
	2-Nitrophenol	20	µg/L	N/A	NE	NE
	3,3'-Dichlorobenzidine	20	µg/L	N/A	NE	NE
	3-Nitroaniline	20	µg/L	N/A	NE	NE
	4,6-Dinitro-2-methylphenol	50	µg/L	N/A	NE	NE
	4-Bromophenyl phenyl ether	10	µg/L	N/A	NE	NE
	4-Chloro-3-methylphenol	10	µg/L	N/A	NE	NE
	4-Chloroaniline	10	µg/L	N/A	NE	NE
	4-Chlorophenyl phenyl ether	10	µg/L	N/A	NE	NE
	4-Methylphenol	10	µg/L	N/A	NE	200, 000 [j]
	4-Nitroaniline	20	µg/L	N/A	NE	NE
	4-Nitrophenol	20	µg/L	N/A	NE	NE
	bis(2-Chloroethoxy)methane	10	µg/L	N/A	NE	NE
	bis(2-Chloroethyl) ether	10	µg/L	N/A	NE	NE
	bis(2-Chloroisopropyl)ether	10	µg/L	N/A	NE	NE
	bis(2-Ethylhexyl)phthalate	10	µg/L	N/A	NE	NE
	Butyl benzylphthalate	10	µg/L	N/A	NE	NE
	Di-n-butylphthalate	10	µg/L	N/A	NE	NE

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/Method	Analyte	Water [i]				
		Proposed RL	Unit	Radiological Limits	STLC Limit	TCLP Limit
	Di-n-octylphthalate	10	µg/L	N/A	NE	NE
	Dibenzofuran	10	µg/L	N/A	NE	NE
	Diethyl phthalate	10	µg/L	N/A	NE	NE
	Dimethyl phthalate	10	µg/L	N/A	NE	NE
	Hexachlorobenzene	10	µg/L	N/A	NE	130
	Hexachlorobutadiene	10	µg/L	N/A	NE	500
	Hexachlorocyclopentadiene	10	µg/L	N/A	NE	NE
	Hexachloroethane	10	µg/L	N/A	NE	3,000
	n-Nitroso-di-n-propylamine	10	µg/L	N/A	NE	NE
	n-Nitrosodiphenylamine	10	µg/L	N/A	NE	NE
	Nitrobenzene	10	µg/L	N/A	NE	2,000
	Pentachlorophenol	20	µg/L	N/A	1,700	100,000
	Phenol	10	µg/L	N/A	NE	NE
	Acenapthene	10	µg/L	N/A	NE	NE
	Acenaphthylene	10	µg/L	N/A	NE	NE
	Anthracene	10	µg/L	N/A	NE	NE
	Benzo[a]anthracene	10	µg/L	N/A	NE	NE
	Benzo[a]pyrene	10	µg/L	N/A	NE	NE
	Benzo[b]fluoranthene	10	µg/L	N/A	NE	NE
	Benzo[g,h,i]perylene	10	µg/L	N/A	NE	NE
	Benzo[k]fluoranthene	10	µg/L	N/A	NE	NE
	Chrysene	10	µg/L	N/A	NE	NE
	Dibenz[a,h]anthracene	10	µg/L	N/A	NE	NE
	Fluoranthene	10	µg/L	N/A	NE	NE
	Fluorene	10	µg/L	N/A	NE	NE
	Indeno[1,2,3-cd]pyrene	10	µg/L	N/A	NE	NE
	Naphthalene	10	µg/L	N/A	NE	NE
	Phenanthrene	10	µg/L	N/A	NE	NE
	Pyrene	10	µg/L	N/A	NE	NE
Pesticides EPA Method 8081A	4,4-DDD	0.1	µg/L	N/A	100 [d]	NE
	4,4-DDE	0.1	µg/L	N/A	100 [d]	NE
	4,4-DDT	0.1	µg/L	N/A	100 [d]	NE
	alpha-BHC	0.05	µg/L	N/A	NE	NE
	Aldrin	0.05	µg/L	N/A	140	NE
	beta-BHC	0.05	µg/L	N/A	NE	NE
	delta-BHC	0.05	µg/L	N/A	NE	NE
	Chlordane	0.5	µg/L	N/A	250	30
	Dieldrin	0.1	µg/L	N/A	800	NE
	Endosulfan sulfate	0.1	µg/L	N/A	NE	NE
	Endosulfan I	0.05	µg/L	N/A	NE	NE
	Endosulfan II	0.1	µg/L	N/A	NE	NE
	Endrin	0.1	µg/L	N/A	20	20

TABLE A.8-2

PROPOSED REPORTING LIMITS

Parameter/Method	Analyte	Water [i]				
		Proposed RL	Unit	Radiological Limits	STLC Limit	TCLP Limit
	Endrin Aldehyde	0.1	µg/L	N/A	NE	NE
	Endrin Ketone	0.1	µg/L	N/A	NE	NE
	gamma-BHC (Lindane)	0.05	µg/L	N/A	400	400
	Heptachlor	0.05	µg/L	N/A	470 [f]	8 [f]
	Heptachlor epoxide	0.05	µg/L	N/A	470 [f]	8 [f]
	Methoxychlor	0.5	µg/L	N/A	10000	10000
	Toxaphene	1	µg/L	N/A	500	500
PCBs EPA Method 8082	Aroclor 1016	1	µg/L	N/A	5,000	NE
	Aroclor 1221	1	µg/L	N/A	5,000	NE
	Aroclor 1232	1	µg/L	N/A	5,000	NE
	Aroclor 1242	1	µg/L	N/A	5,000	NE
	Aroclor 1248	1	µg/L	N/A	5,000	NE
	Aroclor 1254	1	µg/L	N/A	5,000	NE
	Aroclor 1260	1	µg/L	N/A	5,000	NE
TPH EPA Method 8015B	TPH-Gasoline (C6-C10)	0.5	mg/L	N/A	NE	NE
	TPH-Diesel (C10-C24)	0.5	mg/L		NE	NE
	TPH-Motor Oil (C24-C36)	1	mg/L		NE	NE
Title 22 Metals EPA Method 6010B/6020/7000	Antimony	12	µg/L	N/A N/A	15,000	NE
	Arsenic	1	µg/L	N/A	5,000	5,000
	Barium	2	µg/L	N/A	100,000	100,000
	Beryllium	0.4	µg/L	N/A	750	NE
	Cadmium	1	µg/L	N/A	1,000	1,000
	Chromium	2	µg/L	N/A	5,000	5,000
	Cobalt	4	µg/L	N/A	80,000	NE
	Copper	0.5	µg/L	N/A	25,000	NE
	Lead	0.6	µg/L	N/A	5,000	5,000
	Mercury	0.2	µg/L	N/A	200	200
	Molybdenum	4	µg/L	N/A	350,000	NE
	Nickel	4	µg/L	N/A	20,000	NE
	Selenium	1	µg/L	N/A	1,000	1,000
	Silver	0.26	µg/L	N/A	5,000	5,000
	Thallium	1	µg/L	N/A	7,000	NE
	Vanadium	1	µg/L	N/A	24,000	NE
	Zinc	5	µg/L	N/A	250,000	NE
Ignitability EPA Method 1010	Ignitability	N/A	Degrees Celsius	N/A	N/A	N/A

TABLE A.8-2

PROPOSED REPORTING LIMITS

Notes:

* Reporting limits (a.k.a., Minimum Detectable Activity) for radiological analyses are calculated for each sample based on background counts, sample size, and count time.

** Action levels for IDW for radiological analyses will be determined based on disposal facility requirements.

a For chemical samples, the action levels listed are based on EPA Region IX Industrial PRGs (EPA, 2004b) for the imported backfill material samples. At the discretion of the DON, import material that exceeds action levels may be brought onsite and used if the concentrations do not exceed the Hunters Point Ambient Levels or background values. For analytes that do not have an established action level, the DON, in consultation with the regulatory agencies, will evaluate the results for the backfill material and determine if material is suitable for use on site.

b Action levels for IDW are based on the TTLC values.

c Action level listed is for total 1,3-dichloropropane.

d Action level listed is for the sum of 4,4- DDD, 4,4-DDE, and 4,4-DDT.

e Action level listed is for total endosulfan.

f Action level listed is for the sum of heptachlor and heptachlor epoxide.

g Action level listed is for total PCBs.

h Action level listed is from the Bay Area Air Quality Management District.

i Water samples include equipment rinsate samples (as applicable) and wastewater samples collected for characterization. STLC and TCLP limits will be used for IDW samples.

j Action level listed is for the sum of 2-methylphenol and 3/4-methylphenol.

Shading indicates that the lowest laboratory RL achievable is above the action level. Therefore, the method detection limit may be used to evaluate the data.

^{0}C - degrees Celsius
µg/kg - micrograms per kilogram
µg/L - micrograms per liter
bgs - below ground surface
BHC - benzene hexachloride
CARB - California Air Resources Board
DDD - dichlorodiphenyldichloroethane
DDE - dichlorodiphenyldichloroethene
DDT - dichlorodiphenyldtrichloroethane
DOE - Department of Energy
DON - Department of the Navy
EPA - U.S. Environmental Protection Agency
IDW - investigation-derived waste
mg/kg - milligrams per kilogram
mg/L - milligrams per liter
N/A - not applicable
NE - none established
PCB - polychlorinated biphenyl
pCi/g - picocuries per gram
pCi/L - picocuries per liter
PRG - Preliminary Remediation Goal
RL - reporting limit
STLC - Soluble Threshold Limit Concentration
SVOC - semivolatile organic compound
TCLP - Toxicity Characteristic Leaching Procedure
TPH - total petroleum hydrocarbons
TTLC - Total Threshold Limit Concentration
VOC - volatile organic compound

TABLE A.8-3

PROPOSED QUALITY CONTROL ACCEPTANCE CRITERIA

Method	Analyte	Accuracy Soil (%R)	Precision Soil (RPD)	Accuracy Water (%R)	Precision Water (RPD)
EPA Method 901.1 M (soil) and EPA Method 901.1 (water) or equivalent	Cesium-137	75-125	≤ 30	75-125	≤ 30
	Radium-226	75-125	≤ 30	75-125	≤ 30
DOE Sr-01/Sr-02 Method (soil) and EPA Method 905.0 (water) or equivalent	Strontium-90	75-125	≤ 30	75-125	≤ 30
DOE HASL-300 Method or equivalent	Alpha-emitters	75-125	≤ 30	75-125	≤ 30
EPA Method 9310 or equivalent	Gross alpha and beta	75-125	≤ 30	75-125	≤ 30
EPA Method 8260B	1,1-Dichloroethene	65-135	≤ 30	75–125	≤ 20
	Benzene	65-135	≤ 30	75–125	≤ 20
	Chlorobenzene	65-135	≤ 30	75–125	≤ 20
	Trichloroethene	65-135	≤ 30	75–125	≤ 20
	Toluene	65-135	≤ 30	75–125	≤ 20
	Surrogates:				
	Toluene-D8	65-135	N/A	75–125	N/A
	4-Bromofluorobenzene	65-135	N/A	75–125	N/A
	1,2-Dichloroethane-D4	65-135	N/A	75–125	N/A
EPA Method 8270C	1,2,4-Trichlorobenzene	34-152	≤ 30	44-142	≤ 30
	1,4-Dichlorobenzene	25-135	≤ 30	30-125	≤ 30
	2,4-Dinitrotoluene	29-149	≤ 30	39-139	≤ 30
	Acenaphthene	39-135	≤ 30	49-125	≤ 30
	2-Chlorophenol	31-135	≤ 30	41-125	≤ 30
	n-Nitrosodi-n-propylamine	27-135	≤ 30	37-125	≤ 30
	4-Chloro-3-methyl phenol	34-135	≤ 30	44-125	≤ 30
	4-Nitrophenol	25-141	≤ 30	25-131	≤ 30
	Pentachlorophenol	38-146	≤ 30	28-136	≤ 30
	Phenol	25-135	≤ 30	25-125	≤ 30
	Pyrene	37-146	≤ 30	47-136	≤ 30
	Surrogates:				
	2,4,6-Tribromophenol	25-144	N/A	25-134	N/A
	2-Fluorbiphenyl	34-135	N/A	43-125	N/A
	2-Fluorophenol	25-135	N/A	25-125	N/A
	Nitrobenzene-d_5	25-135	N/A	32-125	N/A

TABLE A.8-3

PROPOSED QUALITY CONTROL ACCEPTANCE CRITERIA

Method	Analyte	Accuracy Soil (%R)	Precision Soil (RPD)	Accuracy Water (%R)	Precision Water (RPD)
	Phenol- d_5	25-135	N/A	25-125	N/A
	Terphenyl- d_{14}	32-136	N/A	42-126	N/A
EPA Method 8081A	4,4-DDT	59-135	≤ 50	65-103	≤ 30
	Aldrin	60-135	≤ 50	60-101	≤ 30
	Dieldrin	58-135	≤ 50	70-104	≤ 30
	Endrin	60-135	≤ 50	73-102	≤ 30
	gamma-BHC (Lindane)	58-135	≤ 50	70-111	≤ 30
	Heptachlor	68-135	≤ 50	56-111	≤ 30
	Surrogates:				
	Decachlorobiphenyl (DCBP)	25-143	N/A	25-143	N/A
	Tetrachloro-m-xylene (TCMX)	25-143	N/A	25-143	N/A
EPA Method 8082	Aroclor 1016	50-140	≤50	50-140	≤50
	Aroclor 1260	50-140	≤50	50-140	≤50
	Surrogate:				
	Decachlorobiphenyl (DCBP)	30-140	N/A	30-140	N/A
	Tetrachloro-m-xylene (TCMX)	30-140	N/A	30-140	N/A
EPA Method 8151A	2,4-D	30-120	≤20	N/A	N/A
	2,4,5-TP	39-137	≤20	N/A	N/A
	Surrogate:				
	2,4-Dichlorophenylacetic acid	21-127	N/A	N/A	N/A
EPA Method 8015B	TPH	65-135	≤ 30	65-135	≤ 30
	Surrogate (choose one):				
	Octacosane/hexacosane/ bromofluorobenzene	65-135	N/A	65-135	N/A
EPA Method 6010B/6020/7000	Antimony	75-125	≤ 30	75-125	≤ 30
	Arsenic	75-125	≤ 30	75-125	≤ 30
	Barium	75-125	≤ 30	75-125	≤ 30
	Beryllium	75-125	≤ 30	75-125	≤ 30
	Cadmium	75-125	≤ 30	75-125	≤ 30
	Chromium	75-125	≤ 30	75-125	≤ 30
	Cobalt	75-125	≤ 30	75-125	≤ 30
	Copper	75-125	≤ 30	75-125	≤ 30
	Lead	75-125	≤ 30	75-125	≤ 30
	Mercury	75-125	≤ 30	75-125	≤ 30
	Molybdenum	75-125	≤ 30	75-125	≤ 30
	Nickel	75-125	≤ 30	75-125	≤ 30

TABLE A.8-3

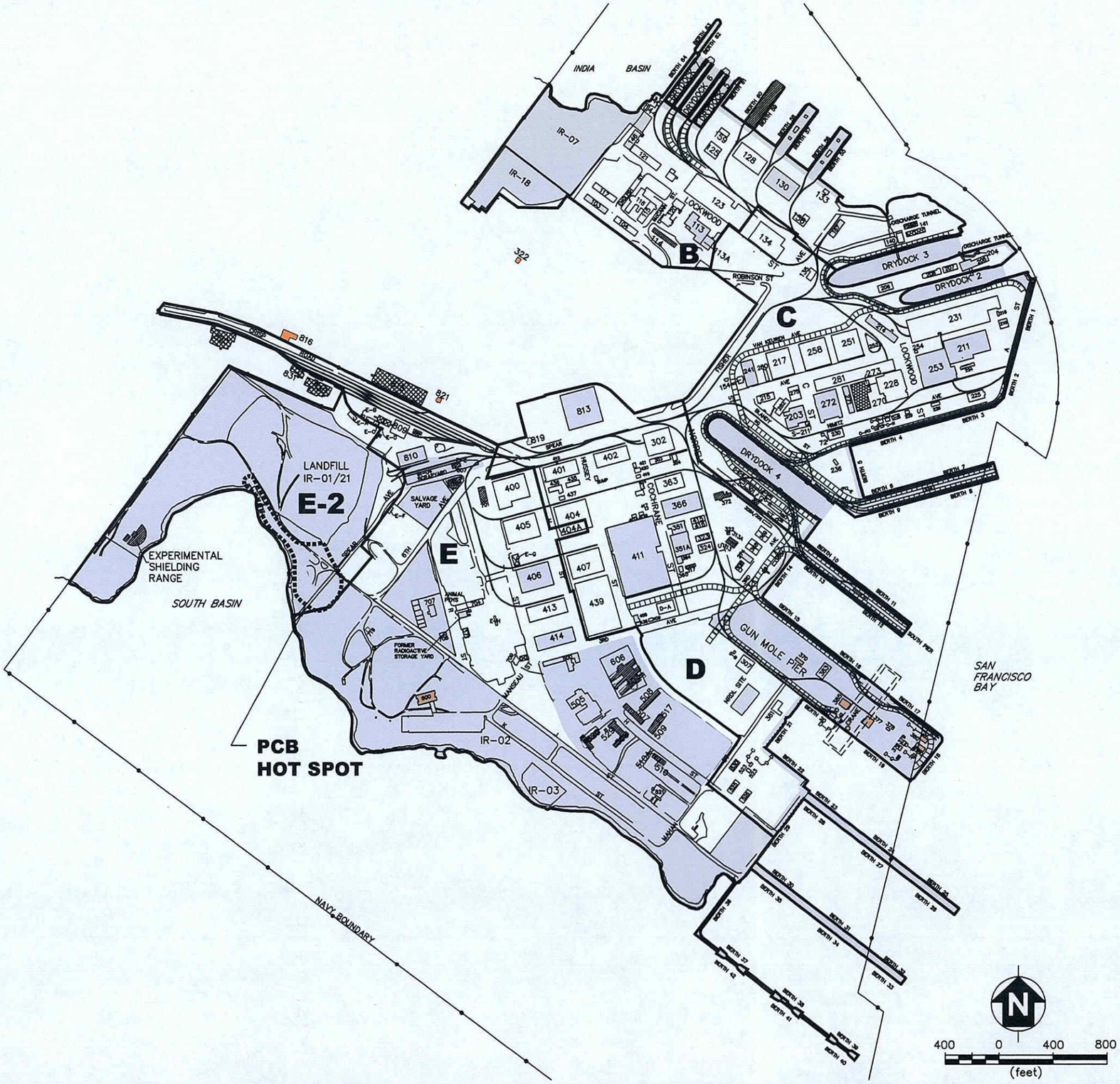
PROPOSED QUALITY CONTROL ACCEPTANCE CRITERIA

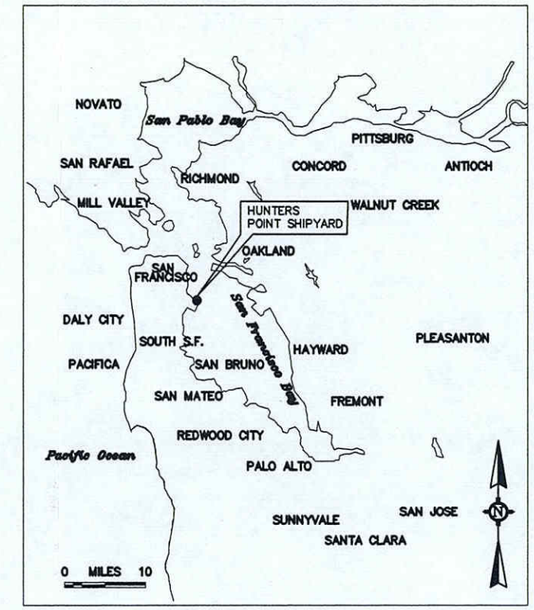
Method	Analyte	Accuracy Soil (%R)	Precision Soil (RPD)	Accuracy Water (%R)	Precision Water (RPD)
	Selenium	75-125	≤ 30	75-125	≤ 30
	Silver	75-125	≤ 30	75-125	≤ 30
	Thallium	75-125	≤ 30	75-125	≤ 30
	Vanadium	75-125	≤ 30	75-125	≤ 30
	Zinc	75-125	≤ 30	75-125	≤ 30
EPA 9045C	pH	99-101	N/A	N/A	N/A
EPA 1010	Ignitability	96-104	N/A	75-125	N/A
SW-846 Chapter 7.3.3 and 7.3.4	Reactive Cyanide	10-100	N/A	N/A	N/A
	Reactive Sulfide	10-150	N/A	N/A	N/A
EPA 9095	Paint filter test	N/A	N/A	N/A	N/A
CARB 435	Asbestos	N/A	N/A	N/A	N/A

Notes:

%R - percent recovery
BHC - benzene hexachloride
CARB - California Air Resources Board
DDT - dichlorodiphenyltrichloroethane
DOE - Department of Energy
EPA - U.S. Environmental Protection Agency
N/A - not applicable
RPD - relative percent difference
TPH - total petroleum hydrocarbons

FIGURES





KEY MAP

- NAVY PROPERTY BOUNDARY (OFFSHORE)
- PCB HOT SPOT EXCAVATION BOUNDARY
- PARCEL BOUNDARY
- IMPACTED BUILDINGS OR SITES
- DEMOLISHED IMPACTED BUILDINGS/STRUCTURES
- DEMOLISHED BUILDINGS/STRUCTURES
- IMPACTED SITES THAT HAVE OBTAINED REGULATORY RELEASE
- IMPACTED FUDS SITES
- NON-IMPACTED BUILDINGS WITHIN AN IMPACTED SITE, RADIOLOGICAL PRECAUTIONS MAY BE REQUIRED

NOTE
IMPACTED SITES ARE SITES THAT HAVE KNOWN RADIOLOGICAL CONTAMINATION OR WHERE SITE HISTORY INDICATES THAT RADIOLOGICAL CONTAMINATION MAY BE PRESENT.

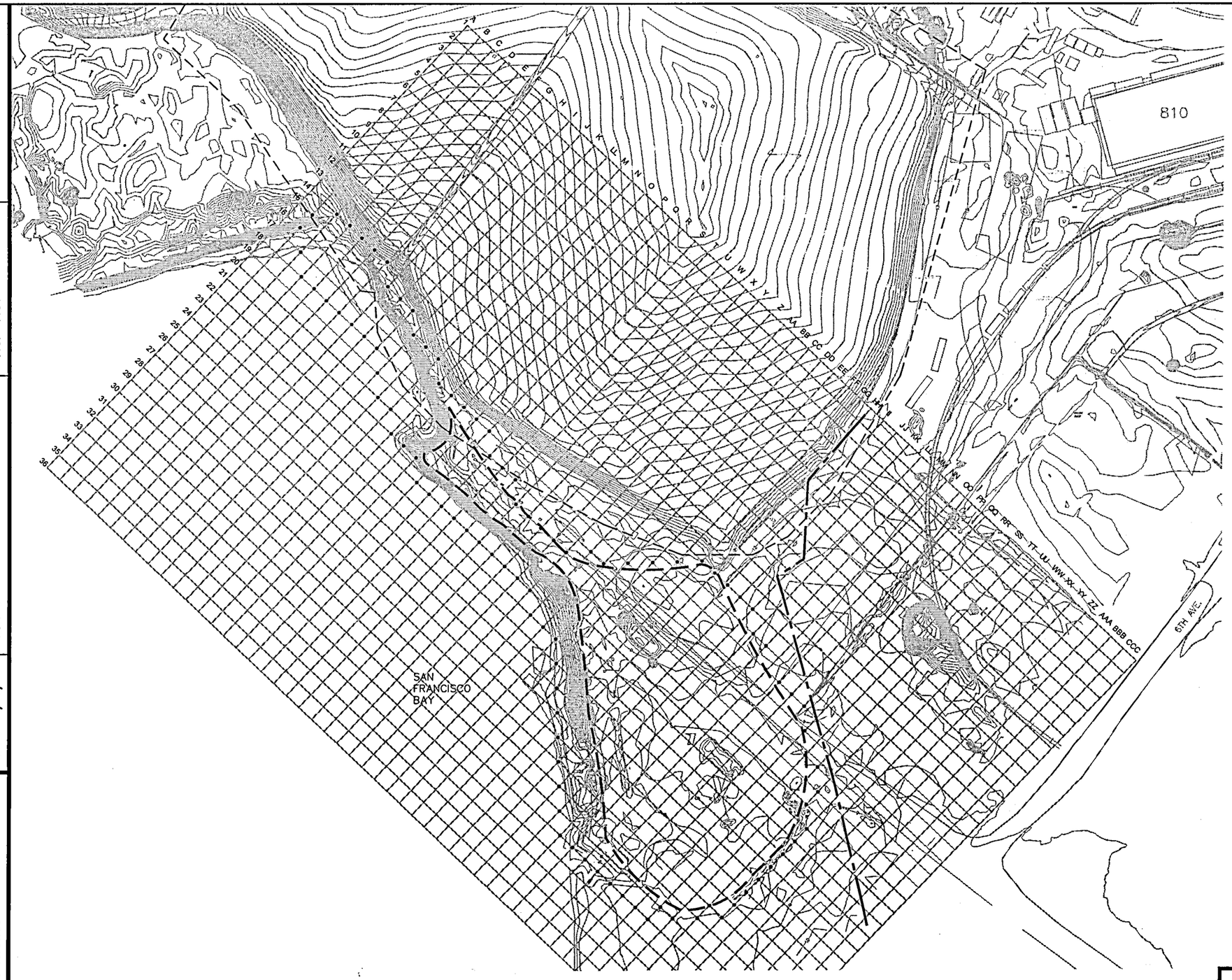
FIGURE A.3-1
HUNTERS POINT SHIPYARD AND PCB HOT SPOT
SOIL EXCAVATION SITE-LOCATION MAP

HUNTERS POINT SHIPYARD-SAN FRANCISCO, CA

TETRA TECH FW, INC.

DRAWING NO: 050992a31.DWG
DCN: FWSD-RAC-05-0992
CTO: 0084
APPROVED BY: LR
CHECKED BY: LB
REV: 0
DRAWN BY: KLD
DATE: 05/17/05

I:\1990-RAC\CTO-0084\DWG\050992\050992A31.DWG
PLOT/UPDATE: MAY 16 2005 17:13:17



LEGEND

- PCB HOT SPOT EXCAVATION BOUNDARY
- ELEVATION CONTOUR
- PRE-EXCAVATION SAMPLING LOCATION
- INDUSTRIAL LANDFILL BOUNDARY
- OPEN SPACE AND RESEARCH & DEVELOMENT/INDUSTRIAL AREA BOUNDARY

NOTES:

TWO (2) SAMPLES PER LOCATION – BETWEEN 0–6 INCHES AND 30–36 INCHES BGS.

EXCAVATION BOUNDARY MAY BE REVISED BASED ON PCB AND TPH PRE-EXCAVATION CHARACTERIZATION SAMPLING.

N

80 0 80 160
(feet)

FIGURE A.3-2
PCB HOT SPOT PROPOSED PRE-EXCAVATION CHARACTERIZATION SAMPLING PLAN

HUNTERS POINT SHIPYARD–SAN FRANCISCO, CA

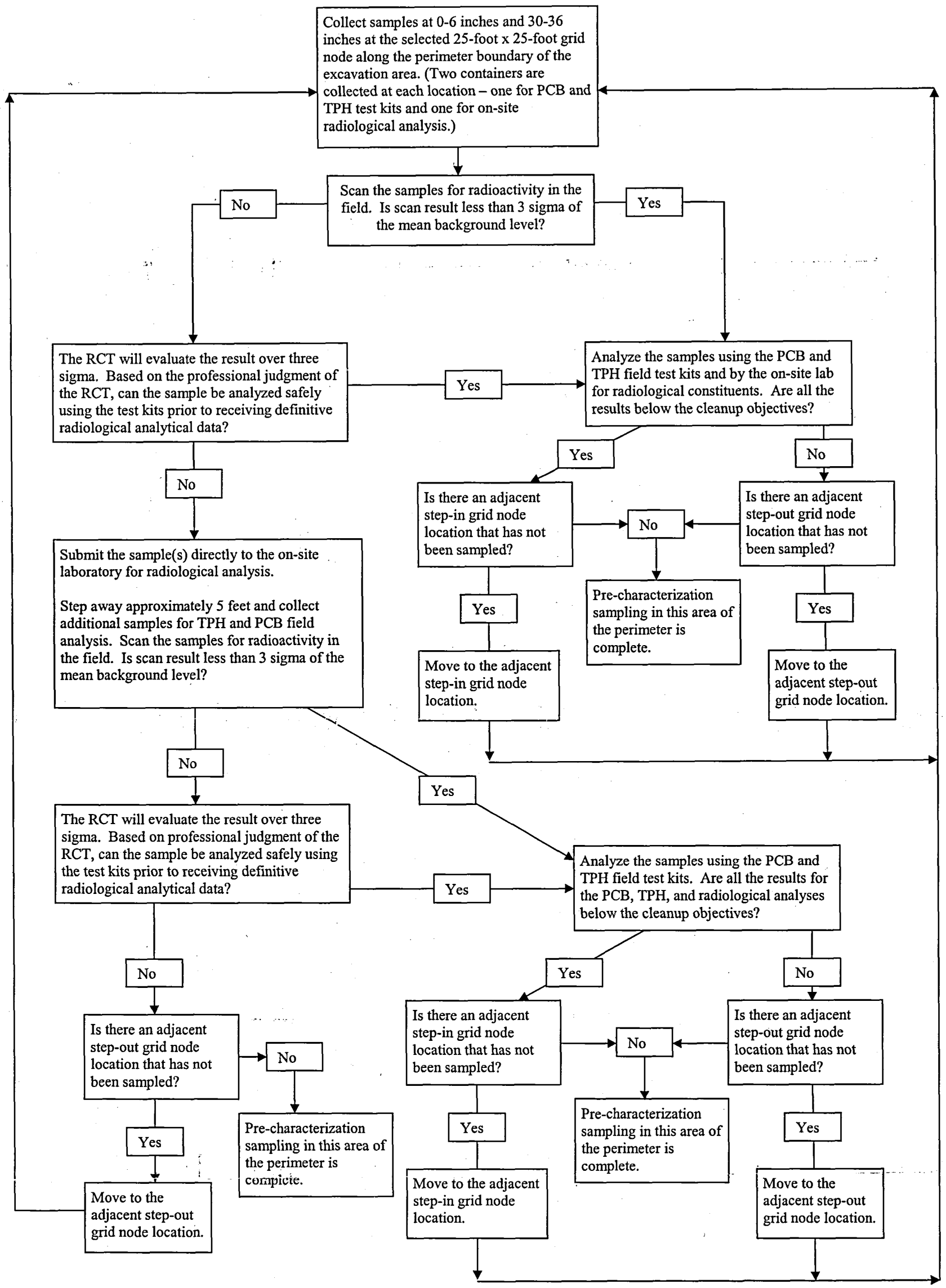
TETRA TECH EC, INC.

DRAWN BY: KLD	CHECKED: LB	APPROVED BY: UTM	DCN: FWSD-RAC-05-1442	DRAWING NO.: 051442A32.DWG
DATE: 11/10/05	REV: 0		CTO: 0084	

I:\1990-RAC\CTO-0084\DWG\051442\051442A32-.DWG
PLOT/UPDATE: MAY 16 2005 16:51:36

Figure A.4-1

Pre-excavation Sampling Strategy Decision Tree



Criteria:

- TPH above 3,500 mg/kg
- PCBs above 1 mg/kg
- ROCs above RROs

Figure A.4-2

Post-excavation Sampling Strategy Decision Tree for Bottom Samples

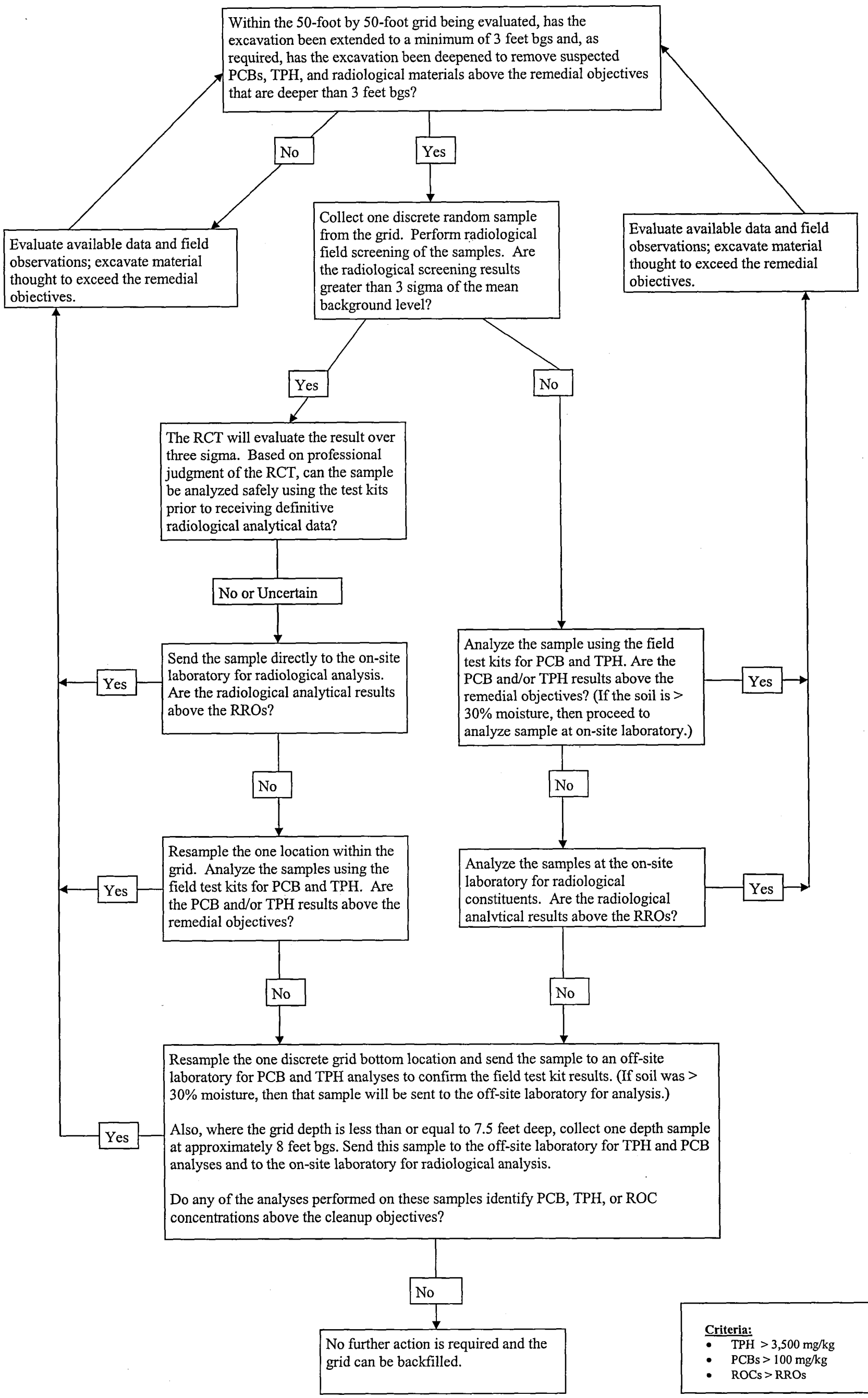


Figure A.4-3

Post-excavation Sampling Strategy Decision Tree for Perimeter Samples

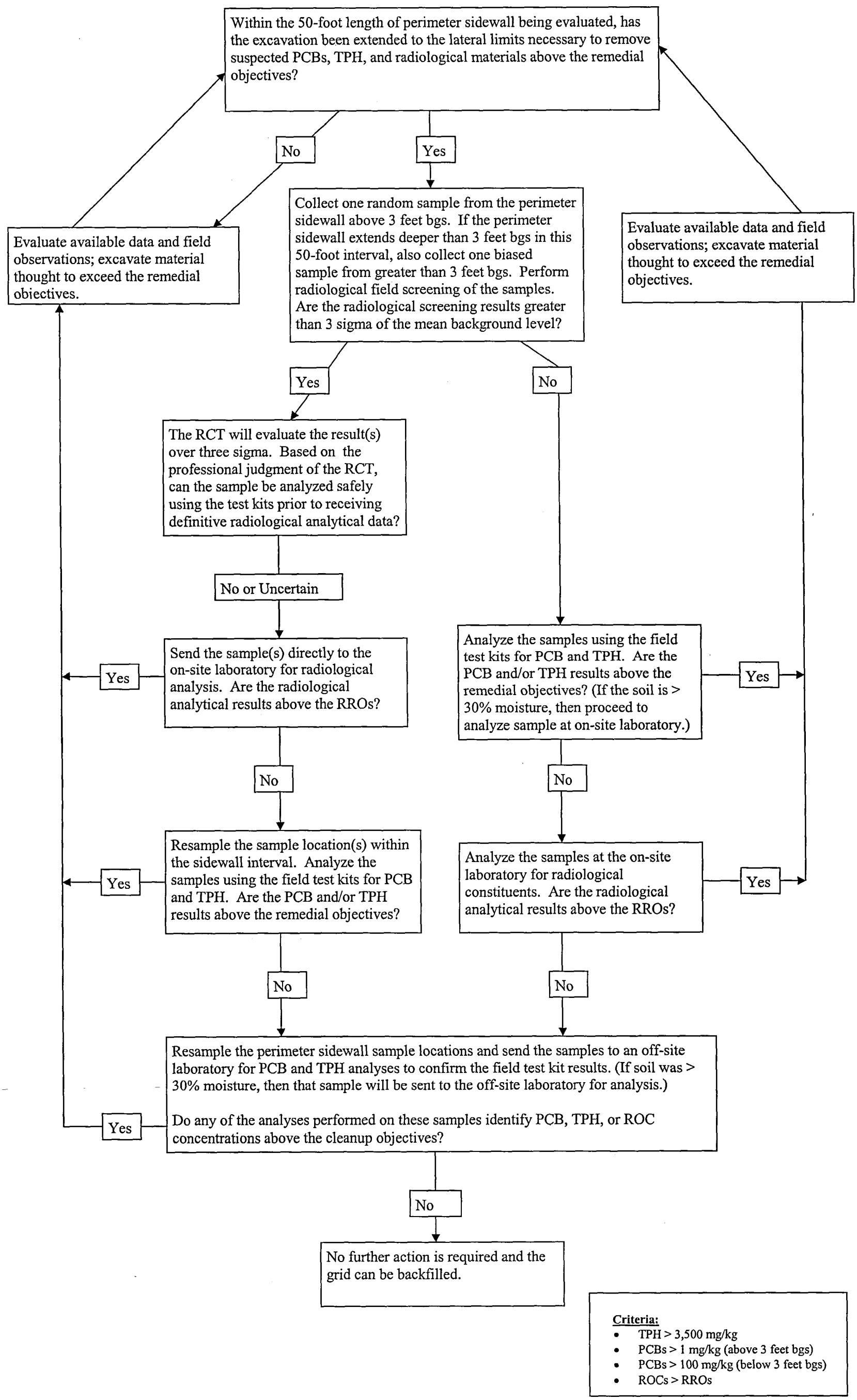
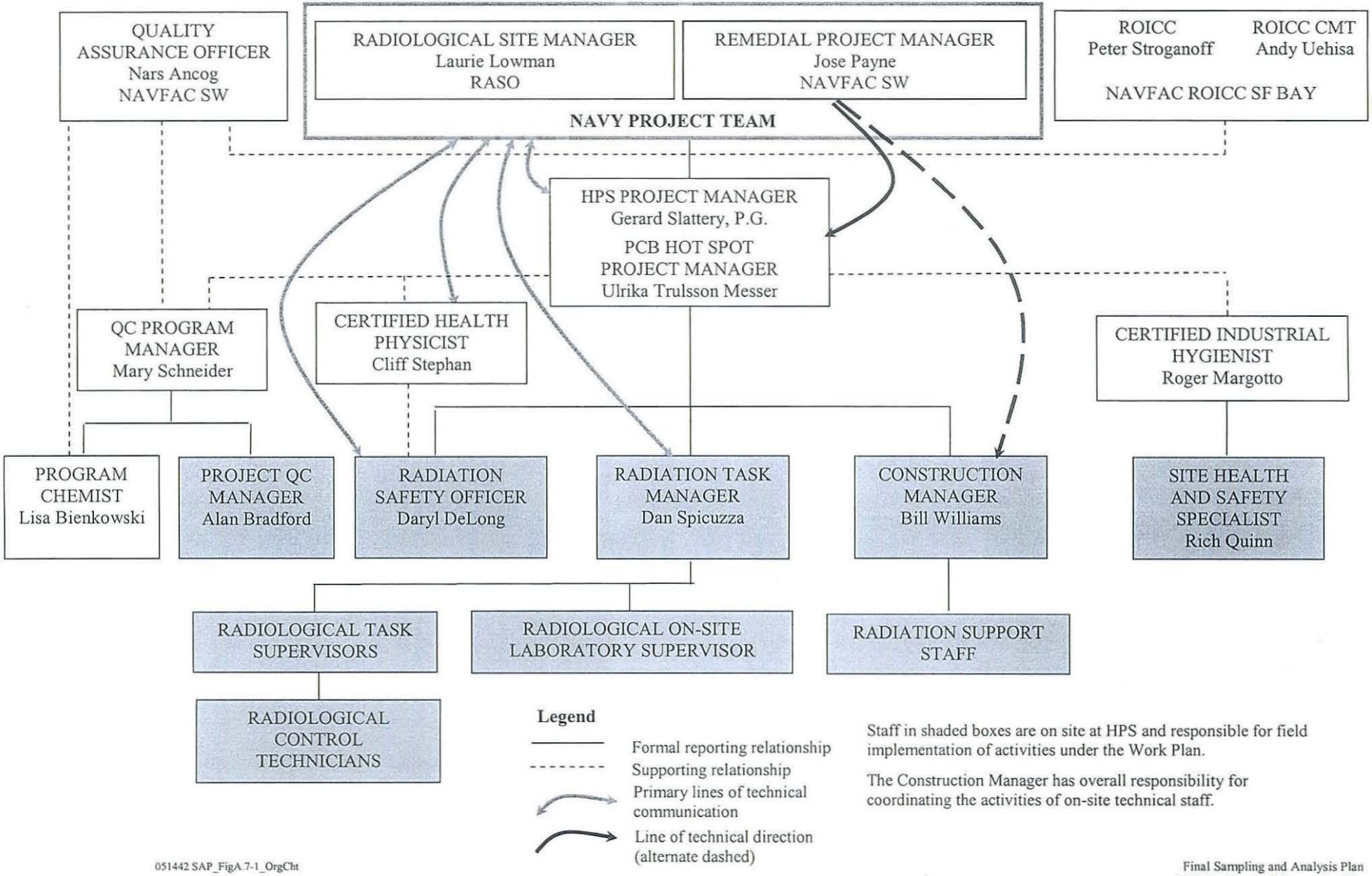


FIGURE A.7-1

PROJECT ORGANIZATION CHART



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

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

051442 SAP_FigA.7-1_OrgCht

ATTACHMENT 1

SAMPLING STANDARD OPERATING PROCEDURE (SOP)

FINAL

HUNTERS POINT SHIPYARD PROJECT

Standard Operating Procedure

SAMPLING PROCEDURES FOR RADIOLOGICAL SURVEYS

HPO-Tt-009

DCN: FWSD-RAC-O5-0473

Revision 0

Approved By:

Chemist	2/16/05 Date
Radiation Safety Officer	2/18/2005 Date
Project Manager	2/18/05 Date

REVISION HISTORY

Revision (Date)	*Rev. No*	*Prepared By*	*Description of Changes*	*Affected Pages*
February 16, 2005	0	L. Bienkowski		All

TABLE OF CONTENTS

REVISION HISTORY 2
TABLE OF CONTENTS 3
1.0 PURPOSE 4
2.0 SCOPE 4
3.0 MAINTENANCE 4
4.0 RESPONSIBILITIES 4
5.0 DEFINITIONS AND ABBREVIATIONS 5
6.0 SAMPLING PROCEDURE DETAILS 5
6.1 GENERAL PROCEDURES 5
6.2 SAMPLING PROCEDURE PROCESS 6
6.2.1 Swipe Sampling 6
6.2.2 Soil Sampling 6
6.2.3 Sediment Sampling 7
6.2.4 Solid Material Sampling 7
6.2.5 Water Sampling 8
6.3 SAMPLE PACKAGING AND TRANSPORT 8
7.0 RECORDS 9
8.0 REFERENCES 10
9.0 ATTACHMENTS 10

1.0 PURPOSE

This procedure will be used by Tetra Tech FW, Inc. (TtFW) personnel and its subcontractors at Hunters Point Shipyard (HPS) to perform swipe sampling and sampling of various types of media including soil, sediment, solid material (such as concrete, brick, porcelain, wood), and water. This procedure also details sample packaging and transporting samples to the laboratory.

2.0 SCOPE

This procedure shall be implemented by TtFW staff and subcontractor personnel when collecting samples on field projects related to radiological surveys at HPS.

3.0 MAINTENANCE

The Program Chemist is designated as the procedure owner and is responsible for updating this procedure. Final approval authority rests with the Project Manager.

4.0 RESPONSIBILITIES

The following personnel (or their qualified designee) will be directly involved with the sampling procedures discussed herein.

Program Chemist - The Program Chemist is responsible for updating this procedure as necessary. In addition, the Program Chemist will coordinate with the Radiation Task Manager (RTM) to ensure that samples are collected in conjunction with this procedure.

Radiation Task Manager – The RTM is responsible for ensuring that the conditions of this procedure are complied with during project sampling operations. The RTM shall ensure, by periodic personal observation, that samples are collected appropriately and chain-of-custody (COC) is controlled as described in this procedure. The RTM will also ensure that Radiological Control Technicians (RCTs) are qualified by training and experience to perform the requirements of this procedure and ensure that personnel under their cognizance observe proper precautions. The RTM will make a copy of this procedure available to the RCTs.

Radiation Safety Officer – The Radiation Safety Officer (RSO) is responsible for training personnel working with radioactive material. The RSO is responsible for the overall implementation and compliance with this procedure during all project operations. The RSO shall conduct periodic reviews, via personal observation of conducting radiation and contamination surveys, to ensure adherence to the requirements of this procedure.

Radiological Task Supervisor – The Radiological Task Supervisor (RTS) shall be responsible for assisting in the assignment of personnel that will perform the tasks required by this procedure. The RTS is responsible for the control of radioactive material samples, supervision of RCT's performing the requirements of this procedure, and to ensure that personnel under their cognizance observe proper precautions.

Radiological Control Technician – The Radiological Control Technician (RCT) shall be responsible for the performance of the requirements of this procedure and documentation of work performed. The RCT shall ensure compliance with this and any other referenced procedure.

5.0 DEFINITIONS AND ABBREVIATIONS

Swipe Samples – Swipe samples are materials, which after being wiped over a surface, are analyzed to determine the presence of removable radioactivity on the surface area that was wiped.

Soil Samples – Soil samples are defined as soil collected for analytical purposes. Soil samples will be collected from the top 15 centimeters (cm) of the surface, unless otherwise noted in the applicable work-planning document [e.g. a Task-specific Plan (TSP), Work Instruction or Work Plan].

Sediment Samples – Sediment samples are defined as a collection of clay, silt, sand, and/or gravel deposited by water, wind, or glaciers used for analytical purposes.

Solid Material Samples – Solid material samples are defined as pieces of concrete, brick, porcelain, wood, or any other hard material collected for analytical purposes from buildings or surrounding areas. The samples could include accumulations from ventilation systems or drain systems.

Liquid Samples – Liquid samples are defined as liquid collected for analytical purposes from sinks, drain piping, sewer systems, rinsate, groundwater, leachate, liquid investigation-derived waste, and low-point accumulation areas inside of buildings, sumps, and excavation pits.

6.0 SAMPLING PROCEDURE DETAILS

6.1 GENERAL PROCEDURES

Field instruments used for measurements required by this procedure shall be checked with standards and verified to have current calibration.

Anytime this procedure is in effect, the RTM (or qualified designee) should ensure, by periodic personal observation, that samples are appropriately collected and controlled.

Surface scan surveys are to be performed at each location before initiating sampling. This will identify the presence of gross contamination, which will require that samples and equipment be treated as radioactive and handled in accordance with applicable license requirements. Samples will be recorded on COC documentation.

6.2 SAMPLING PROCEDURE PROCESS

Sample activities will be recorded in the field logbook as directed by the Base-wide Sampling and Analysis Plan (SAP). Sampling personnel will don a new pair of disposable nitrile gloves immediately before collecting samples at each location.

6.2.1 SWIPE SAMPLING

Swipe samples will be obtained in accordance with HPO-Tt-006, *Radiation and Contamination Surveys*. Swipe samples will be documented in the sample logbook as applicable. Sample COC records shall be completed in accordance with the Base-wide SAP.

6.2.2 SOIL SAMPLING

Because standard surface soil contamination criteria for radionuclides are applicable to the average concentration in the upper 15 cm of soil, the sampling protocol described here is based on obtaining a sample of this upper 15 cm. Special situations, such as sampling at depths greater than 15 cm, evaluating trends or airborne deposition, determining near-surface contamination profiles, and measuring non-radiological contaminants, may require special sampling procedures. These special situations will be evaluated and incorporated into TSPs as the need arises.

Samples will be collected with a hand-auger, hollow-stem auger, split-spoon sampler, disposable scoop, or equivalent. The soil removed for sampling must be sufficient to yield a sample of sufficient volume for the sample container being used. Soil samples will be collected and handled as follows:

1. Loosen the soil at the selected sampling location to a depth of approximately 15 cm, using a trowel or other digging instrument.
2. Remove large rocks, vegetation and foreign objects. In some cases, however, these objects may be the source of the contamination and may be collected as separate samples for characterization.
3. Place as much soil as practical into a 250-milliliter (mL)-wide mouth plastic bottle or plastic 500-mL Marinelli container.

4. If sample containers are not readily available, samples may be collected in a plastic bag for subsequent transport to the laboratory for sample preparation.
5. Tape the cap of the container in place or seal the ziplock plastic bag.
6. Label the sample container in accordance with the Base-wide SAP.
7. Document all samples collected in the sample logbook as applicable. Sample COC records shall be completed in accordance with the Base-wide SAP.
8. Transport samples to the on-site laboratory for analysis as soon as possible after sample collection. Sample packaging and shipment procedures for transporting samples to an off-site laboratory are described in Section 6.3 of this procedure.
9. Clean or decontaminated tools will be used at each sampling location. Sampling tools will be decontaminated as described in the Base-wide SAP.

6.2.3 Sediment Sampling

Several methods are available to collect sediment samples. The tools used will be appropriate to the circumstances and may include use of trowels, augers, or other hand tools. Sediment sampling will be conducted as follows:

1. A hand-auger, trowel or similar device will be used to access each sampling location. The sample collection tool will be selected based on physical limitations accessing the sample location.
2. Place as much material as practical into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4 Solid Material Sampling

Several methods are available to collect solid material samples. To collect samples, solid materials may need to be broken into smaller pieces. Solid materials will be collected as follows:

1. Break up the material into small enough pieces to fill a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
2. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4.1 Pipe and Drain Line Sampling

Pipe and drain line sampling is conducted to assess residual radioactivity that may be inside of drain lines or materials within sanitary sewer and storm drain systems.

1. Since the type of material found inside drain lines varies, there is no specific method identified to collect these samples. Samples may be collected using a plumber's snake, swabs, scraper, trowel, etc.
2. As much material as possible should be collected and placed into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container
3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.4.2 Ventilation Sampling

Ventilation sampling will be performed to identify if the system is impacted and assess the residual radioactivity that may be present.

1. If visible dust is present inside the ventilation system, use a masslin cloth to accumulate the material into a pile. (If no visible dust is present, collect a swipe sample as discussed in HPO-Tt-006, *Radiation and Contamination Surveys*.)
2. Using a flat utensil such as a piece of paper or scraper carefully place as much material as possible into a 250-mL-wide mouth plastic bottle or plastic 500-mL Marinelli container.
3. Follow steps 4 through 9 of Section 6.2.2 to complete sample collection.

6.2.5 WATER SAMPLING

Water samples will be collected as follows:

1. Collect water using any of the following sampling equipment: disposable bailer, pump, coliwassa-type tube sampler, or equivalent. Care will be taken to avoid collection of bottom sediment or vegetation.
2. Fill completely a 250-mL-wide mouth plastic bottle, plastic 500-mL Marinelli container or two liter plastic bottles.
3. Follow steps 5 through 9 of Section 6.2.2 to complete sample collection.

6.3 SAMPLE PACKAGING AND TRANSPORT

Samples will be delivered for analysis to an on-site laboratory via a box, cooler, or similar container (ice is not required if only radiological analysis will be performed) along with the completed COC. Upon arrival at the on-site laboratory, the sampler will sign the "Relinquished By" on the COC, and the laboratory manager will sign the "Received By" on the COC. The white copy of the COC will be submitted with the final analytical report of data from the on-site laboratory to the TtFW project chemist, the pink and yellow copies will be maintained by the on-site laboratory for their project files, and the manila

copy will be submitted to the TtFW project chemist. A duplicate of the manila copy may also be kept in the TtFW project file on site.

Ten percent of the solid or liquid samples analyzed by the on-site laboratory will be sent to an off-site laboratory for quality assurance purposes. Additional samples may be sent for off-site analysis, as described in applicable work planning documents. A new COC will be generated by the laboratory manager for samples designated for off-site laboratory analysis. Samples designated for transport off site will be packaged in accordance with applicable Department of Transportation (DOT) and International Air Transport Association (IATA) procedures. At a minimum, sample containers will be placed in a box, cooler, or similar container for shipment and packaged with bubble wrap or other materials as necessary to prevent container breakage.

For samples transported by an off-site laboratory courier, two custody seals will be taped across the lid of the box or cooler: one seal in the front and one seal in the back. The appropriate section(s) of the COC will be completed by the assigned courier. The box/cooler and the top two copies (white and pink) of the COC will then be released to the courier for transportation to the laboratory.

For samples shipped via a commercial carrier, the COC will include the airbill number, and the "Received By" box will be labeled with the commercial courier's name. The top two copies (white and pink) of the COC will be sealed in a resealable bag and then taped to the inside of the sample cooler lid or placed inside the box. The yellow copy of the COC will be maintained by the on-site laboratory and the manila copy will be submitted to the TtFW project chemist. A duplicate of the manila copy may also be kept in the TtFW project file on site. The box/cooler will be taped shut with strapping tape as necessary. Two custody seals will be taped across the lid: one seal in the front and one seal in the back. The pouch for the airbill will be placed on the box/cooler and secured with clear tape. The airbill will be completed for priority overnight delivery and placed in the pouch. If multiple boxes/coolers are being shipped, then the original airbill will be placed on the box/cooler with the COC, and copies of the airbill will be placed on the other boxes/coolers. The number of packages should be included on each airbill (1 of 2, 2 of 2). Saturday deliveries should be coordinated in advance with the designated off-site laboratory and placement of "Saturday Delivery" stickers on each box and/or cooler to be shipped should be confirmed with the commercial courier prior to release. Prepared packages will also be surveyed prior to shipment.

7.0 RECORDS

Sample collection records will include field logbooks and COCs. These records will be completed and maintained in accordance with the Base-wide SAP.

8.0 REFERENCES

Number	*Title*
DCN: FWSD-RAC-05-0165	*Final Base-wide Radiological Sampling and Analysis Plan, Revision 0, February 16, 2005*
HPO-Tt-006	*Radiation and Contamination Surveys*

9.0 ATTACHMENTS

None.

APPENDIX B

PROJECT CONTRACTOR QUALITY CONTROL PLAN ADDENDUM

BASE REALIGNMENT AND CLOSURE
PROGRAM MANAGEMENT OFFICE WEST
1455 FRAZEE ROAD, SUITE 900
SAN DIEGO, CALIFORNIA 92108-4310

CONTRACT NO. N68711-98-D-5713
CTO NO. 0084

APPENDIX B

FINAL

PROJECT CONTRACTOR QUALITY CONTROL PLAN ADDENDUM

Revision 0
November 10, 2005

PCB HOT SPOT SOIL EXCAVATION SITE
PARCELS E AND E-2, HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: FWSD-RAC-05-1442

Prepared by:

TETRA TECH EC, INC.
1230 Columbia Street, Suite 500
San Diego, CA 92101

Mary Schneider
QC Program Manager

TABLE OF CONTENTS

PAGE

LIST OF TABLES ..... B.iii

LIST OF FIGURES ..... B.iii

ABBREVIATIONS AND ACRONYMS ..... B.iv

1.0 INTRODUCTION B.1-1
- 1.1 PURPOSE B.1-1
- 1.2 SCOPE B.1-2

2.0 ORGANIZATION AND RESPONSIBILITIES B.2-1
- 2.1 INTRODUCTION B.2-1
- 2.2 ORGANIZATION B.2-1
  - 2.2.1 PCB Hot Spot Project Manager B.2-1
  - 2.2.2 Certified Industrial Hygienist B.2-2
  - 2.2.3 Quality Control Program Manager B.2-2
  - 2.2.4 Construction Manager B.2-3
  - 2.2.5 Project Quality Control Manager B.2-3
  - 2.2.6 Certified Health Physicist B.2-4
  - 2.2.7 Radiation Safety Officer B.2-5
  - 2.2.8 Site Health and Safety Specialist B.2-6
  - 2.2.9 Radiological Task Managers B.2-7
  - 2.2.10 Program Chemist B.2-8
  - 2.2.11 Radiological Task Supervisors B.2-8
  - 2.2.12 Radiological On-site Laboratory Supervisors B.2-9
  - 2.2.13 Radiological Control Technicians B.2-9
  - 2.2.14 Radiological Support Personnel B.2-10
  - 2.2.15 Remedial Project Manager B.2-10
  - 2.2.16 Radiological Site Manager B.2-10
  - 2.2.17 Quality Assurance Officer B.2-11
  - 2.2.18 Resident Officer in Charge of Construction B.2-11

3.0 DEFINABLE FEATURES OF WORK B.3-1

4.0 QUALITY CONTROL MEETINGS B.4-1
- 4.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING B.4-1
- 4.2 QC MEETINGS B.4-1

5.0 INSPECTION PROCESS B.5-1
- 5.1 PREPARATORY PHASE INSPECTION B.5-1
- 5.2 INITIAL PHASE INSPECTION B.5-2
- 5.3 FOLLOW-UP PHASE INSPECTION B.5-2

TABLE OF CONTENTS
(Continued)

PAGE

5.4 ADDITIONAL PREPARATORY AND INITIAL PHASES B.5-2
5.5 COMPLETION INSPECTION B.5-3
5.5.1 Pre-final Inspection B.5-3
5.5.2 Final Acceptance Inspection B.5-3
5.6 INSPECTION DOCUMENTATION B.5-3

6.0 REFERENCES B.6-1

LIST OF TABLES

Table B.3-1 Definable Features of Work

LIST OF FIGURES

Figure B.2-1 Project Organization Chart, PCB Hot Spot Excavation

ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
AM	Action Memorandum
bgs	below ground surface
BRAC	Base Realignment and Closure
Cal-OSHA	California Occupational Health and Safety Administration
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
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
DOT	Department of Transportation
EHS	Environmental Health and Safety
EM	Engineer Manual
FCR	Field Change Request
FSS	Final Status Survey
HDPE	high-density polyethylene
HPS	Hunters Point Shipyard
IR	Installation Restoration
IRP	Installation Restoration Program
LLRW	low-level radioactive waste
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MDC	minimum detectable concentration
MSDS	Material Safety Data Sheet
msl	mean sea level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NCR	Nonconformance Report

ABBREVIATIONS AND ACRONYMS
(Continued)

NFECSW	Southwest Division, Naval Facilities Engineering Command
NRC	Nuclear Regulatory Commission
NTR	Navy Technical Representative
NWB	Navy Wildlife Biologist
NWP	Nationwide Permit
NWT	New World Technology, Inc.
ORR	Operational Readiness Review
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PCB Hot Spot	PCB Hot Spot soil excavation site
PMO	Program Management Office
PPE	personal protective equipment
PQCM	Project Quality Control Manager
PVC	polyvinyl chloride
QAO	Quality Assurance Officer
QC	quality control
QCM	Quality Control Program Manager
RAC	Remedial Action Contract
RASO	Radiological Affairs Support Office
RCT	Radiological Control Technician
RSO	Radiation Safety Officer
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RTM	Radiological Task Manager
RTS	Radiological Task Supervisor
RWP	Radiation Work Permit
SAP	Sampling and Analysis Plan
SHPT	Senior Health Physicist Technician
SHSP	Site-Specific Health and Safety Plan

ABBREVIATIONS AND ACRONYMS
(Continued)

SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
SWPPP	Stormwater Pollution Prevention Plan
TCRA	time-critical removal action
TSP	Task-Specific Plan
TtEMI	Tetra Tech EM, Inc.
TtFW	Tetra Tech FW, Inc.
USA	Underground Service Alert
USACE	United States Army Corps of Engineers

1.0 INTRODUCTION

This Project Contractor Quality Control (CQC) Plan establishes the procedures and methods to be implemented for the time-critical removal action (TCRA) for the polychlorinated biphenyl (PCB) hot spot soil excavation site (PCB Hot Spot), located primarily in Parcel E-2 with a portion of the excavation in Parcel E, at Hunters Point Shipyard (HPS), San Francisco, California (Work Plan Figure 1-1). Tetra Tech FW, Inc. (TtFW) has been contracted by the Department of the Navy (DON) to perform this removal action at HPS for the Base Realignment and Closure Program Management Office (BRAC PMO) West under Southwest Division, Naval Facilities Engineering Command (NFECSW) Remedial Action Contract (RAC) No. N68711-98-D-5713. This Project CQC Plan fulfills the requirements with the TtFW quality control (QC) system requirements.

This site-specific Project CQC Plan for Contract Task Order (CTO) No. 0084 is an addendum to the *Contractor Quality Control Program Plan* (TtFW, 2004a).

1.1 PURPOSE

The purpose of this Project CQC Plan is to establish the specific procedures and methods for field inspections of the construction activities that are proposed for the PCB Hot Spot.

Upon review of the site's operational history and the results gathered during the sediment and soil data gaps investigation [Tetra Tech EM, Inc. (TtEMI), 2003], the DON has determined that this site contains PCBs, petroleum hydrocarbons, and low-level radioactive contamination in soils and debris requiring a response action. This decision is documented in the *Final Base-wide Radiological Removal Action Memorandum* (AM) *for Hunters Point Shipyard* (DON, 2001) and the *Draft Action Memorandum, Time-Critical Removal Action for the PCB Hot Spots at Parcels E and E-2* (DON, 2005). The DON has initiated this TCRA for the extraction of impacted soil and debris from the PCB Hot Spot to eliminate the potential threat posed by future migration and/or off-site release of PCBs, petroleum hydrocarbons, and any low-level radioactive contaminants that may be present.

The PCB Hot Spot is located partially in Installation Restoration (IR)-01/21 and IR-02, in Parcels E and E-2 at HPS, along the upland shoreline in the southwestern portion of HPS. The PCB Hot Spot covers approximately 3.5 acres and is found in an open space area, south of the IR-01/21 landfill. The general area was used for industrial waste disposal purposes, including disposal of radiological devices. The site's topography is relatively flat with surface elevations of generally less than 10 feet above mean sea level (msl). Groundwater is located at approximately zero to 2 feet above msl [8 to 11 feet below ground surface (bgs)], with a gradient generally to the west toward the Bay.

The nature and extent of chemical and radiological contamination at the PCB Hot Spot was evaluated under the DON's Installation Restoration Program (IRP) and included completion of standard and non-standard data gaps investigations for Parcel E. These investigations concluded that chemical and radiological contamination was present within the PCB Hot Spot. The TCRA focuses on removal of PCB and petroleum hydrocarbon-contaminated soil and radioactive point sources.

The planned removal action for the contaminated soils within the PCB Hot Spot incorporates a series of preliminary surveys, removal of radioactive material, pre-excavation characterization sampling, protection or removal of existing site utilities and structures, excavation of contaminated soil and radioactive materials, secondary screening of excavated soils, post-excavation sampling, backfilling of the excavated areas, site restoration, and waste management. These activities will be performed in accordance with the Work Plan. The off-site transportation and disposal of the soil will be conducted by a separate DON contractor. The Project CQC Plan provides an effective QC system to ensure the quality of all work performed by TtFW and its subcontractor personnel.

1.2 SCOPE

This Project CQC 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 the Project Work Plan.

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

- Permitting and notifications
- Preparatory activities and meetings
- Environmental resources surveying
- Clearing of vegetation
- Geophysical surveying
- Land surveying
- Radiological surface screening
- Identification and removal of radioactive material
- Pre-excavation characterization sampling
- Existing groundwater monitoring wells and piezometers destruction (if necessary)
- PCB and/or petroleum hydrocarbon-contaminated soil excavation and removal of additional radioactive material
- Post-excavation sampling
- Ex situ screening of excavated soil

- Backfill placement
- Site restoration
- Free-release surveillance and decontamination for equipment, tools, and storage areas
- Waste classification, storage, and disposal

2.0 ORGANIZATION AND RESPONSIBILITIES

2.1 INTRODUCTION

This section describes management of the project including organizational, structural, and functional responsibilities; the use of Radiation Work Permits (RWPs); prerequisite requirements of survey activities; and client notifications.

2.2 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 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 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 PCB Hot Spot Project Manager, Certified Industrial Hygienist (CIH), Quality Control Program Manager (QCM), Construction Manager, Project Quality Control Manager (PQCM), Certified Health Physicist (CHP), Radiation Safety Officer (RSO), Site Health and Safety Specialist (SHSS), Radiological Task Manager (RTM) and Supervisors, Radiological On-site Laboratory Supervisors, 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 Radiological Affairs Support Office (RASO), BRAC PMO West, and NFECSW personnel.

2.2.1 PCB Hot Spot Project Manager

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

- Coordinating work activities of subcontractors and TtFW 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-Specific 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 TtFW 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

2.2.2 Certified Industrial Hygienist

The CIH has authority to implement and oversee the TtFW Health and Safety Program. 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 PCB Hot Spot Project Manager 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, PCB Hot Spot Project Manager, and Construction Manager
- Reviewing all site health and safety documents and cost estimates, and working to properly staff projects
- Working to pre-qualify field subcontractors

2.2.3 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 PCB Hot Spot Project Manager and NFECSW 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 NFECSW 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

2.2.4 Construction Manager

The Construction Manager will report to the PCB Hot Spot Project Manager and is responsible for coordinating, directing, implementing, and supervising site construction and support activities. The Construction Manager 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 worksite, facilities, vehicles, and equipment
- Ensuring that all work activities in the field are conducted in a safe manner 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

2.2.5 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 the 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 an NCR and FCR log
- Ensuring that planning documents are current and controlled
- Maintaining the Submittal Register and a Submittal Log
- Stopping work that is not in compliance with the contract

2.2.6 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
- 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 Standard Operating Procedure (SOP), prior to approval
- Approving records with verifiable signature and date once records meet the quality standards as described in the Radiological Records SOP
- Conducting radiation incident investigations

- Conducting radiological project inspections
- Conducting data assessment

2.2.7 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 TtFW staff
- Conducting search, investigating, and then documenting dosimeters that are reported lost or damaged for TtFW 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 TtFW 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)
- Ensuring 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 SOPs

2.2.8 Site Health and Safety Specialist

The SHSS ensures that all elements of the approved SHSPs 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:

- Ensuring that all personnel understand the requirements of TtFW's Environmental Health and Safety (EHS) program and procedures through training and communication
- Ensuring enforcement of SHSPs 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 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 *Base-wide Health and Safety Plan* (TtFW, 2004b) and SHSP are 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 Construction Manager and PCB Hot Spot Project Manager
- Ensuring maintenance of all health and safety monitoring and personal protective equipment (PPE) and directing site monitoring activities
- Coordinating daily field activities with the Construction Manager
- 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 Construction Manager 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

2.2.9 Radiological Task Managers

The RTMs will plan, direct, and coordinate radiological activities ensuring that requirements, goals, and objectives of the project are accomplished. The RTMs have the responsibility and authority to perform the following:

- Reviewing project plans to determine scheduling and procedures for accomplishing project objectives
- Ensuring that the RTM or a similarly qualified designee will be on site during radiological activities
- Distributing and collecting dosimetry devices
- Performing dosimetry program reviews
- Determining accumulated external dose of workers, documenting dose in NRC Form 4 and providing a copy to each worker
- Writing Task-specific Plans (TSPs) and, in conjunction with TtFW, work directly with the RPM and RASO to ensure that each TSP is finalized and accepted
- Determining requirements for work assignments including personnel monitoring devices
- Determining and providing for radiological staffing for each phase of the project and arranging for assignment of project personnel
- Conferring with project staff to outline Work Plan and to assign duties, responsibilities, and scope of authority
- Attending required meetings, including the pre-construction conference, weekly QC meetings, pre- and post-construction site inspections, and other scheduled and unscheduled meetings

- Reviewing reports prepared by project personnel and modifying schedules or plans as required
- Preparing project reports
- Conferring with project personnel to provide technical advice and to resolve problems
- Coordinating project activities with the activities of regulatory or other governmental agencies, as directed by the PCB Hot Spot Project Manager
- Notifying the PCB Hot Spot Project Manager, 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

2.2.10 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 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

2.2.11 Radiological Task Supervisors

Radiological Task Supervisors (RTSs) will direct field survey personnel and health physics operations as assigned by the RTMs. The RTS 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 for safety program, survey, and/or remediation actions

- Ensuring compliance with NRC, Occupational Safety and Health Administration, and U.S. Environmental Protection Agency 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
- Compiling, writing, and ensuring compliance with the TSPs
- Informing the RTM of work progress
- Ensuring that each individual working at an impacted area complies with the requirements specified in the RWP

2.2.12 Radiological On-site Laboratory Supervisors

The Radiological On-site Laboratory Supervisors will maintain oversight of the on-site laboratory program. The Radiological On-site Laboratory Supervisor has the responsibility and authority to perform the following:

- Maintaining laboratory equipment
- Running calibration checks and maintaining calibration data
- Maintaining chain-of-custody of on-site samples while in their possession; ensuring correct shipment of off-site confirmation samples
- Verifying on-site laboratory results with those obtained from the off-site laboratory
- Communicating analytical needs and capabilities
- Implementing the SOPs and laboratory quality assurance manual
- Providing training to staff regarding laboratory quality assurance policies
- Making recommendations for corrections and improvements as necessary
- Establishing and maintaining statistical limits for QC measurements

2.2.13 Radiological Control Technicians

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

- Conducting and documenting field surveys, sampling, and laboratory 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 and laboratory 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 RTS

2.2.14 Radiological Support Personnel

Radiological support personnel are equipment operators and laborers performing field activities in support of survey activities under the direction of the Construction Manager. The equipment operators will maintain and operate heavy equipment. The laborers will support various field activities directed by the Construction Manager or his designee.

2.2.15 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 TtFW project team, as needed
- Integrating Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) issues at HPS 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

2.2.16 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 CQC 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 on-site laboratory analytical data
- Reviewing and approving project reports
- Ensuring compliance with applicable *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM) [Department of Defense (DoD) et al., 2000; NUREG-1575] requirements
- Recommending changes in TtFW scope to the RPM, as appropriate
- Supporting public meetings

2.2.17 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 CQC Plan. The QAO's duties and authority include:

- Reviewing and approving SAPs
- Providing DON oversight of the TtFW Quality Assurance Program
- Providing quality-related directives through Contracting Officer Representative
- Providing technical and administrative oversight of TtFW 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

2.2.18 Resident Officer in Charge of Construction

The ROICC staff have the primary responsibility for providing on-site quality assurance and safety oversight of contractors performing work at HPS. 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 that is not in compliance
- Interacting with the contractor's 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

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

4.0 QUALITY CONTROL MEETINGS

4.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to start of site work, the PCB Hot Spot Project Manager will conduct a pre-construction kickoff meeting with the RPM, ROICC/Navy Technical Representative (NTR), and Caretaker Site Office (CSO) to discuss the QC program required by this contract. 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 TtFW personnel required to attend the meeting shall include the PCB Hot Spot Project Manager, Construction Manager, PQCM, and RSO. Minutes of the meeting shall be prepared by the PQCM and signed by the PCB Hot Spot Project Manager and the RPM and/or ROICC/NTR or designated representative. This meeting may be held as part of a normally scheduled CQC meeting for CTO 0084.

4.2 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, the CSO, PCB Hot Spot Project Manager, PQCM, RSO, SHSS, and the Construction Manager. 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 Project CQC Plan.

5.0 INSPECTION PROCESS

5.1 PREPARATORY PHASE INSPECTION

The PQCM will conduct preparatory phase inspections prior to starting the DFWs listed in Table B.3-1. These inspections shall include the following:

- Review of the Project Work Plan and drawings
- 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
- An examination of the work area to ensure that all required preliminary work has been completed and is in compliance with the approved Project Work Plan requirements
- A physical examination of 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
- A review of the appropriate Activity Hazard Analysis (AHA) to ensure that safety requirements are met
- A discussion of procedures for constructing the work, including potential repetitive deficiencies
- Documentation of construction tolerance and workmanship standards for the particular phase of work
- Ensuring that the Project CQC Plan for the work to be performed has been accepted by the DON

The PCB Hot Spot Project Manager, 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 Construction Manager and any other personnel involved in performing the DFW.

The issues discussed during the preparatory phase meetings will be documented on the Preparatory Inspection Checklist. The PQCM will direct personnel performing work activities as to the acceptable level of workmanship required.

5.2 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 Site-Specific Health and Safety Plan (SHSP) and AHA
- A review of the AHA with project personnel

The PCB Hot Spot Project Manager, 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 Inspection Checklist and attach it to the Daily CQC Report. 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.

5.3 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 Inspection Checklist, which will be attached to 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.

5.4 ADDITIONAL PREPARATORY AND INITIAL PHASES

The PQCM may conduct additional preparatory and initial inspections on the same DFWs under the following circumstances:

1) If the quality of ongoing work is unacceptable as determined by the PQCM, PCB Hot Spot Project Manager, RPM, ROICC/NTR, or CSO
2) If there are substantial changes in the staff, on-site supervision, or work crew
3) If work on a DFW is resumed after a substantial period of inactivity
4) If other problems develop

5.5 COMPLETION INSPECTION

Completion inspections will be performed as summarized in this section.

5.5.1 Pre-final Inspection

The PCB Hot Spot Project Manager will conduct the pre-final inspection. The RPM, ROICC/NTR, CSO, PQCM, and other primary management representative(s), as applicable, will attend. The PCB Hot Spot Project Manager 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 TtFW.

5.5.2 Final Acceptance Inspection

The PCB Hot Spot Project Manager 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.

5.6 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.

6.0 REFERENCES

Department of Defense (DoD), Department of Energy, NRC, and U.S. Environmental Protection Agency (EPA). 2000. *Multi-Agency Radiation Survey and Site Investigation Manual* (MARSSIM), NUREG-1575, Revision 1. August.

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TtFW. 2004b. *Final Base-wide Health and Safety Plan.* Hunters Point Shipyard, San Francisco, California. April 23.

United States Army Corps of Engineers (USACE). 2003. *Safety – Safety and Health Requirements.* EM 385-1-1. November 3.

TABLES

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Environmental resources survey	• Review survey areas per Work Plan Section 7.3. • Verify that RPM and NWB have been notified about environmental survey. • Verify that ROICC and CSO have been notified. • Review AHAs. • Verify that a project kickoff meeting was held. • Verify that project kickoff meeting minutes were prepared, reviewed, and distributed. • Verify qualifications of the TtFW Wildlife Biologist. • Verify that the biological resource requirements have been met. • Inspect record for radiation general awareness training for all workers. • Verify that USACE ecologist has been informed. • Verify the issuance of NWP 38 permit. • Verify training of NWP 38 requirements. • Verify that all personnel have signed the RWP.		• Inspect documentation of environmental survey. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that site activities are being photographed.		• Verify that environmental resource survey is conducted in all areas where field activities will take place and adjacent areas. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that radiological survey is being conducted in accordance with the Work Plan. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Clearing of vegetation	• Verify that the RPM and CSO have been notified. • Verify that the Vegetation Sampling TSP has been approved. • Verify that management of cleared vegetation protocol is established based on the results of vegetation survey. • Review AHAs. • Verify that PPE is available and meets requirements of the SHSP.		• Verify that a qualified RCT and SHSS are present at active work areas. • Verify that vegetation is removed throughout the excavation area. • Verify that waste vegetation is being managed as required. • Verify that the activity is photographed.		• Continue to inspect ongoing activities. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that the vegetation stockpile is maintained per the requirements. • Verify that the vegetation is manifested and disposed of and that the stockpile location is cleaned up.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• Verify that area has been walked/visually inspected for items that could interfere with clearing (utilities, rebar, etc.) • Verify that radiation awareness training has been completed and that training is documented. • Verify that traffic schedule has been approved by CSO and ROICC.		• Verify that the traffic schedule has been approved by CSO and ROICC.		• Verify that the traffic schedule has been approved by CSO and ROICC. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Geophysical surveying	• Verify that the RPM and CSO have been notified. • Verify that survey instrument certification is current and in good condition. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Review control points. • Review AHAs. • Review the Work Plan and drawings for this activity. • Review boundaries and extent of survey. • 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 qualified RCT and SHSS are present at active work areas. • Verify that surveyor has correct control point information. • Verify that the geophysical survey is performed over areas of known or suspected areas of subsurface utilities. • Verify boundaries and extent of survey. • Verify that site activities are being photographed.		• Verify that a qualified RCT and SHSS are present at active work areas. • Verify that utility locations are marked in the field and identified to the equipment operators. • Verify that boundaries of survey have been met. • 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
Topographical Survey	• Verify that the RPM and CSO have been notified. • Verify that survey instrument certification is current and in good condition. • Verify that sensitive locations at the site are delineated and work crews are aware of restricted areas. • Review control points. • Review AHAs. • Review the Work Plan and drawings for this activity. • Review boundaries and extent of survey. • 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 qualified RCT and SHSS are present at active work areas. • Verify that surveyor understand the work scope, and coordinate system to be used. • Verify the measurement of grid system. • Verify that site activities are being photographed.		• Verify that a qualified RCT and SHSS are present at active work areas. • Verify that the pre-excavation topographical map is complete and correct. • Verify that the survey includes limits of excavation and identifiable features. • Verify that boundaries of survey have been met. • Verify that nodes of each grid system is marked. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Pad construction	• Verify that the ROICC, RPM and CSO have been notified. • Review site layout figures showing pad placement. • Verify that initial radiological surface survey has been performed. • Review AHA(s).		• Verify that rocks, debris and other items that could puncture the liner have been cleared. • Verify that two 20-mil layers of HDPE or PVC liner are used. • Verify that a 6-inch layer of coarse sand has been placed over the first layer of 20-mil liner and sloped such that all runoff is conveyed to a sump. • Verify that the second layer of 20-mil liner has been placed over the sand. • Verify that site activities are being photographed.		• Verify that the pad has been constructed properly, is free of leaks, and is bermed properly. • Conduct ongoing inspection of material and equipment. • 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
Radiological 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 records documentation are being maintained. • Verify that personnel have been given an emergency notification procedure. • Verify that workers assigned dosimetry have completed NRC Form 4. • 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 traffic schedule has been approved by CSO.		• Verify that radiological instruments are as specified in the Work Plan. • Verify that a qualified RCT and SHSS are present at active work areas. • Verify that site activities are being photographed. • Verify that the reference area measurements have been obtained using the procedure described in the Work Plan. • Verify that daily checks were performed on all portable survey instruments. • Verify that required dosimetry is being worn. • Verify that RWP is available at worksite. • Verify that field logbooks and proper forms are in use. • Verify that measurements are being collected in accordance with the Work Plan, SAP, and relevant SOPs. • Verify that limits and boundaries of survey are being met. • Verify that traffic schedule has been approved by CSO.		• Verify that 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 any suspected material location is marked, flagged and documented. • Verify that daily instrument checks and background measurements were obtained and documented. • Verify that survey results are documented. • Verify that RWP is available at worksite. • Verify that personnel have read and signed the revised RWP, if revision is required. • Verify that survey data and sample analysis results are reviewed as required by the SOPs. • Verify that survey activities conform to the Work Plan and SOPs. • Verify that the boundaries of the survey have been met.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
					• Verify that survey instrument is recalibrated after repairs or modifications. • Verify that traffic schedule has been approved by CSO. • Verify that personnel surveys are performed for all personnel leaving a radiological controlled area. • Verify that RASO is notified of discovered radioactive material. • Verify that area known or suspected to contain radioactive material is isolated. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
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 and are calibrated and in working order. • Verify that the stockpile and staging areas are established. • Review the Work Plan. • Verify that PPE is available and meets requirements of the SHSP.		• 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 radiological impact of the material prior to any action for each material. • Verify that radiological safety instruction specific to each material has been reviewed by RCT and RTM.		• Verify that a qualified RCT and SHSS are present at active work areas. • Verify that required dosimetry is being worn. • 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.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• 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 traffic schedule has been approved by CSO. • Verify that personnel have been given an emergency notification procedure.		• Verify that the RCT is on site during removal of the source. • Verify that a surface survey is completed for the initial surface area and each subsequent 1-foot excavation. • Verify that all boxes and drums have been surveyed and surface radiation measurements are collected. • Verify that site activities are being photographed. • Verify that proper logging, recording, and photography of found point sources are being done. • Verify that traffic schedule has been approved by CSO.		• Verify that personnel surveys are performed for all personnel leaving a radiological controlled area. • Inspect radiological logbook for completeness of documentation. • Inspect contaminated material handling procedure. • Verify that removed point source has unique identification, documented in the logbook and the drum inventory sheet. • Verify that removed point source storage and management procedure is in accordance with the Work Plan. • Verify that all bags and drums are marked with a unique identification and information is recorded in the logbook. • Verify that filled drums are stored in Building 406. • Verify that liner remains in good condition. • Verify that the log of radioactive material is routinely reviewed by the CHP. • Verify that traffic schedule has been approved by CSO. • 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
Pre-excavation characterization sampling	• Verify that the RPM and CSO are notified. • Review the 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 25- by 25-foot grid is clearly surveyed. • Verify that personnel are trained in field test kits.		• Verify that a qualified RCT and SHSS are present at the worksite. • Verify that required dosimetry is being worn. • Verify that samples are collected in accordance with the SAP. • Verify that direct surface radiation measurement is performed and documented prior to sample collection at each location. • Verify that field test kits are being performed in accordance with manufacturing instruction. • Inspect sample handling procedures. • Inspect field documentation. • Verify that site activities are being photographed.		• Verify that samples are collected in accordance with the SAP. • Verify that a qualified RCT and SHSS are present at the worksite. • Verify that required dosimetry is being worn. • Verify that direct surface radiation measurement is performed and documented prior to sample collection at each location. • Verify that field test kits are being performed in accordance with manufacturing instruction. • Inspect sample handling procedures. • Inspect field documentation. • Verify that personnel survey is performed for all personnel leaving a radiological controlled area. • Verify that site activities are being photographed. • Verify that sample locations are surveyed.	
Groundwater monitoring well destruction (if necessary)	• Verify that the RPM and CSO are notified. • Review well destruction procedure. • Determine if wells will be abandoned. • Verify that submittals are complete and accepted. • Review AHAs.		• Verify that permit conditions are followed. • Verify that a qualified RCT and SHSS are present at the worksite. • Verify that required dosimetry is being worn.		• Continue to verify well destruction activities. • Verify that a qualified RCT and SHSS are present at the worksite. • Verify that required dosimetry is being worn.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• 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 decontamination after each well. • Verify that records of the volume of sealing material are kept and compared to volume of boring. • Verify well identification. • Verify waste management procedure. • Verify that well samples are collected by a SHPT. • Verify that well monument and wellhead are surveyed for radioactive contamination. • Verify screening for radioactive material in cuttings. • Verify that well depths are measured before drilling. • Verify that the wells are overdrilled at least 3 feet deeper than the well bottom. • Verify that the well sidewalls are overdrilled with an auger that is at least 4 inches larger than the well borehole. • Verify that there is no cave-in of the well prior to placing slurry in the borehole. • Verify that site activities are being photographed.		• Verify that sample of decontamination water is taken. • Verify that auger flights are surveyed and steam-cleaned prior to leaving the site. • Verify that waste and debris resulting from this activity are disposed properly. • Verify that site activities are being photographed.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Excavation	• Verify that the RPM and CSO are notified. • Verify that Cal-OSHA has been notified 5 days prior to excavation. • Verify that USA has been notified 72 hours prior to excavation. • Verify that an assignment letter for competent person is on file. • Verify that training requirements are met for all personnel. • Verify that OSHA excavation permit is on site. • Verify that OSHA excavation regulations are reviewed. • Verify that sandbags berms and/or silt fencing are installed as stated in the Work Plan. • Verify that groundwater extraction wells and piezometers are preserved per the Work Plan. • Verify that equipment and material are surveyed for radiation and survey results are documented. • Verify that final excavation configurations have been reviewed with the DON and regulators. • Verify that initial background air sampling has been conducted. • Verify that electrical lines are de-energized, if necessary. • Verify that existing utilities and structures are removed, if necessary. • Verify that proper equipment is on site to perform work. • Review the Work Plan. • Review the AHAs.		• Verify that RCT and SHSS are present in an active work area. • Verify that airborne concentrations do not exceed the established levels. • Verify that air monitoring and initial baseline sampling are being performed per SHSP. • Verify that required dosimetry is being worn. • Verify that all personnel have signed the RWP(s). • Verify that water quality data is collected. • Verify that excavation is conducted in 12-inch-thick layers. • Verify radiological surface survey prior to excavation of each 12-inch lift, to the extent practicable. • Verify that the excavation protocol, as described in the Work Plan, is being followed. • Verify that each lift is placed in a separate and distinct stockpile and that barriers are placed between the stockpiles, if required. • Verify that dust control is used as necessary. • Verify, measure, and document excavation depths at each layer or point of progress.		• Verify that a RCT is present in an active work area. • Verify that airborne concentrations do not exceed the established levels. • Verify that air samples are collected daily. • Verify that required dosimetry is being worn. • Verify that daily safety briefings discuss status of RWP(s). • Verify that RWP is available at the work location. • Verify that RWP is modified in the event of changes to the conditions. • Verify that modified RWP, was concurred by RASO and concurrence is documented. • Verify that water quality monitoring is being conducted daily. • Verify that tools, material and equipment are cleaned, wiped down, and surveyed prior to removal. • Verify that excavation is conducted in 12-inch-thick layers. • Verify, measure, and document excavation depths at each layer or point of progress. • Verify that the excavation protocol, as described in the Work Plan, is being followed.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
	• Verify that PPE is available and meets the requirements of the SHSP. • Verify that the decontamination and dewatering/screening pads are constructed. • Verify that radiation awareness training has been completed and documented. • Verify that all personnel have assigned dosimeters and completed the NRC Form 4. • Verify that the RWP is in place and that all workers have read the requirements. • Verify that the Traffic Control Plan is in place and reviewed. • Verify that traffic schedule has been approved by the CSO.		• Verify that site activities are being photographed. • Verify that permit conditions are followed. • Verify sediment control per the SWPPP. • Verify that traffic control procedures are being followed. • Verify that traffic schedule has been approved by the CSO.		• Verify that each lift is placed in a separate and distinct stockpile and that barriers are placed between the stockpiles, if required. • Verify that a competent person is conducting daily inspection of the excavation and slope stability and that inspection is documented in a logbook. • Verify that backfill and compaction are performed in accordance with the Work Plan. • Verify that landfill gases including methane are monitored. • Verify that excavated quantities and dimensions of excavation are measured and documented. • Continue to inspect ongoing work. • Verify sediment control per the SWPPP. • Verify that personnel surveys are performed for all personnel leaving a radiological controlled area. • Verify that site activities are being photographed. • Verify that photographs are logged and stored. • Verify that traffic schedule has been approved by CSO. • Verify that traffic control procedures are being followed.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Dewatering of excavated materials	• Verify that the RPM and CSO are notified. • Verify that proper equipment is on site to perform work. • Verify that the sump and storage tank is plumbed. • Verify that PPE is available and meets requirements of the SHSP. • Review the Work Plan. • Review AHAs. • Verify that radiation awareness training has been completed and that training is documented. • Verify that designated personnel have assigned dosimeters and completed NRC Form 4.		• Verify that work performed is in compliance with the Work Plan. • Verify that RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that measurements of water quantities and soil drying characteristics are documented. • Verify that site activities are being photographed.		• Continue to verify that work is completed as required. • Verify that RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that personnel surveys are performed for all personnel leaving the radiological controlled area. • Verify that site activities are being photographed. • Verify that photographs are logged and stored. • Verify that the liner is not damaged.	
Ex situ screening of excavated materials	• Verify that the RPM and CSO are notified. • Verify that proper equipment is on site to perform work. • Verify that PPE is available and meets requirements of the SHSP. • Review the Work Plan. • Review AHAs. • 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 background radiation levels are established for the conveyor system. • Verify that an initial MDC value is established per the Work Plan. • Verify that production rate is maintained. • Verify that RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that work performed is in compliance with the Work Plan. • Verify that all point sources are handled per the Work Plan.		• Continue to verify that work is completed as required. • Verify that RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that work performed is in compliance with the Work Plan. • Verify that production rate is maintained. • Verify that samples are being collected per the Work Plan. • Verify that a minimum of 10 percent of the samples are sent to an off-site laboratory.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
			• Verify that samples are being collected per the Work Plan. • Verify that site activities are being photographed.		• Verify that all point sources are handled per the Work Plan. • Verify that remaining screened soil is placed in an appropriate waste container. • Verify that personnel surveys are performed for all personnel leaving the radiological controlled area. • Verify that site activities are being photographed. • Verify that photographs are logged and stored.	
Post-excavation 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 personnel received training in using field test kits.		• Verify that 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 SAP. • Verify that field test kits are being performed in accordance with manufacturing instruction. • Verify that direct surface radiation measurement is performed and documented prior to sample collection at each location. • Inspect sample handling procedures. • Verify that 100 percent high density gamma scan of excavation bottom and sidewalls is performed. • Inspect field documentation.		• Verify that 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 SAP. • Verify that field test kits are being performed in accordance with manufacturing instruction. • Verify that direct surface radiation measurement is performed and documented prior to sample collection at each location. • Verify that one sample from each grid is sampled. • Inspect sample handling procedures. • Inspect field documentation.	

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 10 percent of samples for radiological analyses are sent to an off-site laboratory. • Verify that 100 percent high density gamma scan of excavation bottom and sidewalls is performed. • Verify that personnel surveys are performed for all personnel leaving the radiological controlled area. • Verify that site activities are being photographed. • Verify that photographs are logged and stored. • Verify that sample locations are surveyed. • Verify sample chain-of-custody form.	
Backfill placement and compaction	• Verify that the RPM and CSO are notified. • Verify that compaction equipment is available. • Review the Work Plan and verify that adequate material is available for fill. • Verify that site has been surveyed prior to backfill. • Review AHAs. • Review the Work Plan. • Verify that PPE is available and meets requirements of SHSP. • Verify that radiation awareness training has been completed and that training is documented. • Verify that designated personnel have assigned dosimeters and completed NRC Form 4.		• Verify that an 8-ounce layer of geotextile is placed over the bottom and sidewalls of the excavation prior to backfill activity. • Verify that material is placed in proper lift thickness. • Verify that compaction is verified and documented by an engineer. • Verify that site activities are being photographed. • Verify that backfill is compacted per the Work Plan.		• Verify that an 8-ounce layer of geotextile is placed over the bottom and sidewalls of the excavation prior to backfill activity. • Verify that fill has been placed to the correct elevations. • Verify that compaction is verified and documented by an engineer. • Conduct ongoing inspection of backfilling and compaction operation. • 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
Waste profiling	• Verify that testing services will be available for the testing of the waste samples. • Review the SAP, Work Plan and AHAs. • Verify that PPE is available and meets requirements of the SHSP. • Verify that there is adequate equipment and materials to decontaminate sample equipment as necessary. • Inspect 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 RCT and SHSS are present in an active work area. • Verify that required dosimetry is being worn. • Verify that samples of proposed materials have been submitted and approved. • Verify decontamination of sampling equipment. • Verify sample collection and labeling of samples. • Verify DOT labeling. • Verify that site activities are being photographed. • Verify that radiological survey of samples is being conducted in accordance with the Work Plan.		• Verify that 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 SAP. • Continue to inspect ongoing work. • Verify that site activities are being photographed. • Verify that radiological survey is being conducted in accordance with the Work Plan.	
Site restoration	• Verify that the RPM and CSO are notified. • Review AHAs. • Verify that PPE is available and meets requirements of the SHSP. • Review site restoration activities and procedure.		• Verify that site restoration procedures have concurrence from RPM and CSO, and documented. • Inspect site restoration activities. • Verify that site activities are being photographed (before/after photographs).		• Conduct ongoing inspection of site restoration activities. • Verify that site activities are being photographed. • Verify that photographs are logged and stored. • Verify that radiological survey is being conducted in accordance with the Work Plan. • Verify that construction-related damages are repaired.	

TABLE B.3-1

DEFINABLE FEATURES OF WORK

ACTIVITY	PREPARATORY	DONE	INITIAL	DONE	FOLLOW-UP	DONE
Free-release survey and decontamination of equipment	• Verify that equipment and materials are accounted for. • Review AHAs. • Review survey procedures. • Verify that PPE is available and meets requirements of the SHSP. • Inspect 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. • Review equipment decontamination procedure.		• 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 RTM, SHSS and Construction Manager inspected and approved all equipment and material prior to removing 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.	

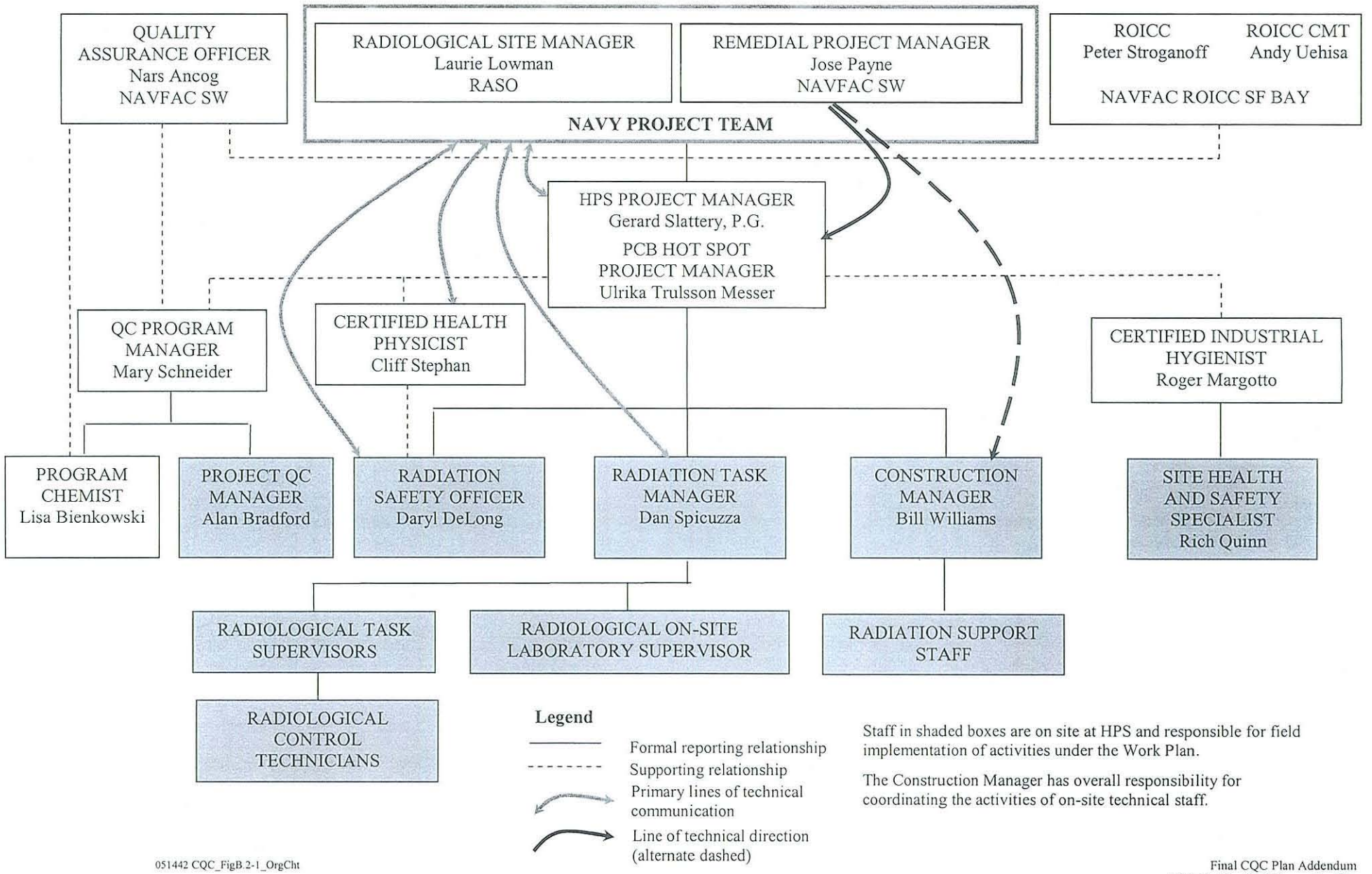
Notes:

AHA – Activity Hazard Analysis
Cal-OSHA – California Occupational Safety and Health Administration
CHP – Certified Health Physicist
CSO – Caretaker Site Office
DON – Department of the Navy
DOT – Department of Transportation
HDPE – high-density polyethylene
MDC – minimum detectable concentration
NRC – Nuclear Regulatory Commission
NWB – Navy Wildlife Biologist
NWP – Nationwide Permit
OSHA – Occupational Safety and Health Administration
PPE – personal protective equipment
PVC – polyvinyl chloride
RCT – Radiological Control Technician
ROICC – Resident Officer in Charge of Construction
RPM – Remedial Project Manager
RTM – Radiological Task Manager
RWP – Radiation Work Permit
SAP – Sampling and Analysis Plan
SHPT – Senior Health Physicist Technician
SHSP – Site-Specific Health and Safety Plan
SHSS – Site Health and Safety Specialist
SOP – Standard Operating Procedure
SWPPP – Stormwater Pollution Prevention Plan
TSP – Task-specific Plan
TtFW – Tetra Tech FW, Inc.
USA – Underground Service Alert
USACE – United States Army Corps of Engineers

FIGURES

FIGURE B.2-1

PROJECT ORGANIZATION CHART



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

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

051442 CQC_FigB.2-1_OrgCht

APPENDIX C

STORMWATER POLLUTION PREVENTION PLAN

Base Realignment and Closure
Program Management Office West
1230 Columbia Street, Suite 1100
San Diego, California 92101

CONTRACT NO. N68711-98-D-5713
CTO NO. 0084

APPENDIX C

FINAL

STORMWATER POLLUTION PREVENTION PLAN

Revision 0
November 10, 2005

PCB HOT SPOT SOIL EXCAVATION SITE
PARCELS E AND E-2, HUNTERS POINT SHIPYARD
SAN FRANCISCO, CALIFORNIA

DCN: FWSD-RAC-05-1442

Prepared by:

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TABLE OF CONTENTS

PAGE

LIST OF TABLES ..... C.iii

LIST OF FIGURES ..... C.iii

ABBREVIATIONS AND ACRONYMS ..... C.iv

1.0 INTRODUCTION C.1-1
- 1.1 PURPOSE C.1-1
- 1.2 SCOPE C.1-2

2.0 SITE DESCRIPTION C.2-1
- 2.1 SITE LOCATION C.2-1
- 2.2 CLIMATE AND PRECIPITATION C.2-1
- 2.3 EXISTING STORMWATER CONVEYANCE SYSTEM C.2-2
- 2.4 CONSTRUCTION ACTIVITIES C.2-2
- 2.5 SITE HYDROLOGY C.2-5
- 2.6 CONSTRUCTION SEQUENCE C.2-5
- 2.7 SOURCE IDENTIFICATION C.2-5
  - 2.7.1 Potential Pollutants During the Construction Phase C.2-5

3.0 BMPS TO BE IMPLEMENTED FOR CONSTRUCTION ACTIVITIES C.3-1
- 3.1 SPILL PREVENTION AND CONTROL (CA12) C.3-1
- 3.2 SOLID WASTE MANAGEMENT (CA20) C.3-1
- 3.3 HAZARDOUS WASTE MANAGEMENT (CA21) C.3-2
- 3.4 CONTAMINATED SOIL MANAGEMENT (CA22) C.3-2
- 3.5 VEHICLE AND HEAVY EQUIPMENT FUELING (CA31) C.3-2
  - 3.5.1 Diesel Fuel C.3-2
  - 3.5.2 Gasoline and Vehicle-related Lubricants C.3-2
- 3.6 VEHICLE AND EQUIPMENT MAINTENANCE (CA32) C.3-3
  - 3.6.1 Heavy Equipment C.3-3
  - 3.6.2 Site Vehicles C.3-3
- 3.7 EMPLOYEE/SUBCONTRACTOR TRAINING (CA40) C.3-3

4.0 BMPS TO BE IMPLEMENTED FOR EROSION AND SEDIMENT CONTROL C.4-1
- 4.1 CONSTRUCTION SEQUENCE / SCHEDULING (ESC1) C.4-1
- 4.2 PRESERVATION OF EXISTING VEGETATION (ESC2) C.4-1
- 4.3 SODDING OR OTHER GROUNDCOVER (ESC10) C.4-1
- 4.4 DUST CONTROLS (ESC21) C.4-1
- 4.5 SOIL STOCKPILE AREAS C.4-1
- 4.6 STABILIZED CONSTRUCTION ENTRANCE / EXIT (ESC24) C.4-2
- 4.7 TEMPORARY SWALES (ESC31) C.4-2

TABLE OF CONTENTS
(Continued)

PAGE

4.8 TRACKWALKING (ESC42) C.4-2
4.9 SILT FENCE AND SANDBAGS (ESC50 AND 52) C.4-2
4.10 STRAW BALE FILTER BARRIER (ESC51) C.4-3

5.0 NON-STORMWATER MANAGEMENT C.5-1

6.0 WASTE MANAGEMENT AND DISPOSAL C.6-1
6.1 SPILL RESPONSE C.6-1

7.0 IMPLEMENTATION OF OTHER APPROVED PLANS C.7-1

8.0 POST-CONSTRUCTION CONTROLS C.8-1

9.0 SITE INSPECTIONS AND MONITORING C.9-1

10.0 RESPONSIBLE PERSONNEL C.10-1

11.0 PERSONNEL TRAINING C.11-1

12.0 CERTIFICATION OF COMPLIANCE C.12-1

13.0 SWPPP REVIEW AND MODIFICATIONS C.13-1

14.0 REFERENCES C.14-1

ATTACHMENTS

Attachment 1 Best Management Practices

Attachment 2 Site Inspection and Monitoring Reporting Forms

LIST OF TABLES

Table C.2-1 Mean Monthly Rainfall Amounts at San Francisco, CA

LIST OF FIGURES

Figure C.1-1 Hunters Point Shipyard and PCB Hot Spot Soil Excavation Site Location Map

Figure C.2-1 Stormwater Drainage and Construction BMPs

ABBREVIATIONS AND ACRONYMS

°F	degrees Fahrenheit
bgs	below ground surface
BMP	Best Management Practice
BRAC PMO	Base Realignment and Closure Program Management Office
CA	construction activity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSO	Caretaker Site Office
cy	cubic yard
DON	Department of the Navy
DWQ	Division of Water Quality
EPP	Environmental Protection Plan
ESC	erosion and sediment control
HDPE	high-density polyethylene
HPS	Hunters Point Shipyard
IR	Installation Restoration
LLMW	low-level mixed waste
LLRW	low-level radioactive waste
mg/kg	milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFECSW	Southwest Division, Naval Facilities Engineering Command
NPDES	National Pollutant Discharge Elimination System
PCB	polychlorinated biphenyl
PCB Hot Spot	PCB Hot Spot soil excavation site
PPE	personal protective equipment
PVC	polyvinyl chloride
RAC	Remedial Action Contract
RCRA	Resource Conservation and Recovery Act
ROICC	Resident Officer in Charge of Construction
RPM	Remedial Project Manager
RRO	radiological remedial objective

ABBREVIATIONS AND ACRONYMS
(Continued)

RWQCB	Regional Water Quality Control Board
SHSP	Site-Specific Health and Safety Plan
SWM	surface water management
SWPPP	Stormwater Pollution Prevention Plan
TCRA	time-critical removal action
TPH	total petroleum hydrocarbons
TSCA	Toxic Substances Control Act
TtFW	Tetra Tech FW, Inc.
WMP	Waste Management Plan

1.0 INTRODUCTION

This Stormwater Pollution Prevention Plan (SWPPP) presents the measures that will be implemented to minimize sediment and other pollutants in stormwater discharges during construction activities for the time-critical removal action (TCRA) and radiological screening at the Polychlorinated Biphenyl (PCB) Hot Spot soil excavation site (PCB Hot Spot), located primarily in Parcel E-2, with a portion of the excavation in Parcel E, at Hunters Point Shipyard (HPS), San Francisco, California (Figure C.1-1). Tetra Tech FW, Inc. (TtFW) has been subcontracted by the Department of the Navy (DON) to perform this removal action at HPS for the Base Realignment and Closure Program Management Office (BRAC PMO) West under Southwest Division, Naval Facilities Engineering Command (NFECSW) Remedial Action Contract (RAC) No. N68711-98-D-5713. The DON is directing this removal action in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

This SWPPP has been prepared for the DON to comply with the substantive requirements of the National Pollutant Discharge Elimination System (NPDES) program, specifically the General Construction Activity Stormwater Permit program as set forth by the California Regional Water Quality Control Board (RWQCB) in August 1999, Resolution No. 99-08-Division of Water Quality (DWQ). Regulated sites, including "site grading over 1 acre," are generally required to develop a SWPPP and a Stormwater Monitoring Sampling and Reporting Program. However, because the PCB Hot Spot TCRA is an on-site response action defined by CERCLA, no federal, state, or local permits are required.

1.1 PURPOSE

The two major objectives for this SWPPP consist of: 1) helping identify the sources of sediment and other pollutants that may affect the quality of stormwater discharges, and 2) describing and ensuring the implementation of Best Management Practices (BMPs) to reduce sediment and other pollutants in stormwater discharges during construction activities. This SWPPP includes BMPs that address source reduction.

This SWPPP is to be used in conjunction with the Work Plan, which has been prepared to describe the scope of the TCRA for the PCB Hot Spot. The DON has initiated this TCRA for the extraction of soils containing PCB concentrations greater than 1 milligram per kilogram (mg/kg) in the upper 3 feet of soil or greater than 100 mg/kg below 3 feet, concentrations of total petroleum hydrocarbons (TPH) greater than 3,500 mg/kg, or any radioactive contaminants that may be present above the radiological remedial objectives (RROs). Radiological surface screening of in-place materials within the excavation boundary will be performed in 12-inch lifts.

Excavated soil will then be passed through a conveyor system for secondary radiological screening. Sources of elevated radiation will be collected, segregated, and stored in appropriate containers for proper disposal. The excavated area will be backfilled, compacted, and graded. Approximately 20,000 cubic yards (cy) of soil will be excavated at the PCB Hot Spot.

1.2 SCOPE

Elements of this SWPPP include:

- Site description (Section 2.0)
- BMPs to be implemented for construction activities (Section 3.0)
- BMPs to be implemented for erosion and sediment control (ESC) (Section 4.0)
- Non-stormwater management (Section 5.0)
- Waste management and disposal (Section 6.0)
- Implementation of other approved plans (Section 7.0)
- Post-construction controls, including a description of local post-construction ESC requirements (Section 8.0)
- Site inspections and monitoring (Section 9.0)
- Responsible personnel (Section 10.0)
- Personnel training (Section 11.0)
- Certification of compliance (Section 12.0)
- SWPPP review and modifications (Section 13.0)
- References (Section 14.0)

The BMPs presented in this document provide the measures and controls necessary to mitigate potential pollutant sources. Supporting site maps, plans, and BMP details, along with site-specific inspection and monitoring reporting forms, are provided in Attachments 1 and 2.

The climate in the project area is Mediterranean (National Oceanic and Atmospheric Administration Division CA-04: Central Coast) with moderate year-round temperatures and a winter rainy season. The SWPPP drainage system in place during construction is designed to control greater than a 2-year, 6-hour rainstorm event. The permanent site stormwater drainage controls will accommodate runoff flows from a 10-year, 24-hour rainfall event.

2.0 SITE DESCRIPTION

The following section describes the physical setting, including weather at the site, in addition to a brief discussion of construction activities and potential pollution sources.

2.1 SITE LOCATION

HPS is located on a long promontory in the southeastern part of San Francisco that extends east into San Francisco Bay. Presently, HPS encompasses approximately 848 acres, including approximately 416 acres on land. HPS was divided into six parcels, Parcels A through F. In November 2004, Parcel A was transferred to the City and County of San Francisco. In 2004, the DON subdivided Parcel E, creating Parcel E-2. The PCB Hot Spot excavation area is located primarily in Parcel E-2, with a portion of the excavation in Parcel E, along the upland shoreline in the southwestern portion of HPS. The PCB Hot Spot excavation area covers approximately 4.1 acres along the shoreline of Parcel E, south of the Installation Restoration (IR)-01/21 landfill. The site is bounded on the west by the San Francisco Bay and to the north and east by relatively flat grassland. The PCB Hot Spot and surrounding area show a very gentle slope toward the southwest.

2.2 CLIMATE AND PRECIPITATION

Since 1970, monthly average temperatures at HPS have exhibited a seasonal pattern ranging from an average low of 49 degrees Fahrenheit (°F) to an average high of 65°F.

The closest long-term precipitation gauge to HPS is located at San Francisco Airport, COOP ID 047769, 10.7 miles south of HPS. The average annual rainfall at that location had a mean of 20.12 inches per year (Table C.2-1). Most of this precipitation occurs during the months of November through March, while summers are relatively dry.

TABLE C.2-1

MEAN MONTHLY RAINFALL AMOUNTS
SAN FRANCISCO, CA
(inches)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
4.5	3.6	2.88	1.31	0.39	0.12	0.02	0.05	0.19	0.96	2.46	3.64

Annual Mean = 20.12 inches
Source: The Weather Channel. 2005 (www.weather.com)

2.3 EXISTING STORMWATER CONVEYANCE SYSTEM

Currently no stormwater drainage system or drainage control features are identified at the site. The existing stormwater conveyance consists of surface sheet-flow drainage from the east to the southwest. The coastal embankment is protected by riprap.

2.4 CONSTRUCTION ACTIVITIES

The following is a general description of the construction activities and the stormwater management control system to be implemented.

Prior to beginning the excavation of PCB-contaminated soil, a sandbag berm, two bags high, will be installed along the entire perimeter of the PCB Hot Spot site to prevent any stormwater on the contaminated portion of the site from leaving the site, as well as to prevent stormwater run-on from areas outside of the site (Figure C.2-1). A 300-foot section of sandbag berm along the western side and a 150-foot section along the southwestern side will be wrapped with a 10-mil liner to prevent stormwater runoff from leaving the site.

To protect the area along the shoreline, silt fencing may be used. Work will only be conducted in the immediate area when dry weather is forecasted. If needed, sandbags will be placed in drainage control swales and at drainage control discharge points or areas with high probability of erosion. When work is to be conducted on or near the slope and wet weather is forecasted, the area being worked on will be tarped to prevent potential contamination of stormwater.

Mobilization activities will include site preparation, moving equipment and materials to the site, establishing a laydown area, installing security fencing and stormwater runoff controls, and protection or proper abandonment groundwater monitoring wells and piezometers within the excavation footprint. Vegetation in the PCB Hot Spot will be cleared and grubbed. A pre-excavation topographical survey will be conducted after the vegetation is cleared to establish a grid system at the site. A geophysical survey will be performed over the entire footprint of the excavation site prior to performing intrusive work to identify any existing subsurface utilities. Prior to mobilizing the excavation equipment, a radiological surface survey will be conducted within the fenced area of the excavation site. Radioactive materials located during the surface survey within the excavation areas will be removed. Pre-excavation characterization activities will further delineate the lateral boundary of the excavation site. The proposed excavation boundary for the PCB Hot Spot will encompass an area of approximately 4.1 acres. Soil samples (via hand-augering) at zero to 6 inches and at 30 to 36 inches below ground surface (bgs) will be analyzed for PCBs and TPH at pre-selected locations to determine the lateral extent of contamination.

Decontamination pads will be constructed adjacent to the exits of the site. The decontamination pads will be constructed of two 20-mil layers of high-density polyethylene (HDPE) or polyvinyl chloride (PVC) liner. Prior to constructing a pad, the area will be cleared of rocks, debris, and other items that could puncture the liner. The first layer of the liner will then be placed directly on the ground surface. A 6-inch layer usually of coarse soil will be placed over the first layer of 20-mil liner and sloped such that all runoff is conveyed to a sump. A second layer of 20-mil liner will be placed over the coarse soil layer. A final top 6-inch layer of coarse soil will be placed on top of the second liner. Equipment to be decontaminated will, therefore, drive over the topsoil layer and not directly on the liner. The purpose of this design is to prevent puncture of the HDPE or PVC liner, thereby preventing any contaminated soil or runoff from coming into contact with the native soil. The decontamination pad will be bermed with sandbags. Because runoff water in the decontamination pads are possibly contaminated, sump basins will be installed in these to collect any runoff water. This water will be pumped to a containment tank (with a leak prevention liner or, in the case of Resource Conservation and Recovery Act (RCRA) or California hazardous liquids, containment tank that will hold 110 percent of the tank volume, plus the maximum rainfall from a 25-year, 24-hour storm event).

The approach for remediating at the site is to excavate unsaturated soil in 12-inch lifts. Prior to removing each 12-inch lift, successive radiological surface surveys will be conducted followed by removal of radioactive material to the extent practical. Saturated materials will not be surveyed in situ.

Petroleum hydrocarbon contamination at concentrations greater than 3,500 mg/kg will be excavated to an estimated maximum depth of 10 feet bgs. If free-phase product is encountered during excavation activities, absorbent booms and/or pads will be used to collect the majority of the free-phase product to the extent practicable. PCB-contaminated groundwater will not be collected. Large-size debris will be segregated from the soil, moved to a screening pad, and screened for PCB and radiological contamination to ensure proper disposal. Removed soil will be placed on dewatering pads, spread out in 12-inch lifts, and allowed to dewater. Once dewatered, the soil will be processed through a conveyor system equipped with an array of beta/gamma detectors, which will allow for identification of any subsurface radiological contaminants not detected during the in situ radiological surveys. Soil determined to be free of radiological contaminants will be placed into stockpiles. The total in-place volume of soil processed using this approach is expected to be approximately 20,000 cy. Stockpiles containing Toxic Substances Control Act (TSCA) and RCRA hazardous waste will be segregated if hazardous waste is identified during soil stockpile characterization activities.

Radioactively contaminated material (debris, excavated soils including mixed wastes) exhibiting concentrations above the RROs will be processed as radioactive or mixed waste and separated out in clearly labeled containers. Radioactive and mixed waste will be properly stored on site pending packaging, transportation, and disposal by an Army contractor in compliance with the

DON Low-level Radioactive Waste (LLRW) Disposal Program. Sampled and surveyed soils that do not exhibit radioactivity at concentrations greater than the RROs will be stockpiled and characterized for disposal.

Because groundwater may be present at depths of 8 feet bgs, saturated soil conditions may exist and a dewatering pad will, therefore, need to be constructed. Saturated soils will be excavated out of the groundwater table and temporarily stockpiled within the excavation limits to drain. The soil will then be loaded and transported to the dewatering pad, if necessary. The dewatering pad and the conveyor system area will both be lined and bermed to capture any additional potential runoff water from the soils. The lined containment areas will be constructed per the decontamination pads specification described previously. The entire perimeter of the containment areas (including the stockpile area described below) will be bermed with sandbags and/or hay bales.

Two pads, a large debris screening pad, and a LLRW/low-level mixed waste (LLMW) staging area will be constructed. A larger soil stockpile area will also be constructed for staging the unsaturated excavated soils. The pads and stockpile area will be doubly lined with HDPE or PVC liner and bermed just as for the decontamination pad, dewatering pad and conveyor system areas as noted above. At the end of each day and immediately prior to a forecasted rain event, the soil stockpiles will be covered with a minimum 10-mil plastic sheeting/tarp and sandbagged to hold the sheeting in place. Completed stockpiles or stockpiles not in use will be covered at all times. Unlike the dewatering pad and the conveyor system area, however, the stockpile area will not require a sump basin, as pumping out stockpile runoff is not necessary. By keeping them covered, the only source of runoff is precipitation and not groundwater or conveyor system spray water. Therefore, stockpile runoff is not expected to be contaminated. The berms will prevent sediment from migrating off site. If necessary, sediment deposits will be removed when they reach one-third of the berm height.

Silt fences and sandbag berms will be used to trap sediment in areas disturbed by construction activities. Straw bales and/or sandbags will be used for filtration around contaminated soil stockpiles. Sandbags will be employed along the entire perimeter of the PCB Hot Spot excavation and stockpile/conveyor area. Active construction area BMPs will be implemented in accordance with those shown in Figure C.2-1.

Following completion of excavation activities within an area, the excavation's bottom and sidewall will be sampled and analyzed for PCBs and TPH. If post-excavation samples indicate PCB concentrations greater than 100 mg/kg and/or TPH concentrations greater than 3,500 mg/kg, additional excavation will be performed to an estimated maximum depth of 10 feet bgs. In addition, radiological screening will be performed to detect additional radioactive material. If radioactive material is detected on the bottom or in the sidewall of the excavation, it will be removed to a maximum depth of 10 feet bgs.

Prior to backfilling, a topographical survey of the sidewalls and excavation bottom will be conducted. In addition, the excavated area will be lined with a geotextile fabric to demarcate the remediation limits. Fill imported from the existing Bay Area Rapid Transit pile or clean import fill will be used to create the required 3-foot barrier and bring the site to final grade.

2.5 SITE HYDROLOGY

The construction drainage controls are based on the 2-year, 24-hour storm event retention and the 2-year peak flow rate (time of concentration: 10 minutes; rainfall intensity: 1 inch per hour). The estimated construction drainage control peak flow rate is 500 gallons per minute, per acre of drainage area.

2.6 CONSTRUCTION SEQUENCE

The construction sequence will be provided by TtFW and approved by the DON prior to beginning any excavation. The phased on-site construction activities will generally be as follows:

- **Pre-excavation Characterization Activities.** This stage includes the collection of soil samples (to be analyzed for PCBs and TPH) to further delineate the lateral extents of the excavation boundary.
- **Construction Activities.** This stage includes excavation, screening of soil and debris for radiological material, stockpiling, waste characterization, and proper on-site storage of the impacted soils (pending disposal through the DON LLRW Disposal Program); and post-excavation sampling, backfilling, and compaction of the excavated area.
- **Site Restoration and Decontamination.** This stage includes decontamination of all project equipment; removal of wastewater, used personal protective equipment (PPE), and other wastes; followed by final grading of the PCB Hot Spot to the design.

2.7 SOURCE IDENTIFICATION

2.7.1 Potential Pollutants During the Construction Phase

Hazardous materials used during construction will include gasoline, diesel fuel, motor oil, hydraulic fluid, and various lubricants. Acutely hazardous materials will not be used or stored on site during construction. There are not any feasible alternatives to motor fuels and oils for operating construction equipment. Soil will be stockpiled and appropriate BMPs implemented. Radiological waste will be stored within secondary containment in a designated waste storage area.

There is only minimal potential for environmental impacts from hazardous material incidents during construction. Small volumes of hazardous materials will be temporarily stored on site inside fuel and lubrication service trucks. Paints and solvents, if required, will be stored in flammable materials cabinets.

The most likely incidents involving these hazardous materials would be associated with minor spills or drips. Impacts from such incidents will be mitigated by thoroughly cleaning up minor spills as soon as they occur. Aboveground storage tanks containing potentially contaminated water will be stored in a bermed area or double-walled tanks in case of leaks. Soil stockpiles will be covered as needed to prevent sediment erosion of contaminated soil through air or stormwater. An incident involving a service vehicle or refueling truck release would present the worst-case scenario for release of hazardous materials. In the case of a large spill of hazardous material, the area would be immediately bermed/contained followed by blocking of the nearest path to the San Francisco Bay to prevent off-site release. The spill would be reviewed by the Construction Manager to determine if the DON and regulatory agencies need to be notified. A large spill or release cleanup would most likely involve excavation and storage of the impacted soil and/or materials in drums or roll-off bins for off-site disposal or recycling. The method for off-site disposal or recycling selected will depend on how the waste is classified.

3.0 BMPs TO BE IMPLEMENTED FOR CONSTRUCTION ACTIVITIES

The following section describes BMPs for construction activities that may cause pollution. Attachment 1 provides detailed construction implementation descriptions for the activities, and construction activity reference numbers (such as CA31) can be found in parentheses after the BMPs indicated below. Additional BMPs may be developed as necessary prior to each construction phase. The BMPs for construction activities that may pollute the stormwater focus on the following potential pollutant sources:

- Contaminated fine-grained soil (silt) from the excavation suspended in stormwater runoff
- Contamination of stormwater with radioactivity, metals, or other constituents of concern
- Hazardous waste including fuel, oil, and lubricant spills
- Erosion of contaminated soil stockpiles built during construction
- Solid waste from construction activities

Good housekeeping and maintenance practices are key factors in reducing potential off-site migration of pollution. These practices shall include elimination of brush, litter, or other items including solid waste that may clog drainage devices and pathways or enter the stormwater flow within the excavation areas. The achievement of good housekeeping and maintenance at the site also requires employee participation and requires specific training and control systems. The following BMPs that will be implemented at the site are essential to maintaining site control of potential pollution sources.

3.1 SPILL PREVENTION AND CONTROL (CA12)

The work at the site will be conducted under specific procedures developed by TtFW, including a Site-Specific Health and Safety Plan (SHSP), a Waste Management Plan (WMP), and Environmental Protection Plan (EPP), which are part of the Work Plan. These documents will be maintained on site and outline the specific steps the Construction Manger will follow in the event of a spill or release.

3.2 SOLID WASTE MANAGEMENT (CA20)

All construction waste shall be disposed in dumpsters, roll-off bins, or other similarly approved containers in designated areas located throughout the site. Specific procedures to handle all types of waste expected at the site have been developed by TtFW and are included in the WMP (Section 7.0 of the Work Plan). The plan will be maintained at the site.

3.3 HAZARDOUS WASTE MANAGEMENT (CA21)

The potential hazardous waste at the site includes fuel, oil, and lubricant spills or releases. Specific procedures to handle all types of waste expected at the site have been developed by TtFW and are included in the WMP. The plan will be maintained at the site.

3.4 CONTAMINATED SOIL MANAGEMENT (CA22)

The excavation activities require the use of a dewatering pad, conveyor system containment area, LLRW/LLMW staging area, large debris screening pad, as well as soil stockpiles for temporary storage of soils following excavation/screening and prior to off-site disposal. The individual stockpile size will be approximately 3,000 cy. Lined, bermed areas will be prepared, as described in Section 2.4. All stockpiles will be covered with 10-mil polyethylene sheeting and secured with sandbags to prevent wind erosion.

3.5 VEHICLE AND HEAVY EQUIPMENT FUELING (CA31)

3.5.1 Diesel Fuel

During construction activities, diesel fuel will be delivered and pumped directly into the equipment. Fueling will occur in designated areas, which are located away from drainage courses, to prevent the run-on of stormwater and the runoff of spills. If a spill occurs during on-site fueling activities, containment with an earth berm and/or excavation retention trap will be provided. The individual noting the spill will be responsible for contacting the Construction Manager, who will notify the DON, who in turn is responsible for notifying regulatory authorities, as necessary, and managing the cleanup and removal of contaminated soils in accordance with regulations.

3.5.2 Gasoline and Vehicle-related Lubricants

Gasoline used for passenger vehicles and trucks will be obtained from filling stations off site. If any spill occurs during on-site fueling activities, the fueler will be responsible for contacting the Construction Manager for cleanup and removal of contaminated soils.

All heavy equipment and vehicles are inspected at the beginning and end of each workday for oil and lubricant leaks. Leaking equipment will be repaired or removed from service and small leaks will be cleaned up immediately. Excessive greasing of components will be avoided and accumulated grease will be wiped off and the contaminated rags properly disposed of off site. All oil and lubricant supplies will be securely stored in drums or bins in the heavy equipment and maintenance area to prevent an uncontrolled discharge of spilled materials.

3.6 VEHICLE AND EQUIPMENT MAINTENANCE (CA32)

3.6.1 Heavy Equipment

Heavy equipment oil changes and maintenance may be performed on site. In the event that a spill associated with the heavy equipment (diesel, hydraulic fluid, or gas leak) occurs, containment will be provided, the Construction Manager will be notified, the spill area will be excavated, and the material containerized and stored in the heavy equipment and maintenance area until proper off-site disposal.

3.6.2 Site Vehicles

Oil changes and maintenance for site vehicles will normally be performed by off-site mechanics.

3.7 EMPLOYEE/SUBCONTRACTOR TRAINING (CA40)

TtFW primary work policies are centered on requiring extensive training for their employees and any subcontractor working on a TtFW site. Each employee is required to be current with appropriate federal hazardous waste training requirements and other training programs, as defined in the SHSP prepared for the project. TtFW requires each subcontractor to attend daily safety meetings at the worksite, and each work phase is reviewed in project orientation meetings. These meetings discuss potential problems, including weather conditions, stormwater control, and a review of the response actions that will occur in the event of any particular spill or pollution situation.

4.0 BMPS TO BE IMPLEMENTED FOR EROSION AND SEDIMENT CONTROL

BMPs for ESC can be found in Attachment 1 and will be referenced and implemented (as necessary) during construction activities. ESC reference numbers (for example, ESC1) can be found in parentheses behind the BMPs indicated below.

4.1 CONSTRUCTION SEQUENCE / SCHEDULING (ESC1)

Grading construction will be sequenced to minimize the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking.

4.2 PRESERVATION OF EXISTING VEGETATION (ESC2)

Vegetation on the site will be preserved until the time that construction is expected to commence in that area. The preservation of existing vegetation shall be maximized where feasible. During construction, the limits of grading or disturbance will be clearly marked in order to segregate this area from areas of preserved vegetation.

4.3 SODDING OR OTHER GROUNDCOVER (ESC10)

Following final grade development in a particular area, the site will be graded to match the existing grade and hydroseeded as soon as possible. A temporary irrigation system may be used in localized areas to promote rapid establishment of the vegetation.

4.4 DUST CONTROLS (ESC21)

Dust control measures will be used to stabilize soil from wind erosion and to reduce dust generated from the following construction activities: clearing and grading activities, construction vehicle traffic on unpaved areas, and sediment tracking onto paved roads and areas of unstabilized soil stockpiles. Water trucks will be used for dust control. The source of water for the truck will be the city public water supply system. In addition to wet suppression (watering), preventative measures to be used for dust control include minimizing disturbed surface areas, limiting on-site vehicular traffic and speed, and controlling the number and activity of vehicles on the site at a given time.

4.5 SOIL STOCKPILE AREAS

During excavation, one area will be used to stockpile soil. The soil will be stockpiled in a generally uncompacted condition and is, therefore, subject to erosion. In addressing stockpiling, BMPs will include diversion of drainage from the stockpile areas (ESC31), placement of

additional sandbag desilting facilities (ESC52), silt fencing on the downgradient toe of stockpile slope (ESC50), and dust control (ESC21). In addition, large stockpiles will be sloped to encourage sheet flow and reduce the infiltration of rainwater. A 10-mil plastic cover will be deployed over the stockpiles at the end of each day and during rainy weather and/or windy conditions.

4.6 STABILIZED CONSTRUCTION ENTRANCE / EXIT (ESC24)

Each construction entrance/exit will be stabilized. The purpose of stabilization is to reduce the amount of sediment traced off site. The stabilized entrance/exit will be constructed on level ground of 1.5-inch gravel at a depth of 1 foot thick. Length will be between 30 and 50 feet.

4.7 TEMPORARY SWALES (ESC31)

Swales may need to be cut to divert and control stormwater runoff. They can be used to divert sheet-flow over slopes, prevent run-on into open excavations or active construction zones, and control erosion along with transport of sediment.

4.8 TRACKWALKING (ESC42)

During final subgrade soil grading activities in a particular area, a dozer and/or similar piece of heavy equipment will be used to trackwalk the soil (driving a bulldozer and/or similar piece of equipment over backfilled areas). Trackwalking will compact soil to hold it in place. Trackwalking will also be provided on the soil stockpile slopes at the end of the day if not covered.

4.9 SILT FENCE AND SANDBAGS (ESC50 AND 52)

Silt fencing may be used as a sediment trapping/filtering device downgradient of all disturbed areas where sheet flow occurs. Silt fences will be installed on a level contour receiving no more than 1 acre of runoff per 100 linear feet or 0.5 cubic feet per second of concentrated flow draining to any point along the silt fence.

Sandbags will be used as a drainage diversion, sediment trapping, and stormwater velocity/erosion control. The sandbags will be installed on level contours receiving drainage areas up to 1 acre and in areas of concentrated flows and drainage courses.

Locations where silt fence and sandbags are to be used on site include:

- Sandbags and silt fencing around and along the downgradient toe of all soil stockpile areas
- Sandbags or silt fencing below cleared active construction areas

- Silt fencing along the downgradient toe of any work done on the shoreline or adjacent steeply sloping bank
- Sandbags in concentrated drainage flow course and as needed in areas downgradient of active work areas
- Sandbags as a diversion berm to run-on upgradient of active work areas and excavations

4.10 STRAW BALE FILTER BARRIER (ESC51)

Straw bale barriers consist of a series of secured, anchored bales placed to intercept and filter sediment-laden runoff from small areas of disturbed soil. Straw bales may be used on site in place of sandbags and silt fencing around stockpile areas and downgradient of any active areas where excess sediment may be expected. Straw bales may be required along the shoreline if the silt fencing does not provide adequate sediment filtration as determined by the field engineer.

5.0 NON-STORMWATER MANAGEMENT

Management of non-stormwater discharges will be implemented as part of the SWPPP. Weekly inspections of the grading, vegetative cover, roads, and stormwater/erosion control structures (including secondary containment structures) will be conducted in addition to wet/dry season observations. Any authorized or unauthorized non-stormwater discharges, if observed, will be documented on the appropriate form in Attachment 2 of this SWPPP.

6.0 WASTE MANAGEMENT AND DISPOSAL

Residuals and wastes are generated by construction and site operation activities. Waste management involves the following four steps:

1. Characterization
2. Handling and storage
3. Transportation
4. Disposal or recycling as appropriate

The WMP provides detailed information on the above steps. The most important step with regards to maintaining compliance with the SWPPP is handling and storage. In order to reduce the potential for and severity of hazardous material spills, all materials and wastes will be stored within lined secondary containment. Portable spill pallets may be used for larger containers such as drums.

6.1 SPILL RESPONSE

If a spill, including a BMP failure, is discovered, it must be immediately contained, cleaned up, and the source of the leak repaired. The PCB Hot Spot Project Manager, DON Remedial Project Manager (RPM), Resident Officer in Charge of Construction (ROICC), and Caretaker Site Office (CSO) will be notified of all spills and releases in accordance with Section 8.4.3 of the Work Plan. Navy representatives will be advised to notify the RWQCB within 24 hours of the spill or leak. The Environmental and Safety Quality Scientist will determine what additional BMPs will need to be implemented to prevent future spills. If a spill occurs and threatens to contaminate stormwater generated at the site, monitoring and sampling must be conducted as described in Section 9.0.

7.0 IMPLEMENTATION OF OTHER APPROVED PLANS

Several site-specific management plans approved by TtFW and the DON have been implemented to provide a framework by which the construction and site operations are executed. These plans describe the methods that will be used to execute, integrate, and coordinate emergency response procedures, control quality, address safety and health, and generally perform the work in a sound manner. These plans include, but are not limited to, the following:

- Work Plan
- Traffic Control Plan (Section 6.0 of the Work Plan)
- WMP (Section 7.0 of the Work Plan)
- EPP (Section 8.0 of the Work Plan)
- Sampling and Analysis Plan (Appendix A of the Work Plan)
- Project Contractor Quality Control Plan (Appendix B of the Work Plan)
- SWPPP (Appendix C of the Work Plan)
- Transport and Disposal Plan (under a separate cover)

8.0 POST-CONSTRUCTION CONTROLS

This SWPPP provides detailed descriptions of the post-construction surface water management (SWM) system. The SWM system includes the following components:

- General grading with positive slopes
- Drainage pathways with terrace drainage controls
- Protective discharge control point
- Vegetative erosion control cover

Additional details on post-construction controls are located in Section 2.4.

9.0 SITE INSPECTIONS AND MONITORING

All stormwater pollution prevention measures and BMPs will be inspected prior to the rainy season and before (prediction of) and following (measurement of) each rain event of 0.25 inches per 24 hours or more. This inspection will allow for evaluation of the BMPs implemented to prevent the release of potential pollutants. Inspections will be performed during construction activities by trained personnel, and the appropriate forms will be filled out. These forms are provided in Attachment 2 of this SWPPP. Inspections will include the date of the inspection, the individual(s) who performed the inspection, and the observations. Any BMP inadequacies shall be recorded and modified and upgraded or repaired as soon as possible. All completed inspection forms shall be retained at the TtFW office for a period of at least 3 years.

Water sampling will be conducted should visual monitoring indicate that there has been a breach, malfunction, leakage, or spill from a BMP, which could result in the discharge of pollutants from the site. Because the site is relatively flat, without a distinguishable discharge point, it is difficult to designate a discharge monitoring point. If a point discharge were to occur as a result of a breach of the berm along the site border during construction activities, the monitoring point would be designated as the point closest to where the breach occurred, if water is present at the time of observation. The shoreline is another susceptible location. Should a BMP near the shoreline fail, the monitoring/sampling point would be nearest to the point where the BMP failed.

10.0 RESPONSIBLE PERSONNEL

The individuals who comprise the Pollution Prevention Team and are responsible for implementing and making any necessary revisions to this SWPPP are the following personnel:

Name	Title	Responsibility
Keli McKay-Means	Environmental Compliance Manager	Preparation of SWPPP and selection of BMPs. Revisions to the SWPPP.
Bill Williams	Construction Manager	Implementation of construction SWPPP, maintaining inspection and monitoring records, reporting, and regulatory notification.
Alan Bradford	Project Quality Control Manager	Implementation of inspection and monitoring activities of the SWPPP and BMPs.

11.0 PERSONNEL TRAINING

All personnel involved with the ongoing monitoring and maintenance of the stormwater management system will attend a training class held by the Construction Manager, or his designee, before beginning the soil excavation phase of construction. The Construction Manager will maintain a file of the training documentation. The SWPPP will be reviewed as it relates to the various responsibilities for personnel implementation and awareness.

12.0 CERTIFICATION OF COMPLIANCE

TtFW and the subcontractors will implement and comply with the program set forth within this SWPPP. Within 30 days of noncompliance, TtFW and/or the subcontractors will notify the DON and correct or submit a schedule for necessary corrections. Written certification that the corrections were undertaken will be issued to the DON upon completion of the activities.

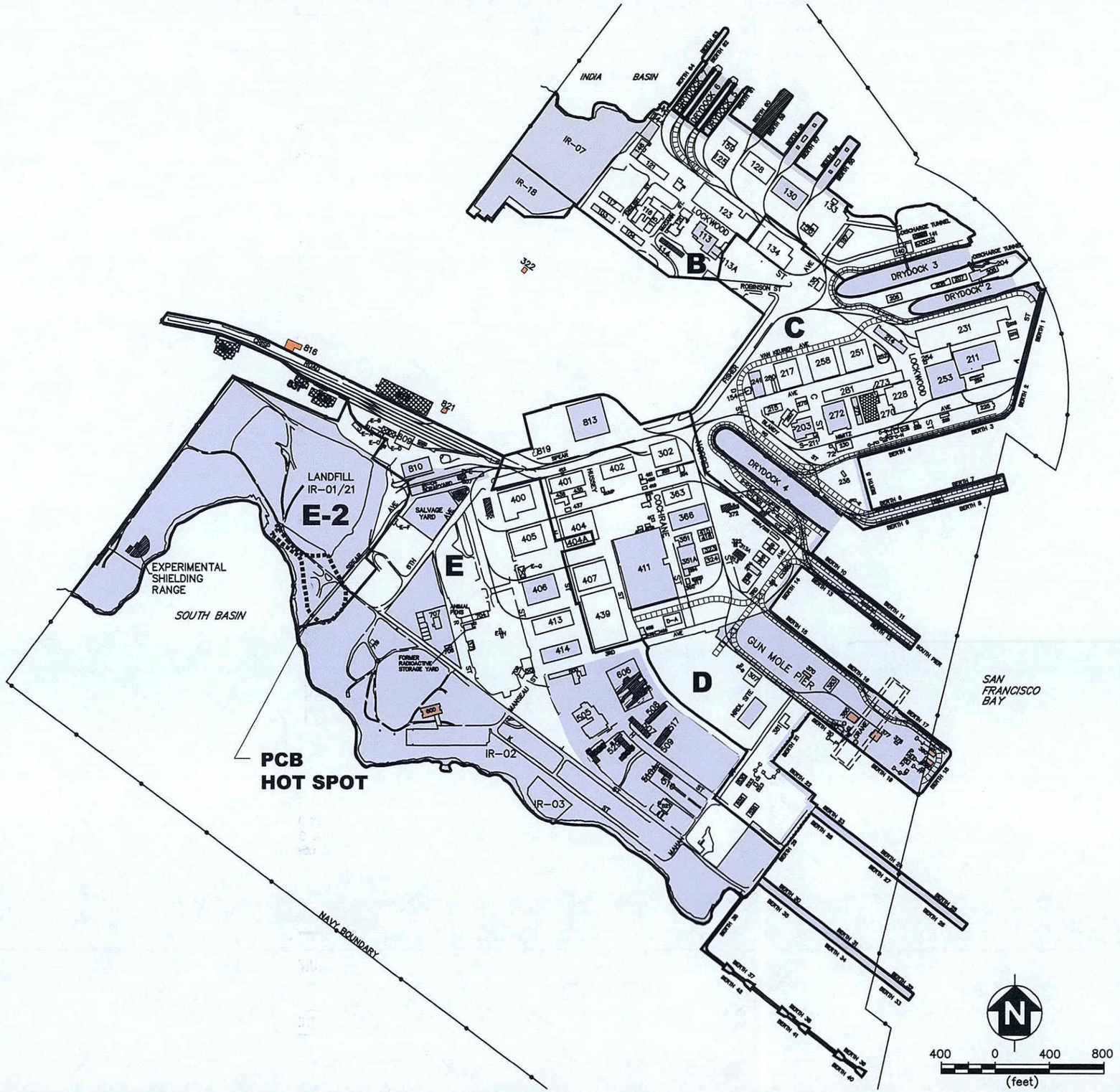
13.0 SWPPP REVIEW AND MODIFICATIONS

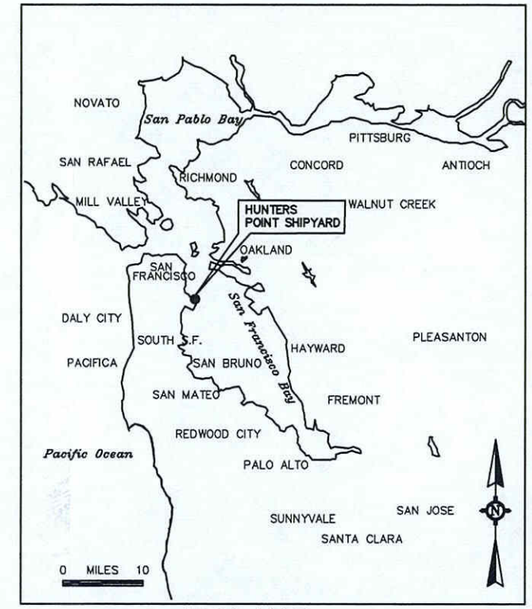
TtFW intends to amend the SWPPP, if deemed necessary, to address changes in the physical condition of the site or to maintain compliance in areas where this SWPPP is inadequate. Changes will be documented in writing and implemented after DON concurrence.

14.0 REFERENCES

The Weather Channel. 2005. Average precipitation amounts at San Francisco, CA (inches). Available online at www.weather.com.

FIGURES





KEY MAP

- NAVY PROPERTY BOUNDARY (OFFSHORE)
- PCB HOT SPOT EXCAVATION BOUNDARY
- PARCEL BOUNDARY
- IMPACTED BUILDINGS OR SITES
- DEMOLISHED IMPACTED BUILDINGS/STRUCTURES
- DEMOLISHED BUILDINGS/STRUCTURES
- IMPACTED SITES THAT HAVE OBTAINED REGULATORY RELEASE
- IMPACTED FUDS SITES
- NON-IMPACTED BUILDINGS WITHIN AN IMPACTED SITE, RADIOLOGICAL PRECAUTIONS MAY BE REQUIRED

NOTE
IMPACTED SITES ARE SITES THAT HAVE KNOWN RADIOLOGICAL CONTAMINATION OR WHERE SITE HISTORY INDICATES THAT RADIOLOGICAL CONTAMINATION MAY BE PRESENT.

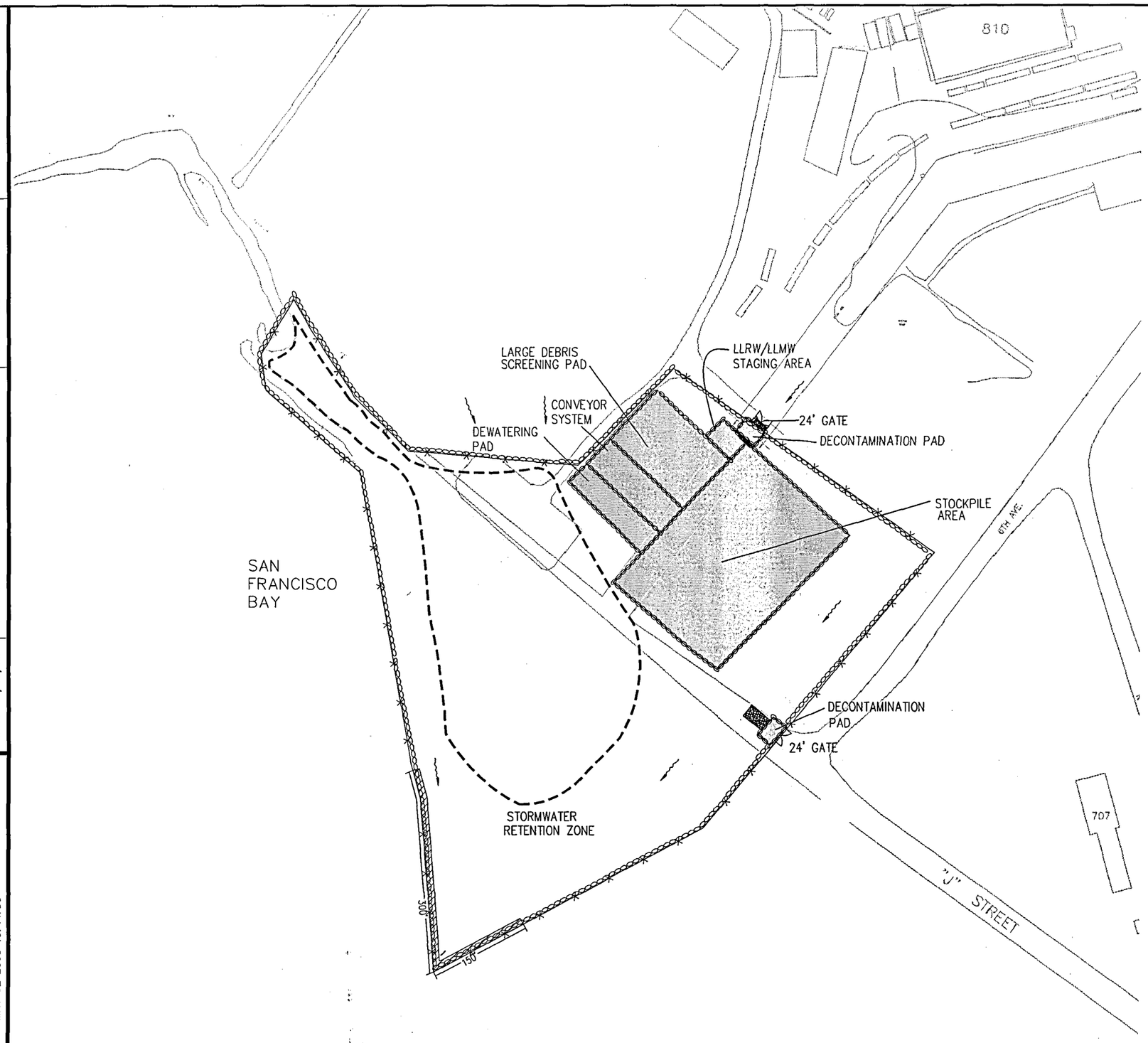
FIGURE C.1-1
HUNTERS POINT SHIPYARD AND PCB HOT SPOT
SOIL EXCAVATION SITE-LOCATION MAP

HUNTERS POINT SHIPYARD-SAN FRANCISCO, CA

TETRA TECH EC, INC.

DRAWING NO: 051442c11.DWG
DCN: FWSD-RAC-05-1442
CTO: 0084
APPROVED BY: UTM
CHECKED BY: LB
REV: 0
DRAWN BY: KLD
DATE: 11/10/05

I:\1990-RAC\CTO-0084\DWG\051442\051442C11.DWG
PLOT/UPDATE: MAY 16 2005 17:07:29



LEGEND

- PCB HOT SPOT EXCAVATION BOUNDARY
- 6-FOOT TEMPORARY FENCE
- SANDBAG BERM
- SANDBAG BERM WRAPPED W/ 10-MIL LINER
- STABILIZED CONSTRUCTION ENTRANCE/EXIT
- DIRECTION OF SURFACE WATER FLOW
- LLMW LOW-LEVEL MIXED WASTE
- LLRW LOW-LEVEL RADIOACTIVE WASTE

NOTES:

LOCATIONS AND SIZES OF CONTAINMENT AND STAGING AREAS ARE SUBJECT TO CHANGE

EXCAVATION BOUNDARY MAY BE REVISED BASED ON PCB PRE-EXCAVATION CHARACTERIZATION SAMPLING

N

80' 0 80' 160'

SCALE: 1" = 160'

FIGURE C.2-1

STORMWATER DRAINAGE AND CONSTRUCTION BMPs

HUNTERS POINT SHIPYARD, SAN FRANCISCO

TETRA TECH EC, INC.

DRAWING NO: 051442C21.DWG

DCN: FWSD-RAC-05-1442

CTO: 0084

APPROVED BY: UTM

CHECKED BY: LB

REV: 0

DRAWN BY: KLD

DATE: 11/10/05

:\1990-RAC\CTO-0084\DWG\051442\051442C21.DWG
PLOT/UPDATE: MAY 02 2005 16:44:50

ATTACHMENT 1

BEST MANAGEMENT PRACTICES

BMPS FOR PCB HOT SPOT, HUNTERS POINT SHIPYARD, SAN FRANCISCO, CA

*Inspected by:*_____ *Y= YES N = NO* *Date:*_____

ITEMS	IN PLACE	CLEARED	ADEQUATE	NEEDS IMPROVEMENT
Berm around perimeter of site (except where site borders San Francisco Bay)				
Sandbags along base of steeply sloping bank				
Silt fence/sandbags at downgradient toe of stockpile slopes				
Stockpile and debris pile covered with geomembrane				
Active construction area silt fence				
Straw waddles acting as sediment collectors throughout site				
Bagged/drummed material and drum storage area				
Trackwalk bare soil areas				
Vehicle decontamination pad				
Off-site mud tracking concerns				
General grading to prevent ponding				
Stabilized construction entrance at northwest corner of site				
Additional BMPs:				

ATTACHMENT 2

SITE INSPECTION AND MONITORING REPORTING FORMS

STORMWATER MANAGEMENT PLAN INSPECTION CHECKLIST

PCB Hot Spot Hunters Point Shipyard, San Francisco, CA

Name/Title of Inspector: _____

Date of Inspection: _____ Time of Inspection: __:__ AM/PM

Type of Inspection: Pre-Precipitation/Post-Precipitation

Weather Conditions: _____

Start of Rainfall (Date/Time): _____

End of Rainfall (Date/Time): _____

Total Recorded Precipitation: _____ inches

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1. Description of Area Under Maintenance/Construction Contributing to Stormwater Runoff (include location of maintenance area, BMPs in place, type of maintenance activity, condition of stormwater discharge structures):

2. Describe changes to the Stormwater Control Structures, if different than the SWPPP (V-ditches, CMP inlets, swales, etc.)

3. Are the Stormwater Control Structures free of debris?

4. Are there areas of erosion?

5. Are there areas of ponding?

6. Are drainage and erosion controls placed around any stockpiled areas?

7. Are the BMPs in place adequate, properly maintained, or implemented?

8. Are additional BMPs required to control stormwater pollution runoff?

9. Recommended corrective actions for SWPPP/stormwater control system:

10. Comments:

APPENDIX D

RESPONSE TO COMMENTS ON DRAFT FINAL PROJECT WORK PLAN REVISION 0, MAY 17, 2005 PCB HOT SPOT SOIL EXCAVATION SITE

RESPONSE TO COMMENTS ON DRAFT FINAL PROJECT WORK PLAN REVISION 0, MAY 17, 2005 PCB HOT SPOT SOIL EXCAVATION SITE PARCELS E AND E-2, HUNTERS POINT SHIPYARD SAN FRANCISCO, CALIFORNIA

Comments dated: May 31, 2005

Comments by: Michael Work, Remedial Project Manager
Superfund Division (SFD-8-3)
U.S. Environmental Protection Agency (EPA)

PCB Hot Spot Removal Action

April 12, 2005, EPA Comments

Comment 1: ***Response to General Comment 1:*** *The response to this comment does not fully address the issues raised in the comment. While 40 CFR 761.61 (PCB Remediation Wastes) does include an option for polychlorinated biphenyl (PCB) wastes with concentrations greater than 25 and less than or equal to 100 parts per million (ppm) to remain in place, it also stipulates that a "cap" meeting the requirements of Section (a)(7) and (a)(8) is required. Section (a) (7) requires a cap "to prevent or minimize human exposure, infiltration of water, and erosion;" concrete or asphalt caps with a minimum thickness of 6 inches are recommended. Section (a) (7) also specifies that compacted soil caps must have a minimum thickness of 10 inches and must comply with the permeability, sieve, liquid limit, and plasticity index parameters in 762.75(b)(1)(ii) through (b)(1)(v). Section (a) (8) requires deed restrictions for caps, in perpetuity. It is unlikely that the soil that will be used as backfill will meet the requirements of 762.75(b)(1)(ii) through (b)(1)(v). In addition, these criteria are for "low occupancy" areas while the allowable criteria for "high occupancy" areas is markedly different. Please provide additional detail and justification to explain how proposed action will comply with all of the requirements of 40 CFR 761. Please also test the backfill soil for permeability, sieve, liquid limit, and plasticity index.*

Further, since the final action must be protective of human health and the environment, the site is adjacent to San Francisco Bay, and infiltrating groundwater will likely result in PCBs in groundwater that are transported to the Bay, it is likely that leaving PCBs in place at concentrations of 100 ppm will not be protective of surface water quality, sediment quality, and aquatic life. As requested in the original

comment, we recommend that the Navy work with EPA and the RWQCB to develop an acceptable action level; if this will be done during the feasibility study (FS), please state this.

Since this area receives surface water run-off from portions of the landfill cap and from areas east of the landfill, to minimize infiltration, it is important that water does not pond on this area. At present, there is evidence that run-off water frequently ponds in this area. It is recommended that the site be graded to minimize the potential for ponded water, and hence the potential for infiltration. Please discuss final grading plans and specify whether an effort will be made to minimize the potential for ponding and infiltration.

Response 1: It is not the intent of this time-critical removal action (TCRA) to be the final remedy for the site. Capping is one of the remedial actions that may be employed as the final remedy and if chosen, the compacted soil cap will adhere to the specifications in Sections (a)(7) and (a)(8) of CFR 761.61 (PCB Remediation Wastes). If an alternate final remedy is chosen, it will take into account the PCBs remaining in place below the extent of the excavation or outside the excavation boundary. The final remedy for the site will be evaluated in the Parcels E and E-2 Remedial Investigation (RI)/FS.

The excavation area will be backfilled with clean imported fill material from the Bay Area Rapid Transit (BART) pile, which, based on previous sampling results, has been deemed suitable for use as backfill by the Department of the Navy (DON), or clean import fill material. No compaction testing shall be conducted as part of this TCRA because the slating of the site is open space reuse. The final 6 inches of backfill will not be compacted; however, it will be graded to match its surrounding elevation for site restoration. Grading will be done in a manner to avoid depressions and therefore minimize ponded water and potential for infiltration.

Comment 2: ***The Response to Specific Comment 12:*** *The response to this comment does not address how potential soil containing alpha emitters like plutonium and uranium will be isolated, since laboratory testing will be done after soil is already stockpiled. Please specify procedures to minimize the amount of soil that will require special handling if alpha emitters are found.*

Response 2: As stated in the previous response to comments, samples will be taken of all media for on-site gamma spectroscopy analysis, which includes a library of 18 radionuclides potentially present at Hunters Point Shipyard (HPS), including Cesium-137 (^{137} Cs). The most likely source of plutonium or uranium radioactivity would be materials associated with atomic or nuclear weapons testing brought to HPS from weapons test sites. Because ^{137}Cs is also associated with atomic weapons testing contamination, it will be used as a surrogate to identify material that may contain alpha emitters such as plutonium or uranium. A minimum of two samples will be collected from each 100 yd^3 stockpile and the results will be reviewed prior to consolidating the soil into the larger stockpiles pending further characterization and disposal. If elevated ^{137}Cs results are noted, alpha spectroscopy analyses for plutonium and uranium will be performed to assess the possible presence of these alpha emitting radionuclides. This will ensure that consolidating soil contaminated with alpha emitters with non-radioactively contaminated soil will not occur.

Comment 3: ***Response to Specific Comment 14:*** *The response to this comment does not address the issue of recontaminating backfill soil from erosion, runoff, and redeposition of soil eroded from contaminated areas upslope of this area. It is understood that this action may not be able to address all of the contamination in adjacent areas, however, the text or response should discuss when and how these areas may be addressed and specify how the potential for recontamination will be minimized.*

Response 3: It is not the intent of this TCRA to be the final remedy for the site. The final remedy for the site will be evaluated in the Parcels E and E-2 RI/FS.

Proper Best Management Practices, such as the use of sandbags, straw bales and silt fence, will be placed downslope of the adjacent area, to prevent stormwater runoff from eroding or recontaminating the site. Upon completion of backfilling and removal of stockpiles, all of the disturbed areas within the perimeter of the PCB Hot Spot will be revegetated. Of primary concern are the prevention of long-term surface erosion from transporting PCB-contaminated soil from the stockpile area as sediment to remediated areas, and prevention of increased sedimentation to the Bay following disturbance. Hydroseeding will be performed in conjunction with either straw or a soil stabilizer [California Department of Transportation (CalTrans), 2002. *Rainfall Simulation: Evaluating Hydroseeding and Plug Planting Techniques for Erosion Control and Improved Water Quality.* CTSW-RT-02-052]. Seed will consist of a mixture of native and sterile cereal grain seed. The sterile seed will more rapidly colonize the area and will stabilize soil with root growth. The following year,

the native vegetation should provide long-term soil stability. This technique has been applied and used successfully at the HPS landfill.

Comment 4: ***Response to Specific Comment 16:*** *The response partially addresses the comment. The decision to sample large debris for PCBs should field conditions warrant is noted the response. However, it is unclear how the available historical data will be used to support this decision. For example, the radius for which PCB data is considered applicable is unclear. Similarly, the concentrations that would trigger the need to sample large debris are not specified. Finally, it is unclear if the presence of free petroleum product would trigger the need to sample this debris. Please clarify the radius for which PCB data is applicable, the concentrations that would trigger the need to sample large debris, and whether the presence of free product would also trigger the need to sample this debris for the benefit of the personnel in the field required to make decisions based on "professional judgement."*

Response 4: The Sampling and Analysis Plan (SAP), Section 4.4 Waste Characterization Sampling, discusses the sampling of large debris with regard to PCB contamination. If visual staining (including the presence of free product) is present and if soil samples collected in the immediate area indicate the presence of PCBs, wipe samples will be collected per the SAP. Since historical data does not cover all sections and depths of the excavation, professional judgement of the project team will be used to determine sampling frequency, no specific trigger or radius will apply. Prior to disposal, waste profiling of large debris will be done in accordance with the appropriate disposal facility's procedures and per previously accepted guidelines used under other contracts executed at HPS.

April 27, 2005, EPA Comments

Comment 1: ***Response to Specific Comment 1:*** *The response to this comment does not address protection of receptors in San Francisco Bay. Since precipitation and surface water run-off can still infiltrate into soil that will be left in place, it is likely that the Chemical Cleanup Goal of 100 ppm for PCBs in soils left in place will not be protective of surface water, sediment or aquatic receptors. In addition, since the text in Section 5.13 indicates that "absorbent booms and/or pads will be used to collect the majority of the free-phase product to the extent practical," it is possible that some free-phase product will remain to facilitate transport of PCBs to San Francisco Bay. If the soil with PCB contamination of 100 ppm is left in place, groundwater monitoring between the PCB hot spot removal area and San Francisco Bay and evaluation of whether this interim measure is protective of*

surface water, sediment, and aquatic life will be necessary for the Remedial Investigation and Feasibility Study Reports.

Response 1: This Work Plan focuses on the TCRA, generally intended to be an interim action prior to the final remedy. Additional remedial activities, such as groundwater monitoring, that are to occur after the excavation is complete will be addressed as part of the final remedy selection for the area that will be developed in the Parcels E and E-2 FS.

Further, the DON is currently preparing a Shoreline Technical Memorandum (SulTech, 2005; in progress), which evaluates groundwater discharge as a potential pathway for migration of PCBs and metals from Parcels E and E-2 to Parcel F. It has been concluded that transport of PCBs by the groundwater pathway is severely limited by the chemical and physical properties of PCBs. PCBs are highly immobile in groundwater because of the low-aqueous solubility of PCBs under normal pH and Eh conditions. The solubility of PCBs is controlled by partitioning between water and soil (EPA, 1990. *Guidance on Remedial Actions for Superfund Sites with PCB Contamination*. EPA/540/G-90/007. August). The distribution of PCBs in sediments in Parcel F also indicates that the groundwater pathway has not contributed PCBs to offshore areas. Currently, concentrations of PCBs are highest within a discrete sediment layer less than 1 meter from the surface, and concentrations decrease toward the groundwater surface with depth below this layer. If the groundwater pathways were transporting PCBs to sediments in the South Basin, PCBs would be expected to be found at higher concentrations with increasing depth to be consistent with the groundwater flow path (Battelle, Neptune & Company, and Sea Engineering. 2005. Draft Technical Memorandum Parcel F *Feasibility Study Data Gaps Investigation, Hunters Point Shipyard, San Francisco Bay, California*. February 25).

Comment 2: ***Response to Specific Comment 3:*** *Please see the comment on the Response to Specific Comment 16, above.*

Response 2: The SAP, Section 4.4 Waste Characterization Sampling, discusses the sampling of large debris with regard to PCB contamination. If visual staining (including the presence of free product) is present and if soil samples collected in the immediate area indicate the presence of PCBs, wipe samples will be collected per the SAP. Since historical data does not cover all sections and depths of the excavation, professional judgment of the project team will be used to determine sampling frequency, no specific trigger or radius will apply. Prior to disposal waste profiling of large debris will be done in accordance with the appropriate disposal facility's procedures and per previously accepted guidelines used under other contracts executed at HPS.

ADDITIONAL COMMENTS

Comment 1: ***Section 2.1, Chemical Characterization, Page 2-4:*** *The proposed screening level of 10,000 milligrams per kilogram (mg/kg) for copper, lead, mercury, and zinc may not be protective of surface water, sediment, and aquatic receptors. After completion of this action, groundwater monitoring between the site and San Francisco Bay should be done to evaluate whether dissolved metals are transported into San Francisco Bay. This should be evaluated and discussed during the Remedial Investigation/Feasibility Study process.*

Response 1: This Work Plan focuses on the TCRA, generally intended to be an interim action prior to the final remedy. Further remedial activities, such as groundwater monitoring, that are to occur after the excavation is complete will be addressed as part of the final remedy selection for the area that will be developed in the Parcels E and E-2 FS. Figure 2-1 was created to show locations where the potential for sandblast grit could be encountered. A screening value of 10,000 milligrams per kilogram for copper, lead, mercury, and zinc was used as a potential indicator of metal concentrations that may indicate sandblast grit.

Comment 2: ***Section 5.8, Identification and Removal of Radioactive Materials, Page 5-5:*** *The text states that a " sandblast grit encountered during excavation activities will be handled in accordance with a RASO-approved work instruction specifically written to govern this material," but this work instruction is not included in this work plan or in the Base-Wide Radiological Work Plan. It is unclear whether this work instruction includes information for recognizing all types of sandblast grit or if it just pertains to "Black Beauty" sandblast grit. Please provide the Regulatory Agencies with a copy of this work instruction or provide specific instructions for recognizing all types of sandblast grit in this Work Plan.*

Response 2: Due to the number and variations of types of sandblast grit, an on-the-job-training (OJT) approach has been developed and implemented. The OJT is designed to be specific to the expectations of HPS sandblast grits. The training is performed by personnel experienced with marine sandblasting. Each excavating operator and/or spotter will be trained to recognize the most common types of sandblast grit. The training is documented on a training module form (Attachment 1).

ATTACHMENT 1

Recognizing Sandblast Grit-Training Module

Training for recognizing sandblast grit will be accomplished as an on-the-job-training (OJT) activity. OJT will be performed by personnel with experience in the use or disposal of marine sandblasting grit. Individuals entrusted to recognize the differing sandblast grits in the field will be required to read this general description and be able to identify specific types of the sandblast grits in the field. A record of this training will be placed in their files.

There are many types of sandblast grit typically used in shipyard operations. Spent grit consists of some type of silica sand plus a small amount of slag-derived grit. Sandblast grit physical characteristics are consistent with coarse-grained beach sand.

The most prevalent type of sandblast grit used throughout the 1960's, 1970's, and 1980's was Black Beauty. It accounted for over 70 percent of the ship maintenance grit market. Black Beauty is a coal slag abrasive material used in removing paint and rust from steel both indoors and outdoors. It is black in color and contains hard angular particles and is of uniform density.

Other types of sandblast grit may have a green, grey or red tint due to metals additives and/or fragments of coatings. Regardless of tint, each of the grits will exhibit the shininess associated with silica and have a uniform size and angular shape.

Training Record:

I have read and understand the preceding training module:

_____ _____

Name Date

I have received and understand the field recognition training:

_____ _____

Name Date