Final

Work Plan
Removal Action at Salvage Yard
MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

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MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

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Prepared under:

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

Final Work Plan

Removal Action at Salvage Yard, Marine Corps Base Hawaii, Kaneohe, Hawaii

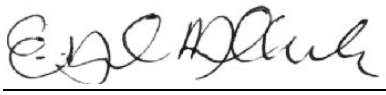
June 2015

I hereby certify that the enclosed Work Plan, shown and marked in this submittal, is that proposed to be incorporated with Contract Number N62742-10-D-1804, Contract Task Order 0025, "*Removal Action at Salvage Yard, Marine Corps Base Hawaii, Hawaii"*. This Work Plan is in compliance with contract specifications, Occupational Safety and Health Administration requirements, United States Army Corps of Engineers, Safety and Health Requirements Manual (EM 385-1-1, 15 Sept 08), and is submitted for Government approval.

Reviewed By:

8 June 2015

Project Manager — Date
Jonathan Borr



8 June 2015

Quality Control Officer — Date
Emily Molhoek

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS iv

1. INTRODUCTION 1-1

- 1.1 Site Location and Background 1-1
- 1.2 Previous Environmental Actions 1-1
  - 1.2.1 1984 Initial Assessment Study 1-1
  - 1.2.2 2010 Multi-increment Sample 1-2
  - 1.2.3 2013 Site Inspection 1-2
  - 1.2.4 2014 Screening Human Health Risk Assessment/ Screening Level Ecological Risk Assessment 1-2
  - 1.2.5 2014 Removal Site Evaluation 1-2
- 1.3 Scope of Work 1-4

2. PROJECT ORGANIZATION 2-7

- 2.1 Project Manager 2-8
- 2.2 Site Superintendent/Site Safety and Health Officer 2-8
- 2.3 Quality Control Officer 2-9
- 2.4 Contractor 2-9

3. REGULATORY BACKGROUND 3-1

- 3.1 Comprehensive Environmental Response, Compensation, and Liability Act 3-1
- 3.2 Department of Health, State of Hawaii 3-1
- 3.3 Toxic Substances Control Act (TSCA) 3-1

4. PRE-CONSTRUCTION ACTIVITIES 4-1

- 4.1 Permits, Licenses and Notifications 4-1
- 4.2 Protection of Existing Structures and Utilities 4-1
- 4.3 Safety Requirements 4-1
- 4.4 Pre-Construction Submittals And Meeting 4-2
- 4.5 Meeting minutes will be taken by the Task Order COR and later disseminated to all attendees:Archaeological Concerns 4-2
- 4.6 Security 4-2

5. FIELD ACTIVITIES 5-1

- 5.1 Utility Clearances and Survey 5-1
- 5.2 Pre-Excavation Delineation and Waste Characterization Sampling 5-1
- 5.3 Mobilization 5-1
- 5.4 Establishment of Work Zones 5-2
- 5.5 Site Preparation 5-2
- 5.6 Dirt and Dust Control 5-3
- 5.7 Excavation, Load Out and Confirmation Sampling 5-3
- 5.8 TSCA Regulated Waste Disposal 5-4
- 5.9 CERCLA Non-Hazardous Waste Disposal 5-4
- 5.10 Post Excavation Survey(s) 5-4
- 5.11 Site Restoration and Demobilization 5-4

6. SAMPLING AND ANALYSIS PLAN 6-6

7. WASTE MANAGEMENT PLAN 7-1

- 7.1 Waste Characterization Sampling 7-1

TABLE OF CONTENTS

7.2 Waste Transportation and Disposal 7-1
7.3 Construction and Site Management Wastes 7-1
7.3.1 Personal Protective Equipment 7-1
7.3.2 Investigation Derived Waste 7-1
7.3.3 Non-Hazardous Debris and Trash 7-1
7.3.4 Equipment Fueling and Lubricants 7-1

8. TRAFFIC CONTROL PROCEDURES 8-1

9. QUALITY CONTROL PLAN 9-1

10. ENVIRONMENTAL CONDITIONS/ENVIRONMENTAL PROTECTION PLAN 10-1

10.1 Natural Resources 10-1
10.1.1 Land Resources 10-1
10.1.2 Temporary Construction 10-1
10.1.3 Wildlife Resources 10-1
10.2 Historical and Archeological Resources 10-2
10.2.1 Objectives 10-2
10.2.2 Methods 10-2
10.3 Munitions and Explosives of Concern 10-2
10.4 Storm Water Management and Control 10-3
10.4.1 Soils Prone to Erosion 10-3
10.4.2 Mechanical Retardation and Runoff Control 10-3
10.4.3 Adverse Weather 10-3
10.5 Prevention of Releases to the Environment 10-3
10.5.1 Spill Response Equipment and Materials 10-4
10.5.2 Contingency Plan 10-5
10.5.3 Notification of Spills and Discharges 10-5
10.6 Emergency Planning and Community Right-To-Know-Act 10-5

11. SUBMITTALS 11-1

12. REFERENCES 12-1

TABLES

Table 2-1: Project Personnel and Subcontractors 2-7

FIGURES

Figure 1-1: Site Location

Figure 1-2: Site Layout

Figure 1-3: PCB Concentration and Depths

Figure 5-1: Excavation Areas

Figure 5-2: Excavation Areas A

Figure 5-3: Excavation Areas B

Figure 5-4: Excavation Areas C

Figure 5-5: Excavation Areas D
Figure 5-6: Excavation Areas E
Figure 5-7: Excavation Areas F
Figure 5-8: Excavation Areas G
Figure 5-9: Excavation Areas H
Figure 5-10: Excavation Areas I

Appendices

A Project Quality Control Plan
B Project Schedule
C Sampling and Analysis Plan
D Site Safety and Health Plan
E Response to Comments

ACRONYMS AND ABBREVIATIONS

bgs	Below Ground Surface
BMP	Best Management Practices
CAPE	CAPE Environmental Management Inc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CO	Contracting Officer
COR	Contracting Officer's Representative
CPR	Contractor Production Report
CRZ	Contamination Reduction Zone
CTO	Contract Task Order
CY	Cubic Yards
DoD	Department of Defense
DOH	Department of Health, State of Hawaii
DON	Department of Navy
DOT	Department of Transportation, United States
DQCR	Daily Quality Control Report
DU	Decision Unit
EAL	Environmental Action Level
EC/EPP	Environmental Condition/Environmental Protection Plan
Element	Element Environmental, LLC
EOD	Explosive Ordnance Disposal
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EZ	Exclusion Zone
ft	feet
HEER	DOH Hazard Evaluation and Emergency Response
IDW	Investigation Derived Waste
in	inches
MCBH	Marine Corps Base Hawaii
MEC	Munitions and Explosives of Concern
mg/kg	Milligrams per Kilogram
MPPEH	Materials Potentially Presenting Explosive Hazards
NAVFAC Hawaii	Naval Facilities Engineering Command – Hawaii
NAVREGHI	Navy Region Hawaii
NTR	Navy Technical Representative
OSHA	Occupational Safety and Health Administration
PACDIV	Pacific Division, Naval Facilities Engineering Command
PAL	Project Action Limit
PCB	Polychlorinated Biphenyls
PM	Project Manager
ppm	Parts Per Million
POC	Point of Contact
PPE	Personal Protective Equipment
PQCP	Project Quality Control Plan
PWS	Performance Work Statement

ACRONYMS AND ABBREVIATIONS

QA	Quality Assurance
QC	Quality Control
QCO	Quality Control Officer
RSE	Removal Site Evaluation
RVR	Remediation Verification Report
RDC	Regional Dispatch Center
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
sHHRA	Screening Human Health Risk Assessment
SI	Site Inspection
SLERA	Screening Level Ecological Risk Assessment
S&H	Safety & Health
SS	Site Superintendent
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
TSCA	Toxic Substances Control Act
TSDF	Treatment, Storage, and Disposal Facility
TAT	Turn-around Time
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plan
UFP-SAP	Uniform Federal Policy for Sampling and Analysis Plan
USACE	United States Army Corps of Engineers
WP	Work Plan

1. INTRODUCTION

This Removal Action Work Plan (WP) has been prepared for the Naval Facilities Engineering Command Hawaii (NAVFAC Hawaii) under Contract Number N62742-10-D-1804, Contract Task Order (CTO) 0025. The purpose of this CTO is to perform a polychlorinated biphenyls (PCB)-contaminated soil removal action at the Salvage Yard (henceforth referred to as "the Site"), located at Marine Corps Base Hawaii (MCBH), Kaneohe, Oahu, Hawaii (Figure 1-1).

All work will be performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and applicable federal, State and local laws, regulations and policies. In addition, this project will be completed in accordance with applicable sections of the federal regulations, including Title 29 of the Code of Federal Regulations (CFR) describing Occupational Safety and Health Standards.

This WP also includes a Project Quality Control Plan (PQCP) in Appendix A, a project schedule in Appendix B, a site-specific Sampling and Analysis Plan (SAP) in Appendix C, and a Site Safety and Health Plan (SSHP) in Appendix D. Response to regulator comments on the draft work plan are included in Appendix E.

1.1 SITE LOCATION AND BACKGROUND

The Salvage Yard is located in the south-central portion of Kaneohe MCBH, southeast of the intersection of First and D Streets, adjacent to Kaneohe Bay. MCBH is located on the southeast (windward) side of Oahu, encompassing the entire 2,951 acre Mokapu Peninsula (Figure 1-1). The Site is surrounded by a marina inlet to the West, a wetland area (known as the Salvage Yard Wetland) which faces Kaneohe Bay to the south and east, and open space and Buildings 139 and 140 (occupied by the Installation's Public Works Department) to the north. The ground surface is variable across the site, and includes concrete, asphalt, and unpaved fill and wetland areas.

The MCBH uses the majority of the Site to store unused equipment and materials. Currently the Site contains the Marina Secondary Boat Storage Area (in the western portion, used by Marina Operations for boat storage), the Vehicle Impoundment Lot, a covered concrete pad area used for storage of old generators, the abandoned Dry Ice Blast Building (Building 6502), a Wetland area, stockpiled soil, and excess material storage including wooden pallets, construction lumber, toilets, large diameter clay pipes, water heaters, air conditioner units, concrete manholes, piles of asphalt patching, and miscellaneous piles of sand, aggregate and excess soil generated during various construction projects around the installation. Structures, etc., are shown on the site map (Figure 1-2).

Historically the Site was used as a storage area for transformers and drums of waste liquids (mostly waste oils). Additionally, until 1978 a small area at the northwest corner of the Site was used to dispose of dilute pesticide rinsate.

Environmental concerns have been previously addressed in a number of investigations and reports (Section 1.2). Investigations have indicated that the Site contains total PCB concentrations above the proposed 10 milligrams per kilogram (mg/kg) project action limit (PAL) for soil (maximum of 1800 mg/kg) (Element Environmental, LLC [Element] 2014).

1.2 PREVIOUS ENVIRONMENTAL ACTIONS

1.2.1 1984 Initial Assessment Study

This Initial Assessment Study evaluated sites posing potential health or ecological risks. The study found that transformers potentially containing PCBs had been historically stored on the Site. No signs of stained soil were visible, and soil sample collected from the transformer storage area in 1982 contained less than

20 ppm PCBs (the detection limit of the analytical technique at the time of the study). The study recommended no confirmation studies for the Salvage Yard Site (Luecker et al. 1984). However, in a U.S. Environmental Protection Agency (EPA) Region 9 letter dated August 2, 1996, addressed to the Pacific Division, Naval Facilities Engineering Command ([PACDIV], now known as Naval Facilities Engineering Command [NAVFAC] Pacific), the EPA requested that additional confirmation sampling be performed at the Site prior to close-out (EPA 1996).

1.2.2 2010 Sample Collection

In April 2010 soil sampling was conducted in support of the preparation of an Environmental Assessment for an improvements project. One of the proposed improvements involved paving the Boat Storage Yard and additional areas located in the western portion of the Salvage Yard Site. A single incremental surface soil sample (0-0.5 feet [ft] below ground surface [bgs]) collected from the Boat Storage Yard contained trace to low levels of diesel, oil, lead, 4,4'- dichlorodiphenyltrichloroethane, and nine polycyclic aromatic hydrocarbon compounds as well as PCBs that exceeded the Department of Health, State of Hawaii (DOH) environmental action level (EALs) for unrestricted and industrial land use (Element 2014).

1.2.3 2013 Site Inspection

In 2012 a Site Inspection (SI) was performed, to evaluate potential soil and groundwater at the Site. The Site was broken up into 11 decision units (DUs). Elevated levels of PCBs were identified as potential human health risks associated with ongoing commercial exposure. Sampling methodology involved collection of both incremental and discrete surface samples, incremental subsurface soil samples, and shallow groundwater samples. incremental samples were collected from four depth intervals (0 to 0.5 ft bgs, 0.5 to 1 ft bgs, 1 to 2 ft bgs, and 2 to 4 ft bgs), with the exception of the two wetland DUs where just surface incremental samples were collected. Discrete surface soil samples were collected from 30 sample locations within eight main DUs (Salvage Yard and Marina areas). Soil samples were not obtained from the former rinsate disposal area DU and two adjacent coastal area DUs). All discrete surface soil samples were collected as splits of the incremental samples. Of a total of 240 primary samples, Aroclor 1260 equaled or exceeded the residential EAL of 1.1 mg/kg in 49 samples. Concentrations ranged from 1.1 to 75 mg/kg. The highest levels of PCBs detected in surface soil samples were concentrated in the northwest corner of the Salvage Yard and within the Marina Boat Storage Yard (Figure 1-3). One groundwater well was sampled in each DU; PCBs were not detected in any monitoring wells.

It should be noted that all surface incremental results were below DOH Tier 1 industrial EALs (6.3 mg/kg), with the exception of PCBs in 0.5 ft bgs in the DU adjacent to the coast in the Marina Boat Storage Yard (7.9 mg/kg). Sampling indicated that elevated PCB contamination was primarily in the west and northwest sections of the Site, and in isolated hotspots in the central portion as well as wetland sections of the Site. The highest concentrations of PCBs was presumed to extend to a maximum depth of 2 ft bgs. The SI recommended collection of additional data to better delineate the lateral and vertical extent of PCB contamination at the Site, as well as a comprehensive assessment of the potential risk posed to human and ecological receptors at the Site (Element 2013).

1.2.4 2014 Screening Human Health Risk Assessment/ Screening Level Ecological Risk Assessment

The screening risk assessment was intended to aid risk managers in the development of the Removal Site Evaluation (RSE). In 2013 and 2014, discrete PCB samples were collected from areas where elevated PCB levels were observed during the 2012 investigation, to address characterization concerns (Intrinsik 2014). This assessment included a Screening Human Health Risk Assessment (SHHRA) and a Screening Level Ecological Risk Assessment (SLERA).

The SHHRA, which follows Hawaii Department of Health (DOH) environmental hazard evaluation guidance, applying both Tier 1 and 2 EALs in the screening process, concluded that the hazards posed by PCBs in Site soils may warrant remedial action. The calculated risk in many of the areas is driven by a single or handful of very high PCB levels, therefore a targeted soil removal action in some areas would likely lower the residual human health risk to acceptable levels for receptors.

The SLERA was performed following USEPA risk assessment guidance, and was limited to the two Wetland DUs, DU-16 and DU-17, where ecological receptors are present. During the SLERA, hazards quotients (HQs) were calculated and used to quantify potential ecological risks in the Wetland. An HQ less than or equal to one indicates the chemical is unlikely to cause adverse ecological effects (USEPA 1997). The HQs for aquatic plants did not exceed one for PCBs. The sediment invertebrate low effects range-HQs exceed one for PCBs in both DUs, however only the DU-17 PCB concentrations result in median effects range-HQs above this threshold. For the Hawaiian Stilt, the HQs exceed one for PCBs in DU-17. The SLERA concluded that the adjacent Salvage Yard areas have much higher detected PCB concentrations than the areas in the wetland, therefore installing berms at the upland areas of the Site to prevent run-off to the wetland (effectively removing the source) could be a sufficient option limiting transport of PCB contamination.

1.2.5 2014 Removal Site Evaluation

For the RSE, the Site was divided into ten DUs, based on the 2012 SI results. Five of the DUs are located in the main Salvage Yard area, three in the unpaved marina Boat Storage Yard, and two in the wetland area. Soil sampling during this evaluation targeted three discrete depths in each DU: 0 to 0.5 bgs, 0.5 to 1 ft bgs, and 1 to 2 ft bgs. Samples were also collected up to 4 ft bgs in two of the main Salvage Yard area DUs. Samples were collected from locations following grids to provide coverage of the DUs. Surface water samples were collected from two ponds during two sampling events (one in the wet season, and one in the dry season).

PCB concentrations exceeded the DOH Tier 1 residential EAL in 195 of the 911 soil samples collected. The highest levels of PCBs in site soils are concentrated in the northwest corner of the Salvage Yard, as well as within the current Marina Boat Storage Yard. Localized areas of PCB contamination were identified in adjacent DUs. Over all, exceedances of the residential soil PCB EAL decreased with sample depth, although some exceedances were observed in samples collected from 4 ft bgs in one DU in the northeast corner of the Site. PCBs were not detected in surface water samples (Element 2014).

Contaminated soil volumes were estimated using Surfer ® Surface Mapping System modeling software, which uses the Kriging method to interpolate concentrations between data points. Interpolated areas were calculated in AutoCAD ® and multiplied by depth of contamination to estimate soil volumes. The RSE concluded that the volume of soil with PCB concentrations between 10 and 50 mg/kg was approximately 1,890 Cubic Yards (CY); the volume of soil with PCB concentrations greater than 50 mg/kg was estimated to be approximately 365 CY.

Note that this estimated total may vary significantly from the actual total, as additional delineation, input of other historical data not included in the model, and potential over-excavations will alter the actual excavation boundaries.

The RSE states that future remedial activities performed at this Site will comply with the substantive requirements of the Toxic Substances Control Act (TSCA) for PCB remediation wastes, and that the requirements of 40 CFR 761.61(a), “Self-implementing On-Site Cleanup and Disposal of PCB Remediation Waste”, will serve as a general guide for developing appropriate sampling, analysis, disposal, and decontamination procedure for the removal actions.

1.3 SCOPE OF WORK

The objective of the project is to remove PCB-contaminated soil exceeding the PAL and to evaluate levels of residual contamination remaining at the Site. The Removal Action will be achieved by excavating contaminated soil in excess of the PAL and properly disposing of the soil. The PAL for PCBs is 10 mg/kg, based on the TSCA high occupancy action level. Confirmation soil sampling will be performed to evaluate whether all soils in excess of the PAL (which are discussed in detail in the site specific SAP) have been removed. The Scope of Work elements specific to this project are summarized below:

- **Permitting and Planning:** Prior to mobilization to the Site, final Work Plans will be prepared and submitted to the Navy and all appropriate agencies will be notified of Cape Environmental Management Inc (CAPE's) intended start date. A dig permit will be obtained for the duration of the field activities, and a pre-construction meeting will be conducted prior to any field activities.
- **Mobilization and Site Preparation:** Underground utility toning will be performed prior to disturbing the soil to identify subsurface structures. Additionally, a site survey will be conducted to re-establish pre-determined delineation sampling locations, in order to use those locations to mark the excavation areas. The chain-link fence separating the Boat Storage Yard from the Salvage Yard will be removed, where necessary, to enable excavation or temporary access into the Salvage Yard for Salvage Yard Personnel.

  Prior to excavation at the two eastern excavation areas in the Salvage yard, temporary fencing and shade cloth will be erected between the excavation area and the adjacent wetland boundary in order to shield the wetlands/nesting areas during construction activities. Within the Salvage Yard, CAPE will use temporary orange construction fencing to surround excavation areas. Any brush clearing activities in the Eastern Salvage Yard will be completed outside the bird nesting season is (1 March to 15 September).

  The heavy equipment and materials staging areas located in open sections of the Salvage Yard will be demarcated with temporary orange fencing or caution tape. A pathway to allow access to the open-air storage structure in the Salvage Yard will be maintained on the southern side or eastern side. The equipment, including generators, stored within the open-air structure will be covered with plastic to protect the equipment from dust.
- **Delineation Sampling:** Prior to excavation, additional delineation samples will be collected and analyzed for PCBs as Aroclors. The results from samples collected in this area will be used to delineate lateral and vertical extent of contamination and to characterize the impacted soil for disposal. If a delineation sampling location or a historical surveyed sampling location with results below the PAL is excavated all the way to that location it will also serve as confirmation sampling. Pre-excavation delineation sampling will be performed using a slide hammer sampler or hand auger. Samples will be analyzed for PCBs as Aroclors, the contaminant of concern present at the Site. See the SAP for details.
- **Waste Characterization Sampling:** Based on previous investigations at the site, locations where PCB concentrations in soil exceed 50 mg/kg will be characterized as TSCA-regulated waste and disposed of off-island at a treatment, storage, and disposal facility (TSDF) permitted to receive the soil. Soil with PCB concentrations between 10 and 50 mg/kg will be characterized as CERCLA non-hazardous waste, and be disposed at the local PVT Landfill. Prior to excavation of these soils, a representative composite waste characterization soil samples will be collected from each excavation area. It is estimated that fifteen composite samples will be collected from CERLCA non-hazardous excavation areas to be analyzed for PVT Landfill acceptance criteria parameters. An estimated six samples will be collected from TSCA regulated excavations to confirm that lead TCLP concentrations are below RCRA hazardous waste levels. This waste characterization data will be used to meet landfill facility testing requirements. See Section 7 of this WP for additional details.

- **Excavation, Hauling and Disposal:** Excavation will take place in three phases; first in the Western Salvage Yard, second in the Boat Storage Yard, and last in the Eastern Salvage Yard. This phasing of work suits two purposes, excavation to site restoration of the Western Salvage Yard allows for the boats in the Boat Storage Yard to move here while the Boat Storage Yard is being excavated and restored. By the time the Western Salvage Yard and Boat Storage Yard is fully completed, the end of the bird nesting season is expected, opening up the Eastern Salvage Yard for excavation to site restoration activities. Within each excavation phase, the TSCA-regulated soil will be removed first in each excavation if present, followed then by the CERCLA non-hazardous waste soil. Excavations will not extend below the groundwater table or below structures.

  TSCA regulated waste soil will be excavated, direct loaded into supersacks and weighed for off-island disposal at a TSDF permitted to accept TSCA regulated soil waste.

  CERCLA non-hazardous waste soil will be direct loaded into dump trucks for immediate disposal at PVT landfill or into roll off bins for future disposal. Wherever possible, the excavation will be extended to re-established sampling locations from previous investigations or to sampling locations collected during the pre-excavation delineation sampling which had concentrations of PCBs below the PAL.

- **Confirmation Sampling:** Following excavation, discrete confirmation samples will be collected from floors and sidewalls as required to meet confirmation sampling coverage requirement per the SAP.

  Excavations with TSCA Regulated Waste Soil. If an initial confirmation sample indicates that PCB concentrations in a TSCA regulated excavation remain above 50 mg/kg, additional soil will be excavated and placed into supersacks for disposal. After removal of the additional soil identified as TSCA regulated is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed or excavation has reached boundary limitations, excavation of CERCLA non-hazardous soils will commence in that excavation, or if the results indicate that all soil has been removed to the PAL, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

  Excavations with only CERCLA Non-Hazardous Waste Soil. If an initial confirmation sample indicates that PCB concentrations in a CERCLA Non-Hazardous excavation remain above the PAL, additional soil will be excavated and placed into the dump truck or roll off bin for disposal. After removal of the additional soil identified above the PAL is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations above the PAL has been removed or excavation has reached boundary limitations, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

  As noted under delineation sampling summary, in locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration less than the PAL, this sampling point will be used as confirmation of removal. Once enough excavation confirmation sampling points meet the confirmation sampling coverage requirements or the boundary limitations are reached, the excavation is considered completed and no further excavation will be completed.

  Confirmation samples will be analyzed for PCBs as Aroclors. See SAP for details.

- **Site Restoration:** Once excavation is completed, the excavated areas will be surveyed. A demarcation liner then installed at the base of excavations, to mark the separation of clean backfill from existing native soil. The excavation will then be backfilled with virgin material from the quarry or clean certified material in mechanically compacted lifts with certified clean material and grade. The imported backfill will be free of organics and construction materials. If the imported backfill is not virgin

material or clean certified, it will be sampled to ensure it is not contaminated prior to backfilling. Topsoil and seeding will be required in some disturbed grass areas to match existing conditions.

- **Demobilization:** Following completion of all the above-mentioned tasks, all construction equipment and facilities will be demobilized from the field Site.
- **Remediation Verification Report (RVR):** An RVR will be prepared to document and summarize removal action field activities and all analytical results. The RVR will include a detailed narrative of field activities and procedures implemented, as well as any deviations from the procedures proposed in this WP. Also included will be site diagrams and/ or figures, site photographs, field test summaries, a summary of all sampling and analysis, tabular listings of all laboratory analytical results, copies of all laboratory data quality assessment reports, chain of custody forms and waste disposal documentation generated during removal actions.

The provisions of this WP are applicable to all CAPE employees and subcontractors engaged in this project, and any individual or agent acting as a vendor to CAPE to provide support services and/or commodities. Certain portions of the WP apply to personnel from the Navy or regulatory agencies who may visit the site. Certain provisions will be applicable to NAVFAC Hawaii, primarily safety precautions for emergency notifications in the event of an accident or incident. Work conducted under this plan will be performed in accordance with all applicable federal, state, and local safety and occupational health laws and regulations.

2. PROJECT ORGANIZATION

The CAPE project organization chart identifying key personnel, responsibilities, and lines of authority is provided in Figure 4-1 of the PQCP (Appendix A). Table 2-1 contains project personnel, subcontractors, and their contact information.

Table 2-1: Project Personnel and Subcontractors

Position	Name	Telephone Number
Naval Facilities Engineering Command – HAWAII		
Remedial Project Manager (RPM)	Eric Shigaki	(808) 471-1171 x264
Contracting Specialist	Jenny Yatsushiro	(808) 471-5694
Task Order Contracting Officer's Representative (COR)	David Chock	(808) 474-3220 x286
CAPE		
Project Manager (PM)	Jonathan Borr	(808) 791-6885 office phone (808) 554-8015 mobile phone
Site Superintendent (SS)	Jamie White	(808) 479-2324 mobile phone
Quality Control Officer (QCO) / Site Safety and Health Officer (SSHO)	Emily Molhoek	(808) 791-6891 office phone (907) 223-9942 mobile phone
SS Alternates	Alan Ahsing Jonathan Borr	(808) 292-0390 mobile phone (808) 554-8015 mobile phone
QCO/SSHO Alternates	Alan Ahsing Carrie Plath Jonathan Borr Haley Miranda	(808) 292-0390 mobile phone (907) 349-5207 mobile phone (808) 554-8015 mobile phone (808) 652-3384 mobile phone
Subcontractor	**Address/ Contact Name**	**Responsibility**
Accutest	2015 Lundy Avenue, San Jose, CA 95131 POC: Tony Vega	Laboratory Analytical Services
ULS Services Corporation	9061 Calle Del Verde, Santee, CA 92071 POC: Mike Benedict	Utility Toning
Hawaii Engineering Group	1150 King Street, Suite 1200, Honolulu, HI 96814 POC: Ed Yeh	Land Surveying
Enviroservices Training Center LLC	505 Ward Avenue, Suite 202 Honolulu, Hawaii 96814 POC: Greg Perry	Transportation and Disposal of Contaminated Soils
David's Fencing, Inc.	94-079 Leokane Street Waipahu, Hawaii 96797 POC: Joanne Abellanida	Fence Rental and Construction

Notes:

COR	Contracting Officer's Representative	POC	Point of Contact
PM	Project Manager	RPM	Remedial Project Manager
QCO	Quality Control Officer	SS	Site Superintendent
SSHO	Site Safety and Health Officer		

A discussion of the roles of key project personnel is provided in the sections that follow. If changes to key personnel are required, CAPE will discuss the proposed change(s) with the Navy prior to making the change(s).

The following CAPE management organization has been assembled to execute the project tasks.

2.1 PROJECT MANAGER

The Project Manager (PM) is responsible for the following:

- Execution of the CTO for overall conformance to NAVFAC Hawaii requirements and specifications, with respect to technical, cost, and schedule issues;
- Review of CTO submittals to ensure contract compliance; Interaction and coordination with the Remedial Project Manager (RPM), Contracting Officer (CO) or designated representatives, Task Order Contracting Officer's Representative (COR), Navy Technical Representative (NTR), regulatory bodies, and other stakeholders;
- Management of all field construction activities, including directing project staff and subcontractors in accordance with the contract requirements and site-specific WP;
- Tracking, documenting, and reporting proposed changes to the scope of work for the project;
- Direct communication with NAVFAC Hawaii regarding project execution and accountability;
- Coordination with the project Quality Control Officer (QCO) to ensure compliance with standard protocols and procedures and implementation of the WP;
- Coordination with the Site Safety and Health Officer (SSHO) and NAVFAC Hawaii to ensure implementation of the SSHP;
- Assigning personnel consistent with contract and CTO requirements; and
- Ensuring compliance with federal, state, and local regulations and requirements as appropriate.

2.2 SITE SUPERINTENDENT/SITE SAFETY AND HEALTH OFFICER

The Site Superintendent (SS) will dual hat as the SSHO, and will ensure that work at the site occurs in a safe manner and in accordance with the approved project WP and SSHP. Specifically, responsibilities will include the following:

- Serving as the primary field POC;
- Oversight and enforcement of the SSHP, including stop-work authority;
- Ensuring compliance with project-specified safety and health requirements, Federal and Occupational Safety and Health Administration (OSHA) regulations, as well as the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, USACE 2008);
- Serving as the main POC for any onsite emergency;
- Field implementation of the CTO, including day-to-day operations;
- Documenting all activities in the daily Contractor Production Report (CPR);
- Oversight of field crews and ensuring that project tasks are completed according to the performance work statement (PWS);

- Sequencing subcontractors into work areas; and
- Working with the PM to plan day-to-day site activities.

2.3 QUALITY CONTROL OFFICER

The QCO will ensure the proper implementation of the PQCP and SSHP. Specifically, responsibilities will include the following:

- Ensuring compliance with federal, state and local regulations and requirements as appropriate;
- Developing, maintaining and enforcing the PQCP, with stop work authority for quality reasons;
- Development and delivery of Daily Quality Control Reports (DQCR);
- Performing and maintaining three phases of control for each phase of work, to ensure that work complies with contract requirements; and
- Performing inspections, tests, and periodic quality control meetings at the Site to track and report progress.

2.4 CONTRACTOR

Contractor information for CAPE is as follows:

Company Name:	Cape Environmental Management Inc (CAPE)
Address:	155 Kapalulu Place, Suite 111 Honolulu, Hawaii 96819
Primary POC:	Mr. Jonathan Borr jborr@cape-inc.com (808) 791-6881 office phone (808) 554-8015 mobile phone

The site supervision, inspection, and approval of all work will be the responsibility of CAPE. CAPE will adhere to the procedures identified in the PWS and will follow the procedures, quality control (QC), and site safety protocols designated therein. Contact information for CAPE, NAVFAC Hawaii, and subcontractor personnel are provided in Table 2-1.

3. REGULATORY BACKGROUND

3.1 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT

CERCLA, passed in 1980, created the legal mechanism for cleaning up hazardous waste sites and was adopted by the Department of Defense (DoD). In 1986, the Superfund Amendments and Reauthorization Act was passed in order for DoD to follow the same cleanup regulations as private entities. State and federal cleanup standards are used under CERCLA and no permits are required for on-site CERCLA actions.

3.2 DEPARTMENT OF HEALTH, STATE OF HAWAII

The project site is within the State of Hawaii and, therefore, is regulated by the DOH Hazard Evaluation and Emergency Response (HEER) office. WPs and the RVR are reviewed by DOH, and concurrence with project scoping and sampling methodology is required.

3.3 TOXIC SUBSTANCES CONTROL ACT (TSCA)

PCBs, along with over 75,000 other specific chemicals, are controlled and managed under TSCA. TSCA gives the EPA the guidance and authority to regulate the use and remediation of PCBs. For PCB soil disposal, concentrations greater than 50 mg/kg are considered regulated under TSCA. Section 761.61(a)(4) of 40 CFR contains cleanup levels for PCB remediation wastes. The regulation sets cleanup levels for PCB bulk remediation waste at less than or equal to 1 mg/kg for high-occupancy areas and less than or equal to 25 mg/kg for low-occupancy areas. The PAL of 10 mg/kg for total PCBs applied to this Site is based on the TSCA high occupancy action level (when covered with an appropriate cap).

4. PRE-CONSTRUCTION ACTIVITIES

The following pre-construction items or activities will be satisfied or in-place before the commencement of any fieldwork.

4.1 PERMITS, LICENSES AND NOTIFICATIONS

Operations will be performed in compliance with all applicable federal regulations. In addition, the work will be performed to meet with the substantive requirements of state or local laws, rules, and regulations.

CAPE will suspend work and notify the Task Order COR in the event unusual site conditions are encountered, such as the observation of suspect endangered species and/or the unearthing of suspected artifacts and/or human remains. CAPE will notify the Task Order COR if structural damage occurs to surface features and adjacent structures.

A hot work permit will be required for saw cutting of concrete for concrete removal. A dig permit will be obtained for the duration of fieldwork activities.

Furthermore, CAPE will notify and obtain clearance for transporting non-hazardous waste to PVT Landfill prior to beginning any excavation work as well as have all necessary permits to transport TSCA-regulated waste off-island.

4.2 PROTECTION OF EXISTING STRUCTURES AND UTILITIES

A subcontractor will perform a subsurface utility clearance using ground penetrating radar, electromagnetic equipment, and a metal detector. The utility lines identified will be marked by paint or stakes, and noted on project drawings. Any subsurface utilities identified during the utility clearance will be protected from damage during intrusive work. CAPE will immediately notify the Task Order COR / RPM if structural damage occurs to surface features and/or adjacent structures during the course of this project.

Plastic sheeting will be used to cover the generators stored in the open air building in the Western Salvage Yard.

4.3 SAFETY REQUIREMENTS

CAPE will be responsible for the Safety and Health (S&H) of all employees and subcontractors working at the site and will follow the applicable reference guidance documents, including:

- USACE Safety and Health Requirements Manual, EM 385-1-1 (USACE, 2008);
- OSHA Guidance Manual for Hazardous Waste Site Activities, National Institute for Occupational Safety and Health / OSHA / United States Coast Guard / EPA;
- 29 CFR 1910, OSHA, General Industry Standards; and,
- 29 CFR 1926, OSHA, Standards for Construction.

CAPE will implement S&H measures upon arrival to the Site and throughout fieldwork. Work will be performed, at a minimum, in Level D personal protective equipment (PPE). Higher levels of PPE may be used, as determined to be appropriate by the onsite SSHO, and will be upgraded in accordance with CAPE's Safety and Health Program. The SSHP specifies the necessary monitoring, inspection, controls, training, reporting, and communication for this project. The SSHP also includes appropriate activity hazard analyses. All persons working at the Site will be required to read the SSHP and sign an acknowledgement verifying their understanding of the plan prior to their participation in any onsite work.

4.4 PRE-CONSTRUCTION SUBMITTALS AND MEETING

All pre-construction submittals will be provided and approved prior to commencing field activities. Pre-construction submittals consist of the WP, SAP, PQCP, and SSHP. Internal Draft, Agency Draft, and Final pre-construction submittals will be submitted to the Task Oder COR and the RPM.

The pre-construction meeting will be scheduled by the Task Order COR following approval of this WP. The CAPE PM, SS/SSHO, QCO, as well as the Navy RPM, and other representatives will participate in this meeting. The primary objective of this meeting will be to ensure that all parties understand the project tasks, schedule, and other concerns. Other topics that typically are discussed at this meeting include:

- Scope of work;
- Daily reporting, production, safety and QC protocol; and
- Communication, coordination channels, and POCs.

Meeting minutes will be taken by the Task Order COR and later disseminated to all attendees.

4.5 ARCHAEOLOGICAL CONCERNS

If, during any of the fieldwork, human remains, or objects that could be archaeological artifacts are observed, work will be suspended and the artifacts or remains will be protected from disturbance. CAPE will notify the Task Order COR immediately. Work in the area will be suspended until CAPE receives written notification from the Navy to resume work at the location containing the potential cultural resources. Specific details regarding archeological clearance for the Site is included in Section 10, Environmental Condition/Environmental Protection Plan (EC/EPP).

4.6 SECURITY

Access to site excavation areas will be controlled and limited to authorized personnel only. These controlled areas will be closed off with temporary construction fencing, silt fencing, and signs. Visitors will not be allowed into the restricted portions of the Site without prior permission from the CAPE PM or the SS.

5. FIELD ACTIVITIES

The following will be performed as part of field activities.

5.1 UTILITY CLEARANCES AND SURVEY

Prior to any subsurface work, the proper permits will be obtained and commercial utilities will be marked in the work area through the Hawaii "One Call" Notification. Additionally, a subcontractor will conduct underground utility location for any subsurface conveyances, structures and/or piping. A land survey will be performed to determine locations of previous sampling locations advanced by Element during their historical investigations in order to utilize that data in determining excavation extents.

5.2 PRE-EXCAVATION DELINEATION AND WASTE CHARACTERIZATION SAMPLING

Prior to excavation, pre-excavation delineation samples will be collected and analyzed for PCBs as Aroclors to improve delineation and determine excavation extents. At the designated pre-excavation delineation sampling locations (Figures 5-2 through 5-10) soil samples will be collected up to the bottom excavation depth plus one sampling interval deeper. Soil sampling intervals will be 0-6 inches (in), 6-12 in, 12-24 in, and 24-48 in, and 48-60 in. For example, if historical data indicated the required excavation depth to meet the PAL is 12 in, the pre-excavation delineation sampling locations around that excavation would have sampling interval depths of 0-6 in, 6-12 in, and 12-24 in.

Samples will not be collected if groundwater is encountered. Pre-excavation delineation sampling will be performed using a slide hammer sampler or hand auger.

In addition to delineation sampling and prior to excavation, waste characterization soil samples will be collected from each excavation area to provide concentrations of potential background chemicals in the soil. These background chemical concentrations are typically requested by the disposal facility if generator knowledge is deemed not sufficient for the disposal facility to ensure they are below the requirements set forth in their federally issued disposal permit.

If the landfill requests these background chemicals, a composite soil sample consisting of a minimum of 6 increments representative of the excavation area and excavation depths will be collected. The boundary or boundaries of the excavation are divided by disposal characteristic (TSCA regulated and CERLCLA non-hazardous shown on Figure 5-2 through 5-10. For example, on Figure 5-3A, there are two CERLCA non-hazardous excavation areas shown, a single composite sample would be collected to represent both excavations. On Figure 5-3B, there is one TSCA regulated excavation area and two CERCAL non-hazardous excavation areas. A composite sample would be collected to represent the TSCA regulated excavation area, and a single composite sample collected to represent both CERCLA non-hazardous excavation areas.

Sampling is further discussed in the SAP (Appendix C).

5.3 MOBILIZATION

The mobilization of equipment and personnel to the Site and establishment of work zones will be conducted at the onset of the project. The chain-link fence separating the Boat Storage Yard from the Salvage Yard will be removed, where necessary, to enable excavation or temporary access into the Salvage Yard for Salvage Yard Personnel. Temporary orange fencing will be placed across the gap in the removed fencing.

Prior to excavation in the Eastern Salvage Yard Excavation Areas, temporary fencing 8 ft high with a solid dust screen will be erected between the excavation area and the adjacent wetland boundary in order to shield the wetlands/ nesting areas during construction activities.

The EC/EPP located in Section 10, addresses all site concerns regarding storm water runoff and soil erosion controls that will be implemented at the Site.

A project team will be mobilized to the Site. The team will consist of a SS/ SSHO, QCO and a field crew consisting of equipment operators and laborers. The following equipment and supplies will be mobilized:

- Heavy equipment;
- Water truck;
- Best management practices (BMPs) materials for erosion and sedimentation control (i.e. erosion control fiber rolls, orange construction fencing, and signage);
- Supersacks, pallets, and bins;
- Metal Loading hopper;
- Plastic sheeting;
- PPE;
- Hand wash and eye wash stations; and
- Portable toilet(s).

All heavy equipment will be inspected daily for leaks, loose hydraulic hoses, etc. Any hazardous materials (fuel for equipment, etc.) brought onsite will be properly stored at a minimum of 15 ft from any drain inlet, storm drain, shoreline, etc. Before heavy equipment that will be needed in a future site activity, a cost analysis will be completed on whether it will be more economical for the equipment to stay on site or if it should be demobilized and then re-mobilized.

5.4 ESTABLISHMENT OF WORK ZONES

At the Eastern and Western Salvage Yard, temporary orange construction fencing will be used to surround excavation areas, demarcating this area as an exclusion zone (EZ). Support zones will be established outside of the active EZ and contamination reduction zone (CRZ). A first aid station, hand wash station, emergency eye wash station, spill control kit, easy up tent for shade, and job site safety board will be established in the support zone. Project signage will be posted as appropriate.

Once work starts in the Boat Storage Yard, it will be cleared of boats and has a perimeter fence, and therefore temporary orange construction fencing will not be needed around each excavation in Boat Storage Yard. Caution tape will be used to demarcate the EZ in the Boat Storage Yard. Project signs will be posted on the existing Boat Storage Yard fence and EZ as appropriate.

All appropriate traffic control measures, including but not limited to installing barricades, will be undertaken to prevent entry of any unauthorized vehicles into any of the exclusion zones. This may be necessary in the Salvage Yard if there is an excavation area deeper than a foot adjacent to road or building that Salvage Yard Personnel may need to access in an emergency situation outside of normal work hours.

CAPE will be responsible for maintaining site control over the course of work at the Site and notifying NAVFAC Hawaii prior to any field site visit by non-project related personnel.

5.5 SITE PREPARATION

Vegetation will be cut as needed using conventional equipment. Note that heavy equipment or mechanical vegetation clearing activities are not allowed during the bird nesting season in the Eastern Salvage Yard.

Fencing and other surface debris will be removed as necessary and placed into a roll-off bin for disposal at a municipal landfill.

5.6 DIRT AND DUST CONTROL

A water truck will be used for dust control. During excavation activities which create fugitive dust water will be sprayed to reduce or eliminate the dust. When trucks, roll-off bins or supersacks are loaded with soil, precautions will be taken to ensure that spillage does not occur (i.e., minimizing drop height, using a loading spotter). Additionally, the operators will be supervised and will not be allowed to overfill the excavator bucket.

Field personnel will visually inspect trucks prior to departing the Site to ensure that no excess or loose material is on the outside of truck or roll-off container. Water will be used to dampen loads and eliminate the potential for fugitive dust during transport.

5.7 EXCAVATION, LOAD OUT AND CONFIRMATION SAMPLING

Excavation work will be completed in three phases, the first phase is the Western Salvage Yard, the second phase is the Boat Storage Yard, and the third phase in the Eastern Salvage Yard. This phasing of work serves two purposes: 1) After the first phase of excavation and site restoration at the Western Salvage Yard, the boats in the Boat Storage Yard will move to the Western Salvage Yard 2) By the time the first and second phases are completed it is expected to be the end of the bird nesting season, and the third phase of excavation and site restoration at the Eastern Salvage Yard can be performed. Essentially, the excavation, confirmation sampling, backfilling, and site restoration process will be fully completed in each phase before moving onto the next phase. Within each phase, TSCA-regulated waste soil will be removed first, followed by the CERCLA non-hazardous waste soil.

TSCA regulated waste soil will be direct loaded into supersacks using a metal soil load out hopper. The filled supersack will be placed onto a pallet for handling. Each supersack will be labeled and weighed by scale to ensure the maximum weight does not exceed 2,200 pounds. Once all TSCA-regulated soil has been removed as delineated by historical results and pre-excavation delineation sample results, preliminary confirmation samples will be collected according to the SAP as needed and submitted to the laboratory with a 3-day turn-around time (TAT). If an initial confirmation sample indicates that PCB concentrations in a TSCA regulated excavation remain above 50 mg/kg, additional soil will be excavated and placed into supersacks for disposal. After removal of the additional soil identified as TSCA regulated is completed, confirmation sampling will be repeated. When confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed or excavation has reached the boundary limitations (groundwater or structural), excavation of CERCLA non-hazardous soils will commence in that excavation. Note that if the results indicate that all soil has been removed to the PAL, no further excavation is required and the post excavation survey and site restoration can commence in this specific excavation.

Supersacks will stored in a designated support zone to be covered by plastic sheeting at the end of the work day for protection from degradation due to weathering.

CERLCA non-hazardous soil will be direct loaded into dump trucks or plastic lined roll off bins for disposal at PVT landfill. Once the soil has been excavated to the designated excavation boundary, confirmation samples will be collected according to the SAP as needed and submitted for 3-day TAT. If an initial confirmation sample indicates that PCB concentrations in a CERCLA Non-Hazardous excavation remain above the PAL, additional soil will be excavated and placed into the dump truck or roll off bin for disposal. After removal of the additional soil identified above the PAL is completed, confirmation sampling will be repeated. If confirmation sampling results indicate that all soil within that excavation with concentrations above the PAL has been removed or excavation has reached a boundary limitation (groundwater or a

building), no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

In locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration less than the PAL, this sampling point will be used a confirmation sample. Once enough excavation confirmation sampling points meet the confirmation sampling coverage requirements set forth in the SAP or the boundary limitations are reached, the excavation is considered completed and no further excavation will be required.

Spoil piles not yet loaded into supersacks, dump trucks or roll off bins will be covered with plastic sheeting at the end of the work day to prevent erosion during non-work hours.

5.8 TSCA REGULATED WASTE DISPOSAL

A designated area will be requested by the Contractor, in consultation with NAVFAC Hawaii and facility stakeholders, for staging of supersacks prior to off-island disposal. The anticipated storage area in the Salvage yard is the southern half of the Salvage Yard area, near the stockpiled soil (Figure 1-2). The anticipated staging area in the Boat Storage Yard is on the southern end.

The supersacks containing TSCA-regulated wastes will be placed in Conex box for shipping to the mainland disposal facility permitted to receive such waste. The Transportation and Disposal subcontractor will place supersacks into the container using a rough terrain forklift or a forklift with loading ramp. Each supersack and Conex box is labeled according to Department of Transportation, United States (DOT) and Maritime shipping requirements. Prior to shipment a TSCA regulated waste profile and draft manifest will be submitted to the Navy for review and signature. Once approved by the Navy and accepted by the disposal facility, off-site shipping may commence. The TSCA regulated waste manifests require signature by the MCBH Hazardous Waste Manager before off-site removal to the docks for barge shipment to the mainland.

5.9 CERCLA NON-HAZARDOUS WASTE DISPOSAL

CERLCA non-hazardous excavated soil will be transported to a CERCLA-approved landfill facility for proper disposal (PVT Landfill located in Nanakuli, Oahu). CERCLA non-hazardous waste soil will be transported by dump truck equipped with a dust screen or in a roll off bin in which the soil is completely wrapped.

Prior to shipment to PVT Landfill a waste profile and draft manifest will be submitted to the Navy for review and signature. Once approved by the Navy and accepted by the disposal facility, off-site shipping may commence. The CERLCA non-hazardous regulated waste manifests requires signature by the MCBH Hazardous Waste Manager or CAPE personnel that has been authorized by the Navy to sign on behalf of the Navy.

5.10 POST EXCAVATION SURVEY(S)

Once confirmation sampling indicates PALs have been met, a post-excavation survey will be conducted by a licensed land surveyor. The post excavation survey will collect survey coordinates of confirmation sampling locations, and excavation boundaries and depths. Results from the survey will be in a format that is compatible with the Navy database, Naval Installation Restoration Information Solution, and will be documented in the RVR.

5.11 SITE RESTORATION AND DEMOBILIZATION

A demarcation liner (polypropylene black woven stabilization fabric or equivalent) will be placed at the base of the excavations, to mark the separation of clean backfill from the existing native soil. The excavation will then be backfilled with virgin material from the quarry or clean certified material in mechanically

compacted lifts no greater than eight inches thick. The imported backfill will be free of organics with no particle size greater than 3in in diameter. If the imported backfill is not virgin material or clean certified, it will be sampled to ensure it is not contaminated prior to backfilling. The base backfill material is expected to be clean certified crushed concrete. In pre-excavation graveled areas (typically roads) the top 3 in of backfill will be 1-inch minus rock/gravel so as to match pre-excavation conditions. At pre-excavation vegetated areas, the top 6 to 8 in will be backfilled with commercial topsoil. Grass seeding will be completed at the areas requiring commercial topsoil.

Any damage to the surrounding areas that may occur during this project will also be restored to its original condition or better; any concrete removed will be replaced in kind.

Upon the completion of field activities, it is anticipated that a dry decontamination method will be utilized for construction equipment; however, the appropriate equipment decontamination method used will be at the discretion of the SSHO. Further details of dry decontamination procedures are discussed in the SSHP (Appendix D). Following equipment decontamination, all on-site equipment, material, and personnel will be demobilized from the project site. The final inspection with NAVFAC Hawaii personnel will be conducted following the completion of the fieldwork.

6. SAMPLING AND ANALYSIS PLAN

The SAP describes the sampling and analysis activities to be performed during this project. The SAP was prepared in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), thus referred to as the Uniform Federal Policy for Sampling and Analysis Plan (UFP-SAP). The UFP-SAP describes the in comprehensive detail the quality assurance (QA), QC, and other technical activities such as sampling methods, locations, quantities, and sampling techniques for the field sampling program. The worksheets associated with the UFP-QAPP can be found in the UFP-SAP, in Appendix C.

7. WASTE MANAGEMENT PLAN

The following section explains where CAPE anticipates each of the described waste streams will need to be disposed of during the execution of the project.

7.1 WASTE CHARACTERIZATION SAMPLING

All Waste characterization samples at a minimum will be analyzed for PCBs as Aroclors by EPA Method 8082. On CERLCA non-hazardous soil waste to be disposed of at PVT Landfill, Total Lead, Total Cadmium, TCLP Lead, TCLP Cadmium, TCLP Chromium, Flashpoint, Polycyclic Aromatic Hydrocarbons (PAHs), Benzene, Toluene, Ethylbenzene, Xylenes (BTEX), Total Petroleum Hydrocarbons Residual Range Organics (TPH-RRO) and Halogenated Volatile Organic Compounds (HVOCs) are expected to be analyzed for PVT to accept the soil. On TSCA regulated waste soil TCLP lead testing is expected to be required by the mainland disposal facility for acceptance.

Composite soil sampling techniques and analysis is further described in the SAP (Appendix C).

7.2 WASTE TRANSPORTATION AND DISPOSAL

All vehicles used in the transportation of this soil will display the appropriate DOT placards and marks during the shipment. CAPE will coordinate with the Task Order COR or Task Order COR designee to witness the waste loading, placarding, and inspection activities to the Navy's satisfaction. Upon satisfactory review of the above activities, the Task Order COR or Task Order COR designee will sign the waste manifests on behalf of the government.

7.3 CONSTRUCTION AND SITE MANAGEMENT WASTES

7.3.1 Personal Protective Equipment

Used PPE will be bagged and disposed of at a Subtitle D facility, pending disposal clearance. The PPE will be free of loose soil, and CAPE will discuss the acceptance criteria with the landfill prior to sending them any PPE. CAPE will send this material offsite during the execution of the project so that there are no issues associated with onsite storage. The NAVFAC Pacific Environmental Restoration Program Procedure I-A-6, *IDW Management* will be followed (NAVFAC 2007).

7.3.2 Investigation Derived Waste

Any non-disposable sampling equipment and excavation tools used during site activities will be decontaminated using techniques that minimize the generation of investigation derived waste (IDW). Any IDW generated during sampling will be disposed with the waste soil.

7.3.3 Non-Hazardous Debris and Trash

Any site debris and trash generated by site activities will be collected by CAPE and disposed of offsite. Measures will be taken to control the generation of excess waste. Smaller trash bins/barrels will be set up in the support areas for domestic rubbish. Burning of solid waste will not be allowed. Upon completion of the project, the entire site and adjacent work areas will be patrolled for any debris, trash, or litter and such items will be removed.

7.3.4 Equipment Fueling and Lubricants

All equipment fueling and maintenance operations will be performed in a manner as to reduce the potential for a release of fuel or lubricants. No fuel tanks will be stored on site. Equipment will not be "topped off" by the fueling person (operator). Only CAPE's qualified operators knowledgeable in fueling procedures

and equipment fuel tank capacity will fuel equipment. A spill kit will be located on-site in the event of a spill. The Task Order COR will be immediately notified of any spills.

All lubricant (engine oil, hydraulic oil, transmission oil, etc.) replacement and filling will be performed only by qualified personnel knowledgeable with the particular piece of equipment in the designated area. Waste oil pans having capacity of at least 1.5 times the equipment oil reservoir capacity will be used for draining oil. Spill kits will be located at oil replacement/filling areas in obvious locations. The service companies that service the equipment will be responsible for disposing of the used waste oil.

8. TRAFFIC CONTROL PROCEDURES

This section details the traffic control procedures that may be required during the removal action at the Site. Employees may be exposed to vehicle impact hazards during the project. To control these hazards, the following safety requirements will be strictly enforced:

- Seat belts shall be worn any time a vehicle is in motion, regardless of speed or distance to be traveled. Seat belt requirements also apply to the operation of backhoe and other construction equipment;
- The basic speed law and local traffic laws shall be followed at all times; and
- Vehicles shall never be operated at a speed that is unsafe for the conditions (i.e. road surface, traffic, visibility, weather, etc.).

Ingress and egress routes will be marked and secured prior to commencing work. The routes will be clearly delineated and controlled as needed to minimize public and field personnel hazards. Where appropriate and possible, the ingress and egress routes will be separate to minimize hazards and maximize efficiency.

Haul routes will be managed in a way as to minimize the interference of surrounding activities and vehicular traffic patterns.

9. QUALITY CONTROL PLAN

The QC procedures that CAPE personnel (including on-site subcontractor personnel) will follow during the performance of this task order are detailed in the PQCP located in Appendix A. The primary function of QC management is to ensure tasks are performed in accordance with the PWS and within the defined schedule and budget. This is achieved through the execution of a realistic plan to ensure that the required standards of quality will be met.

CAPE will implement the requirements of the PQCP during all phases of the project. This includes inspections, tests, and periodic QC meetings at the site to track and report progress. The PQCP also outlines procedures to help monitor contract compliance during the project utilizing three phases of control.

10. ENVIRONMENTAL CONDITIONS/ENVIRONMENTAL PROTECTION PLAN

The following sections outline details to ensure that the project activities associated with the removal activities do not contribute to the release of potential contaminants into the environment or negatively impact sensitive habitats.

Environmental pollution and damage as defined is the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of plant or animal communities; or degrade the environment from an aesthetic, cultural, or historic perspective. Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of air, water, land, biological and cultural resources. This includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; and other pollutants.

This EC/EPP includes information on Emergency Planning and Community Right-to-Know Act (EPCRA) reporting requirements. Additionally, this plan describes protective measures and procedures to prevent and control pollution, limit habitat disruption, and correct environmental damage that occurs during remediation activities.

10.1 NATURAL RESOURCES

CAPE understands its responsibility to preserve the natural resources within the project boundaries and adjoining areas. As practical, CAPE will restore the site to an equivalent or improved condition upon completion of work.

10.1.1 Land Resources

To the extent practical, land surfaces outside the work area limits will not be disturbed without approval from the RPM or the Task Order COR. Equipment lay-down or work pads will be as small as practical without jeopardizing worker safety or productivity. The ingress and egress to the Site will be flagged to ensure disturbance to natural resources is minimized.

10.1.2 Temporary Construction

Any temporary fencing installed around work areas, and other signs of construction will be removed prior to demobilization. Any waste material generated by CAPE will be hauled offsite.

10.1.3 Wildlife Resources

Removal activities will be managed to minimize interference with, disturbance to, and damage of wildlife resources. CAPE does not anticipate any significant impact to wildlife resources; however, CAPE will do everything possible to ensure that field activities do not interfere with any wildlife or wildlife habits. It is expected no additional measures will be needed in the Boat Storage Yard or Western Salvage Yard. There are two excavations in the Eastern salvage yard which are within line of sight of the wetland. At these two excavations, temporary fencing with dust control fabric will be set up between the Wetland and the excavation.

One week prior to hand sampling activities during the bird nesting season in the Eastern Salvage Yard, the Navy Natural Resource Specialist at MCBH will be notified to visit the site to ensure no birds nest have been established in close proximity to planned sampling activities. If a nest has been established too close to the sampling locations as determined by the Navy Natural Resource Specialist, the Navy Natural

Resource Specialist will inform CAPE hand sampling is not allowed until the nesting season is finished on 15 September.

Any wildlife identified during the execution of the project will be pointed out to the Task Order COR and documented in the DQCR and CPR.

10.2 HISTORICAL AND ARCHEOLOGICAL RESOURCES

Any known historical, archaeological, or cultural resources within the work areas will be designated by the Navy prior to the commencement of construction activities. An archeologist onsite is not required since this area was originally part of Kaneohe Bay and was filled in during the 1940s, and no archaeological sites or deposits are known to be present in the fill. However, if dune sand or archaeological materials (as determined by a briefing from the Navy Archaeologist) are discovered during field activities, CAPE will immediately stop construction in that specific excavation and report findings to the Task Order COR and the RPM. If other excavations areas available CAPE will shift activities those locations if possible. Excavation will not continue in the excavation where archaeological materials or dune sand are discovered until authorization is received to do so.

Historical, archaeological, and cultural resources include, but are not limited to, human skeletal remains; artifacts; shells, bone, charcoal, or other deposits; rocks, paving, wall, other construction features; any indication of agricultural or other human activities; or other implements considered to be of archaeological significance. Any historical and archeological resources discovered will be protected in-place and work will cease until otherwise directed by the Navy.

10.2.1 Objectives

The objective associated with historical and archeological resources is to have zero instances where the work activities would negatively affect any artifacts that were within the work areas. CAPE will diligently watch all active excavation areas and immediately report any findings to the Task Order COR.

10.2.2 Methods

Excavation will be monitored during intrusive work for any material that looks suspect or any material encountered that was unanticipated. In the event that any items are observed that are suspected of being regulated, CAPE will completely stop operations and move to another area when items that are obviously significant are encountered (human remains, artifacts, etc.). These items will also be reported immediately to the Task Order COR for investigation.

10.3 MUNITIONS AND EXPLOSIVES OF CONCERN

If any suspected Munitions and Explosives of Concern (MEC) or Materials Potentially Presenting Explosive Hazards (MPPEH) are discovered while work is being conducted at the site, the following precautions will be conducted, but are not limited to:

- Stop all work in the area and isolate area of concern;
- Notify Navy personnel as per the reporting chain below:
  - First call - Regional Operations Center (ROC): (808) 473-3215/6
  - Second call – MDSU-1 Det EOD: LT Eric Bokhoven, (808) 474-3614/5 And/or Senior Chief Byant Little, (808) 474-3614/5
  - Third call – CNRH/JBPHH Explosives Safety: Patrick Mallard, (808) 471-1111 x131
  - Fourth call – NAVFAC HI Environmental Coordinator Terence Tengan, (808) 471-1111 x320; COR: Dennis Makabe, (808) 282-1886; RPM: Eric Shigeki, (808) 471-1171 x264

- Work will resume only after proper disposal and/or removal of the MEC/MPPEH has occurred and clearance given by Explosive Ordnance Disposal (EOD).

10.4 STORM WATER MANAGEMENT AND CONTROL

Erosion and sediment control practices (i.e., fiber rolls, sidewall sloping, dust control, etc.) will be employed as necessary. Site specific BMP methods to be employed at the site include the use of silt fencing and/or fiber rolls installed downslope of disturbed areas.

CAPE will be prepared to protect any drainage swales adjacent to the Site to ensure pollutants do not wash into these areas. Areas with the capability to contaminate runoff water will be covered in anticipation of a precipitation event to prevent any contamination of runoff.

During field activities, the QCO will inspect disturbed areas and sediment controls every 7 calendar days, and within 24 hours after the end of any storm event that produces 0.5 in of rain at the site, to ensure the controls are in place, are functioning, and are adequate. If sediment inspections indicate that a control is not functioning properly, the control will be replaced or modified promptly.

10.4.1 Soils Prone to Erosion

CAPE will institute measures to prevent the runoff of soils prone to erosion at the Site. Once the necessary controls have been installed, the QCO will walk the project site with the Task Order COR to ensure that the Task Order COR is satisfied with the location and amount of protection that is installed. CAPE will discuss with the Task Order COR what measures are expected to be in place and maintain these features throughout the project.

10.4.2 Mechanical Retardation and Runoff Control

CAPE will prepare measures to protect storm drains and/or culverts, by placing fiber rolls at any storm drain inlets located within work areas, to ensure sediment does not wash into and clog the drains. No storm drains have been identified near the immediate site work area.

10.4.3 Adverse Weather

During adverse weather, special precautions will be taken to ensure that any damage at the site will be minimal. The following precautions will be conducted, but are not limited to:

- Equipment will be tied down; and
- Any open excavation areas will be backfilled and compacted as soon as analytical data confirms the soil left in place is below the cleanup criteria.

BMPs will be constructed to divert storm water from exposed areas and prevent migration of sediment and pollutants from moving outside the boundary limits.

10.5 PREVENTION OF RELEASES TO THE ENVIRONMENT

CAPE will not have any hazardous substances onsite and does not expect to have any hazardous materials onsite except for petroleum fuels and lubricants found in vehicles and heavy equipment used at the Site. CAPE will not store any of these fuels or lubricants onsite and will fuel all of its heavy equipment using a mobile fueling service. Any unexpected release would be limited and not uncontrolled. In the event of a release of one of these fuels or lubricants the COR will be notified immediately and CAPE will take the following immediate action:

- CAPE will deploy all necessary controls such as absorbent pads and dikes to contain the release from further migration into the environment;

- If the release is still active after containment is in-place, CAPE will make effort to stop the flow of the release by plugging, capping, or crimping the source of the release; and
- Once the spill is controlled, all spilled fuel or lubricant and impacted media will be immediately cleaned up using absorbent pads and bulk absorbent media with the use hand implements. All contaminated material will be placed in secured closed drums and labeled accordingly. Subsequent arrangements will be made for their proper disposal.

In the event of a spill of fuel or lubricant which leads to the following:

- Causes a sheen to appear on surface water or any navigable water of the State of Hawaii;
- Causes free product to appear on groundwater;
- Results in a release of greater than 25 gallons; or
- Results in a release of less than 25 gallons, but which is not contained and remediated within 72 hours.

CAPE will additionally notify the COR of spills or releases that may require reporting under the following federal, state, municipal, and military agencies.

- The Navy on Scene Coordinator (NOSC) NRH ENV at 473-4689;
- The Regional Dispatch Center (RDC) will be notified at 474-1271. If the spill can be cleaned up without assistance from the Navy Region Hawaii (NAVREGHI), the caller shall so inform the dispatcher at the RDC when making the call so that emergency response personnel are not dispatched. If assistance is needed, the RDC shall send the appropriate personnel and equipment;
- The National Response Center will be verbally notified within 15 minutes of the spill at 1-800-424-8802 and a written report shall follow notification within 24 hours of the incident;
- The DOH HEER office will be verbally notified within 15 minutes of the spill at 586-4249, or for afterhours 247-2191. A written follow-up notification shall be sent no later than thirty (30) days after initial discovery of a release, and must be sent by certified mail, faxed, hand-delivered, or another means which provides proof of delivery;
- The Local Emergency Planning Committee will be notified within 15 minutes of the spill at 523-4121 and a written follow-up notification shall be post-marked no later than thirty (30) days after initial discovery of a release, and sent by certified mail or another means which provides proof of delivery;
- The MCBH Fire Department (911) will be notified within 24 hours of the incident.

All spills on NAVREGHI property shall be reported to the RDC by the responsible party causing the spill. If any spill involves a reportable quantity, the required reports and notifications will be completed.

10.5.1 Spill Response Equipment and Materials

CAPE will have the following equipment on site at all times in order to handle hazardous material releases:

- Noncombustible absorbent, such as vermiculite or floor-dry;
- DOT approved containers for temporary storage of spilled or leaking materials;
- Shovels, brooms and other hand tools; and,
- PPE (poly-coated Tyvek, nitrile gloves, goggles, caution tape, sheeting, etc.).

10.5.2 Contingency Plan

The following actions/measures will be implemented during a spill response action:

- Notify the Task Order COR immediately;
- Take immediate measures to control and contain the spill using above mentioned equipment and materials;
- Isolate and contain hazardous spill areas;
- Deny entry to unauthorized personnel;
- Do not allow anyone to touch spilled material;
- Stay upwind;
- Keep out of low areas;
- Keep combustibles away from the spilled material;
- Use water spray to reduce dust, as needed;
- Perform cleanup activities as directed by the Task Order COR using competent/qualified personnel;
- Take samples for analysis to determine that cleanup is adequate;
- If released from tanks, prevent discharge beyond site boundaries; and
- Any other actions as needed.

10.5.3 Notification of Spills and Discharges

CAPE will notify the COR and RPM of all spills and releases under Federal and local regulation, including, but not limited to 40 CFR 110, 302, 355, 370, 372, etc., immediately upon discovery of a spill or discharge. A report will be submitted no later than 24 hours after a release, including the following items:

- Description of material spilled, including identity, quantity, and a copy of the waste disposal manifest;
- Exact time and location of the spill, and the description of the area involved;
- Containment procedures utilized;
- Description of the cleanup procedures employed at the site, including disposal of spill residue;
- Summary of CAPE's communications with other agencies; and,
- Determination if the spill has been reported to the Task Order COR and/or reportable, and the date that the report to the appropriate agency was made, and the name of the agency representative who accepted the report.

10.6 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW-ACT

The EPCRA established requirements for federal, state and local governments regarding emergency planning and "Community Right-to-Know" reporting on hazardous and toxic chemicals. The Community Right-to-Know provision allows public access to information on chemicals at individual facilities, their uses, and releases into the environment. The repository for information on the site is available for public review at the following location:

Hawaii State Emergency Response Commission
Hawaii State Department of Health
919 Ala Moana Boulevard, Room 206
Honolulu, Hawai'i 96814

11. SUBMITTALS

CAPE will prepare a RVR to summarize all work performed under this CTO. The RVR will include a narrative of removal action activities to include procedures implemented and deviations from the WP and objectives of the removal action. The RVR will present a tabular listing of all analytical results in comparison to corresponding site cleanup goals and will include conclusions and recommendations.

At a minimum, the RVR will include the following:

- Site diagrams and/or figures including excavation boundaries;
- Site photographs documenting field activities;
- Summaries and results of any field tests conducted;
- A summary of all sampling and analyses conducted;
- Tabular listings of all laboratory analytical results accompanied by the pertinent data validation qualifiers, as applicable;
- Copies of all laboratory data quality assessment reports, chain-of-custody forms, and waste disposal documentation generated during the removal action; and
- Written responses to regulator comments on the draft RVR. The review comments and final responses to comments will be included in the final RVR as an appendix.

12. REFERENCES

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Figures

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NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

SITE LOCATION MAP

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 1-1

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NAVFAC

REVISIONS:		
No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

FACILITIES DEPARTMENT SALVAGE YARD
LAYOUT AND ADJACENT AREAS

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2025
SCALE: AS SHOWN	FILE NAME: MCBH Salvage Yard RSE Fig 1-2

SHEET NUMBER

FIGURE 1-2

DEPTH
0-6 IN

DEPTH
6-12 IN

DEPTH
12-24 IN

DEPTH
24-48 IN

TRUE NORTH
SCALE: 1"=200'

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

100' 0 100' 200'
SCALE: 1" = 200'

REVISIONS:

No.	Date	By	Chk.	Remarks

NAVFAC

PROJECT NAME
REMOVAL AND CLOSURE OF
(1) 550-GALLON UNDERGROUND STORAGE TANK
WHEELER ARMY FIELD
CAMP STOVER
OAHU, HAWAII

SHEET TITLE
PCB CONCENTRATIONS AND DEPTHS

CONTRACT NO:
N62742-10-D-1804, CTO 0025

JOB NO:
01804.025.003

CHECKED BY:
E.MOLHOEK

DRAWN BY:
C.RIOS

DATE:
APRIL 2015

FILE NAME:
MCBH Salvage Yard RSE Figs 1-3_5-2

SHEET NUMBER:
FIGURE1-3

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NAVFAC	REVISIONS: No. / Date / Remarks	PROJECT NAME: REMOVAL ACTION AT SALVAGE YARD MCB HAWAII, KANEOHE, HAWAII	SHEET TITLE: EXCAVATION AREAS	CONTRACT NO: N62742-10-D-1804 / T.O. NO: CTO 0025; CHECKED BY: E.MOLHOEK / JOB NO: 01804.025.003; DRAWN BY: C.RIOS / DATE: APRIL 2015; SCALE: AS SHOWN / FILE NAME: MCBHSalvYdRSEFigs1-3_5-1	SHEET NUMBER: FIGURE 5-1

REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS A

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-2

SHEET NUMBER

FIGURE 5-2

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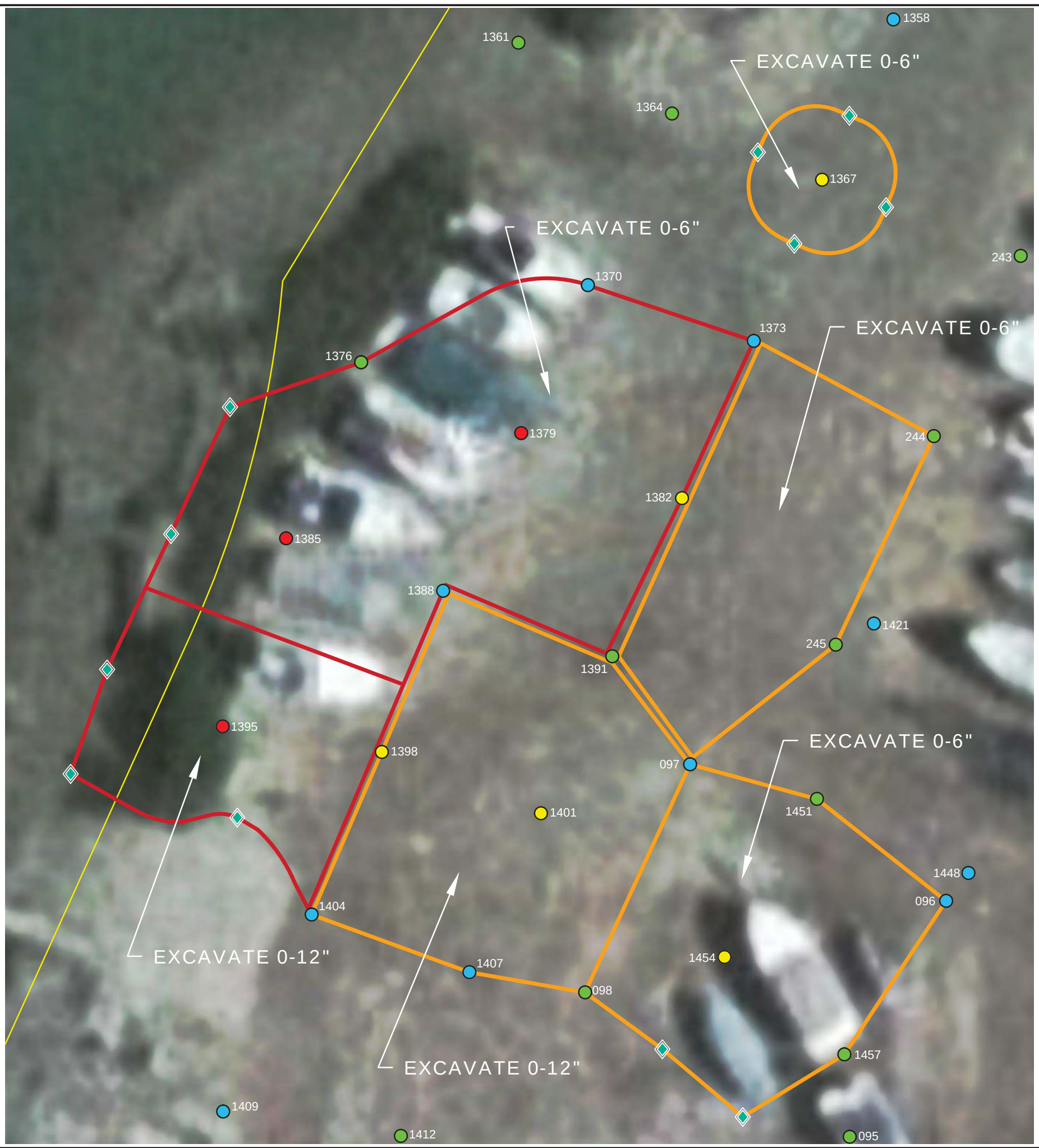

LEGEND

REF: GOOGLE EARTH IMAGE, 2010

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- TSCA EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS B

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-3

SHEET NUMBER

FIGURE 5-3

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LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

REF: GOOGLE EARTH IMAGE, 2010

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS C

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-4

SHEET NUMBER

FIGURE 5-4

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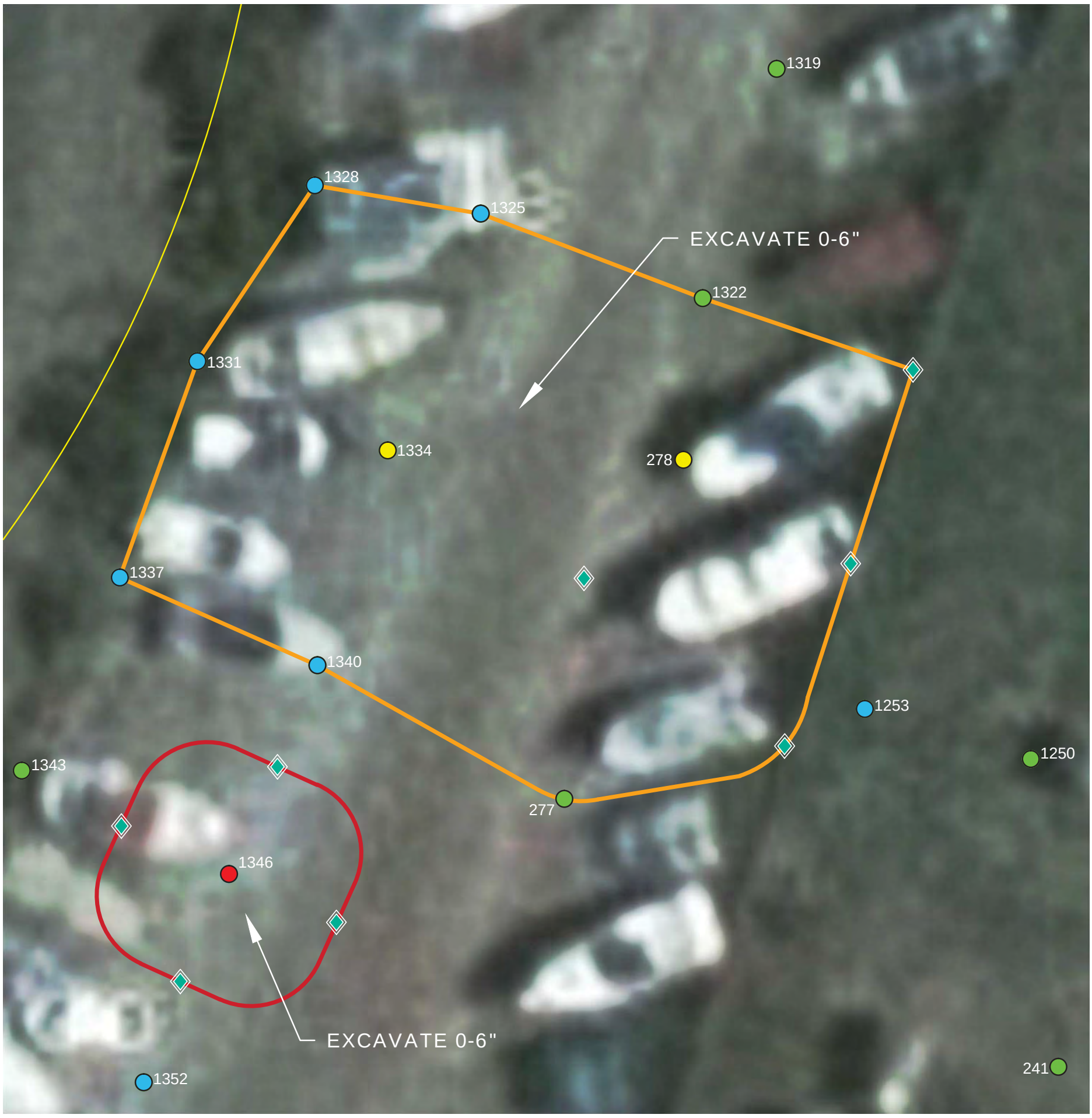

REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- TSCA EXCAVATE BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

8 0 8 16

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS D

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-5

SHEET NUMBER

FIGURE 5-5

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REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS E

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-6

SHEET NUMBER

FIGURE 5-6

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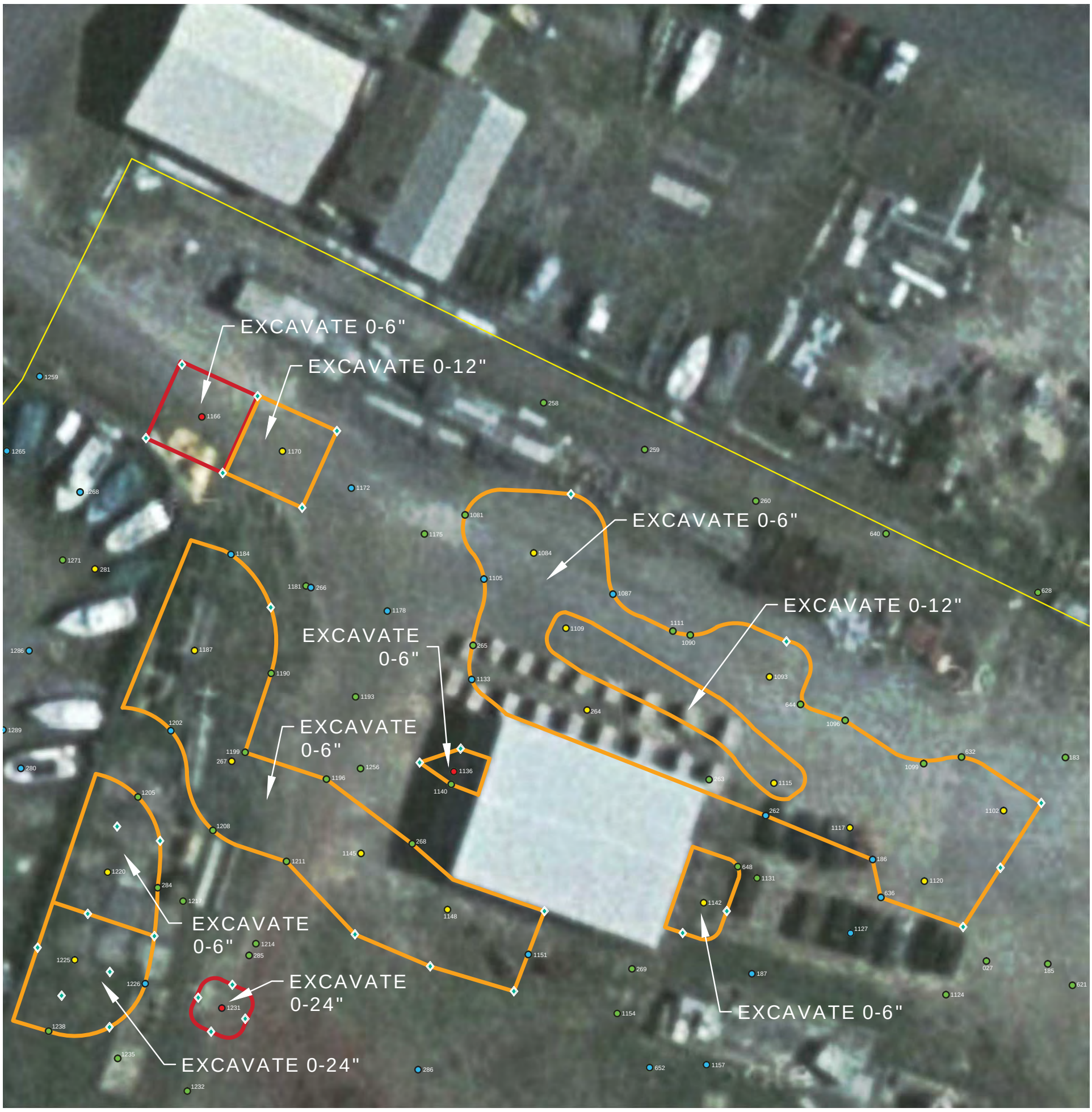

REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- TSCA EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

20 0 20 40

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS F

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-7

SHEET NUMBER

FIGURE 5-7

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REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS G

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-8

SHEET NUMBER

FIGURE 5-8

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REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- TSCA EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS H

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-9

SHEET NUMBER

FIGURE 5-9

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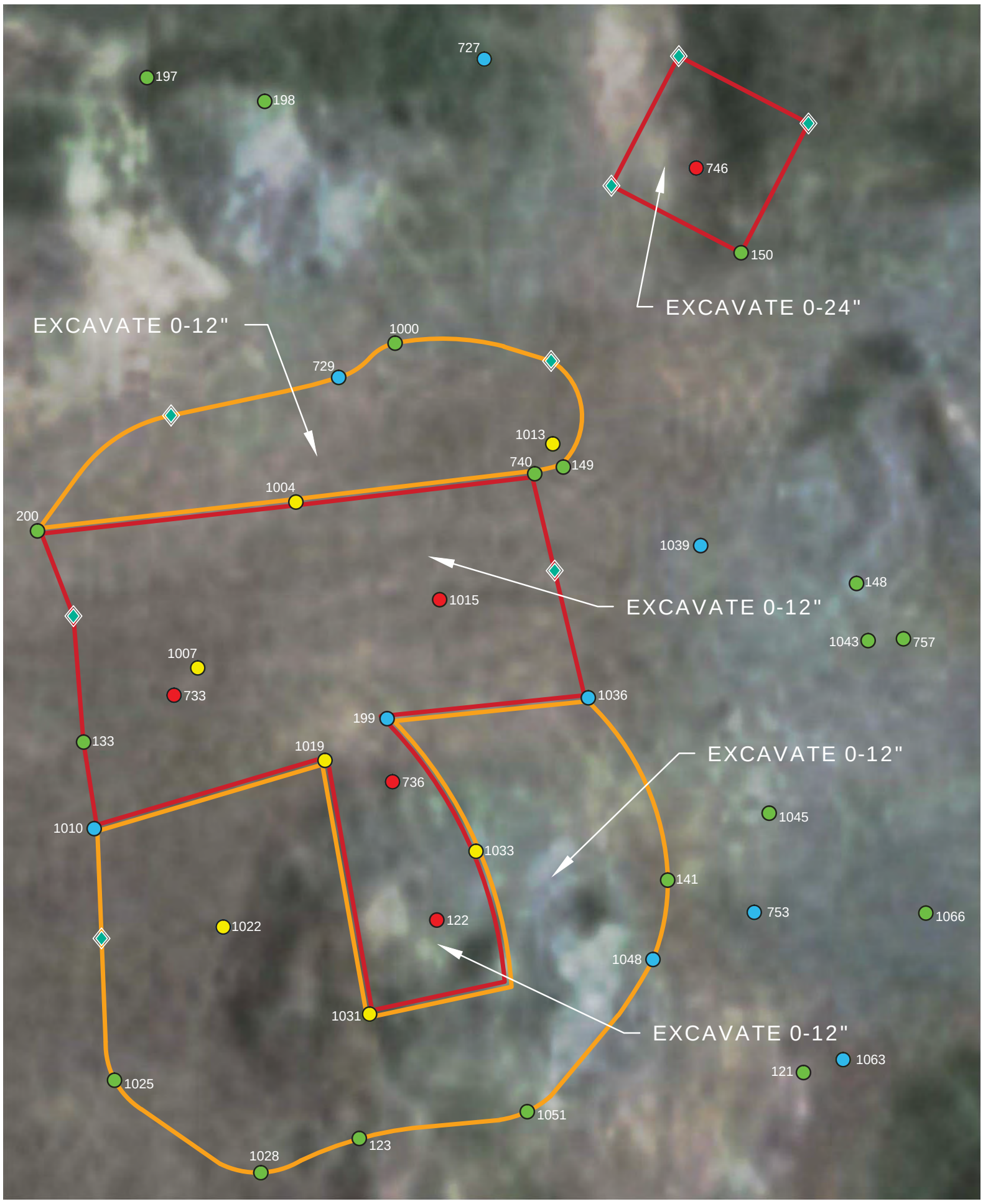

REF: GOOGLE EARTH IMAGE, 2010

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY
- CERCLA NON-HAZARDOUS EXCAVATION BOUNDARY
- TSCA EXCAVATION BOUNDARY
- PRE-EXCAVATION DELINEATION/POTENTIAL CONFIRMATION SAMPLE LOCATION

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

N

10 0 10 20

SCALE IN FEET

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

EXCAVATION AREAS I

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: J.BORR	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: APRIL 2015
SCALE: AS SHOWN	FILE NAME: MCBH SY...FIG 5-10

SHEET NUMBER

FIGURE 5-10

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Appendix A
Project Quality Control Plan

Final

Project Quality Control Plan
Removal Action at Salvage Yard
MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

Final

Project Quality Control Plan
Removal Action at Salvage Yard
MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

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PROJECT QUALITY CONTROL PLAN (PQCP)

Removal Action at Salvage Yard
Marine Corps Base Hawaii, Kaneohe, Hawaii

CONTRACT N62742-10-D-1804

CTO 0025

I hereby certify that the enclosed Project Quality Control Plan is in compliance with contract specifications and is submitted for government approval. Once approved, the PQCP will be implemented during the CTO 0025 execution of "*Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii*".

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TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS iv

1. INTRODUCTION 1-1
   - 1.1 Project Quality Management 1-1
   - 1.2 Quality Commitment 1-1
   - 1.3 Project Description 1-2

2. REFERENCES 2-1

3. PROJECT QUALITY CONTROL PLAN 3-1
   - 3.1 Purpose 3-1
   - 3.2 PQCP Content 3-1

4. QUALITY CONTROL PROGRAM ORGANIZATION 4-1
   - 4.1 Quality Control Structure 4-1
   - 4.2 Position Roles and Responsibilities 4-1
     - 4.2.1 Program Manager 4-1
     - 4.2.2 Program Quality Assurance Manager 4-1
     - 4.2.3 Program Health and Safety Manager 4-3
     - 4.2.4 Project Manager 4-3
     - 4.2.5 Site Superintendent 4-3
     - 4.2.6 Quality Control Officer 4-3
     - 4.2.7 Project Chemist 4-3
     - 4.2.8 Subcontractors 4-4
   - 4.3 Organizational Changes 4-4

5. MEETINGS 5-1
   - 5.1 Coordination and Mutual Understanding Meeting 5-1
   - 5.2 Quality Control Meetings 5-1
   - 5.3 On-site Meetings 5-1
   - 5.4 Meeting Minutes 5-1

6. CONTROL 6-1
   - 6.1 Three-Phase Control System 6-1
     - 6.1.1 Preparatory Phase 6-1
     - 6.1.2 Initial Phase 6-2
     - 6.1.3 Follow-up Phase 6-2
     - 6.1.4 Additional Preparatory and Initial Phases 6-3
   - 6.2 Control for Off-Site Work 6-3
   - 6.3 Deficiency Management 6-3
     - 6.3.1 Preventive Measures 6-3
     - 6.3.2 Continual Improvement 6-3

7. TESTING AND INSPECTION 7-1
   - 7.1 Analytical Testing 7-1
   - 7.2 Inspection 7-1
     - 7.2.1 Receiving Inspection 7-1
     - 7.2.2 Punch-Out Inspection 7-1
     - 7.2.3 Pre-Final Inspection 7-1
     - 7.2.4 Final Acceptance Inspection 7-1
   - 7.3 Instrumentation/Equipment Testing, Inspection, and Maintenance 7-2

TABLE OF CONTENTS

8. QUALITY CONTROL CERTIFICATION 8-1

8.1 Contractor Quality Control Report Certification 8-1
8.2 Invoice Certification 8-1
8.3 Completion Certification 8-1

9. QUALITY CONTROL DOCUMENTATION 9-1

9.1 Reporting Requirements 9-1
9.1.1 Daily Contractor Production Report 9-1
9.1.2 Daily Contractor Quality Control Report 9-2
9.1.3 Testing Plan and Log 9-2
9.1.4 Rework Items List 9-3
9.1.5 Monthly Summary Report of Field Tests 9-3
9.1.6 Quality Control Meeting Minutes 9-3
9.1.7 Safety and Health Deficiency Tracking 9-3
9.1.8 Field Log Book 9-3
9.2 Records Management 9-4
9.3 Change and Control Procedures 9-4

10. SUBMITTALS 10-1

10.1 Submittal Register 10-1
10.2 Submittal Schedule 10-1
10.3 Submittal Procedure 10-1
10.4 Re-submittal Procedure 10-2
10.5 Deviations 10-2
10.6 Control of Submittals 10-2
10.7 Internal Review 10-2
10.8 Certification 10-2
10.9 Transmittal to the Navy 10-2
10.9.1 Transmittal Form 10-2
10.10 Comment Response Matrix 10-3

11. NONCONFORMANCE REPORTING 11-1

11.1 Nonconformance Definition 11-1
11.2 Deficiency Identification 11-1
11.3 Nonconformance Determination 11-1
11.4 Planning and Implementing the Corrective Action 11-1
11.5 Accepting Corrective Action 11-1
11.6 Verifying Corrective Action 11-1
11.7 NCR Distribution 11-1

12. AUDITS AND ASSESSMENTS 12-1

12.1 Management System Reviews 12-1
12.2 Project Audits 12-1
12.3 Laboratory Audits 12-1
12.4 Project Self-Assessments 12-2

TABLE OF CONTENTS

FIGURES

Figure 4-1: Project Quality Control Plan Organizational Structure 4-2

ATTACHMENTS

1 Schedule of QC Observations and Testing By Definable Feature of Work

2 PQCP Forms

3 Qualification of the QCO and Alternate QCO

ACRONYMS AND ABBREVIATIONS

AHA	Activity Hazard Analysis
CAPE	Cape Environmental Management, Inc
CD	Compact Disk
CIH	Certified Industrial Hygienist
CO	Contracting Officer
COC	Chain of Custody
COR	Contracting Officer's Representative
CTO	Contract Task Order
DFW	Definable Feature of Work
DoD	Department of Defense
DQCR	Daily Quality Control Report
DQO	Data Quality Objectives
DVD	Digital Versatile Disk
ELAP	Environmental Laboratory Accredited Program
EPA	Environmental Protection Agency
EZ	Exclusion Zone
FCR	Field Change Request
FTP	File Transfer Protocol
H&S	Health and Safety
MCBH	Marine Corps Base Hawaii
NAVFAC	Naval Facilities Engineering Command
NCR	Nonconformance Report
OSHA	Occupational Safety and Health Administration
PGM	Program Manager
PM	Project Manager
POC	Point of Contact
PQCP	Project Quality Control Plan
PWS	Performance Work Statement
QA	Quality Assurance
QC	Quality Control
QCO	Project Quality Control Officer
UFGS	United Facilities Guide Specification
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SHSS	Site Health and Safety Specialist
SSHP	Site Safety and Health Plan
USACE	United State Army Corps of Engineers
WP	Work Plan

1. INTRODUCTION

This Project Quality Control Plan (PQCP) addresses the requirements for the performance of work under Contract N62742-10-D-1804, Contract Task Order (CTO) 0025, "*Removal Action at Salvage Yard, Marine Corps Base Hawaii (MCBH), Kaneohe, Hawaii"* for the Naval Facilities Engineering Command (NAVFAC) Hawaii. It reflects company commitment to quality and is the blueprint for ensuring quality deliverables for this CTO. It identifies requirements and assigns responsibilities for ensuring that the project objectives are met. To do this, it describes or references the controls, quality procedures and processes, and guidelines to be followed.

This PQCP has been developed in accordance with the Performance Work Statement (PWS) for this CTO, and the Program Quality Control (QC) Plan.

1.1 PROJECT QUALITY MANAGEMENT

The information provided in this PQCP will ensure compliance with the quality and schedule goals and applicable statutory and regulatory requirements. The PQCP describes the specific procedures that will be implemented during execution of CTO activities at the site. To accomplish these activities, CAPE Environmental Management, Inc. (CAPE) will demonstrate its commitment and focus on quality management by:

- Maintaining strict adherence to the PWS and CTO requirements;
- Continually assessing the changing needs of NAVFAC Hawaii and proactively requesting feedback on our performance;
- Ensuring that all staff assigned to the CTO are qualified, experienced, trained, and have the aligned attitude for high-quality and responsive service to our client;
- Providing adequate equipment and resources to meet the client's needs; and
- Auditing and assessing CAPE's performance to identify aspects of our work that we can improve and to continuously be in the process of creating the "next edition" of these improved services.

1.2 QUALITY COMMITMENT

CAPE's commitment to adhere to this PQCP is better affirmed by quoting the company's corporate quality policy:

> *Each CAPE Staff Member must demonstrate a full understanding of and total commitment to a strong culture of quality based on solid financial performance and operational excellence.*

Quality at CAPE is:

- Client Satisfaction (internal and external)
- Deliverables, services, and products meet the client's criteria and are delivered within a promised schedule
- Profitability
  - Tasks and projects are performed within budget
  - Budgets are established and followed that make the project and firm profitable
- No Health and Safety (H&S) Incidents
- No Liabilities
  - All activities meet legal, regulatory, and client's program requirements.
    The decisions made and the tasks accomplished by each CAPE staff member are performed in accordance with and measured against CAPE's definition of quality. Each staff member must believe that every action they perform that meets CAPE's

definition of quality creates immediate and long-term success for CAPE and its staff members.

Quality is achieved at CAPE by using the following fundamental principles that define CAPE's quality culture:

- Comprehensive planning/approval of all tasks and related budgets/schedules/profit goals
- Listening to and gaining a full understanding of a client's needs (internal and external) before executing a task
- Effective, clear, and timely communications with suppliers and clients (especially on scopes of work, plans, budgets, schedules, roles, responsibilities, authorities, and expectations)
- Comprehensive monitoring of task execution and financial and budget/schedule performance
- Only using staff properly trained for the task they are assigned
- Clear, organized, up-to-date, and properly filed documentation
- Establishing, documenting, and following approved work processes
- Effective teamwork
- Reviewing all work products (by a reviewer of the same or higher technical ability as the producer) before the work product is delivered to a client (internal and external)
- Continuous improvement.

1.3 PROJECT DESCRIPTION

The objective of the project is to remove polychlorinated biphenyl (PCB)-contaminated soil exceeding cleanup goals and to evaluate levels of residual contamination remaining at the Site. The Removal Action will be achieved by excavating contaminated soil in excess of the site cleanup goals and properly disposing of the soil. Prior to excavation delineation and waste characterization sampling will be performed to refine excavation boundaries and characterize the waste. Following excavation, confirmation soil sampling will be performed to evaluate whether all soils in excess of the site screening levels (which are discussed in detail in the site specific SAP- Appendix C) have been removed.

2. REFERENCES

The publications/documents listed below are incorporated by reference into this PQCP:

- NAVFAC Pacific PWS for Delivery Order 25, dated 17 September, 2014.
- Quality Control Program Plan. CAPE November 2010, prepared for NAVFAC Pacific.
- United States Army Corps of Engineers (USACE) 2005, Construction Quality Management For Contractors, Student Study Guide
- CAPE's Corporate Quality Assurance (QA) Program
- USACE, NAVFAC, Air Force Center Engineering Support Agency (AFCESA), National Aeronautical Space Administration (NASA), United Facilities Guide Specification (UFGS) section 014500.00.10 QC, February 2010

3. PROJECT QUALITY CONTROL PLAN

3.1 PURPOSE

The purpose of the PQCP is to establish an effective QC System for all operations, both on and off site, to be followed and implemented during the performance of the CTO. The implementation of this system will ensure, with a reasonable degree of certainty, that completed activities meet and/or exceed all NAVFAC Hawaii criteria, plans, and specifications. The purpose of this PQCP is also to provide project-level QC requirements in accordance with CTO requirements.

3.2 PQCP CONTENT

The PQCP describes the procedures and organization required to ensure that the CTOs quality objectives are met. This plan addresses operations including work by subcontractors, fabricators, suppliers, and purchasing agents. In summary, the PQCP includes the following components:

- A description of the QC organization, including a chart showing lines of authority for this program;
- A list of responsibilities and authorities of the personnel typically assigned;
- Coordination and mutual understanding meeting and QC meetings;
- Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents;
- Procedures for maintaining proper document control and records management;
- Control, verification, and acceptance of testing procedures for each specific test required under the contract documents;
- Procedures for tracking and documenting preparatory, initial, and follow-up control phase inspections and tasks; verification and acceptance tests;
- Procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures will establish verification that identified deficiencies have been corrected; and
- Reporting procedures, including proposed reporting formats.

4. QUALITY CONTROL PROGRAM ORGANIZATION

CAPE has assembled a proven team to execute this project. CAPE will perform all site project management, QC management, H&S management, logistics, property control, and cost and schedule controls in-house and provide technical and management services locally as required. All subcontractor personnel will adhere to the requirements of this plan through their respective quality organizations and will ultimately report to the site specific QC Officer (QCO) concerning QC issues.

4.1 QUALITY CONTROL STRUCTURE

An organizational chart showing the reporting relationship of personnel involved in this project is provided in Figure 4.1. The QCO is responsible for the QC organization as supported by the Program QA Manager and additional QC staff as dictated by CTO directives. The QC team and organization will include the Program QA Manager, Program Manager (PGM), Program H&S Manager, and Project Manager (PM). Onsite construction QC organizations will include the QCO and Site Superintendent (SS). The responsibilities, authorities, and reporting requirements of these positions are identified in the following. The PGM and Program QA Manager will determine selection of qualified and experienced personnel for project-level positions.

To ensure independence from operations the QCO will report directly to the Program QA Manager. This structure ensures that quality issues within the project are not compromised by project cost/schedule considerations and are allowed to immediately rise to a higher program and corporate level of responsibility in the organization for resolution, as necessary.

4.2 POSITION ROLES AND RESPONSIBILITIES

4.2.1 Program Manager

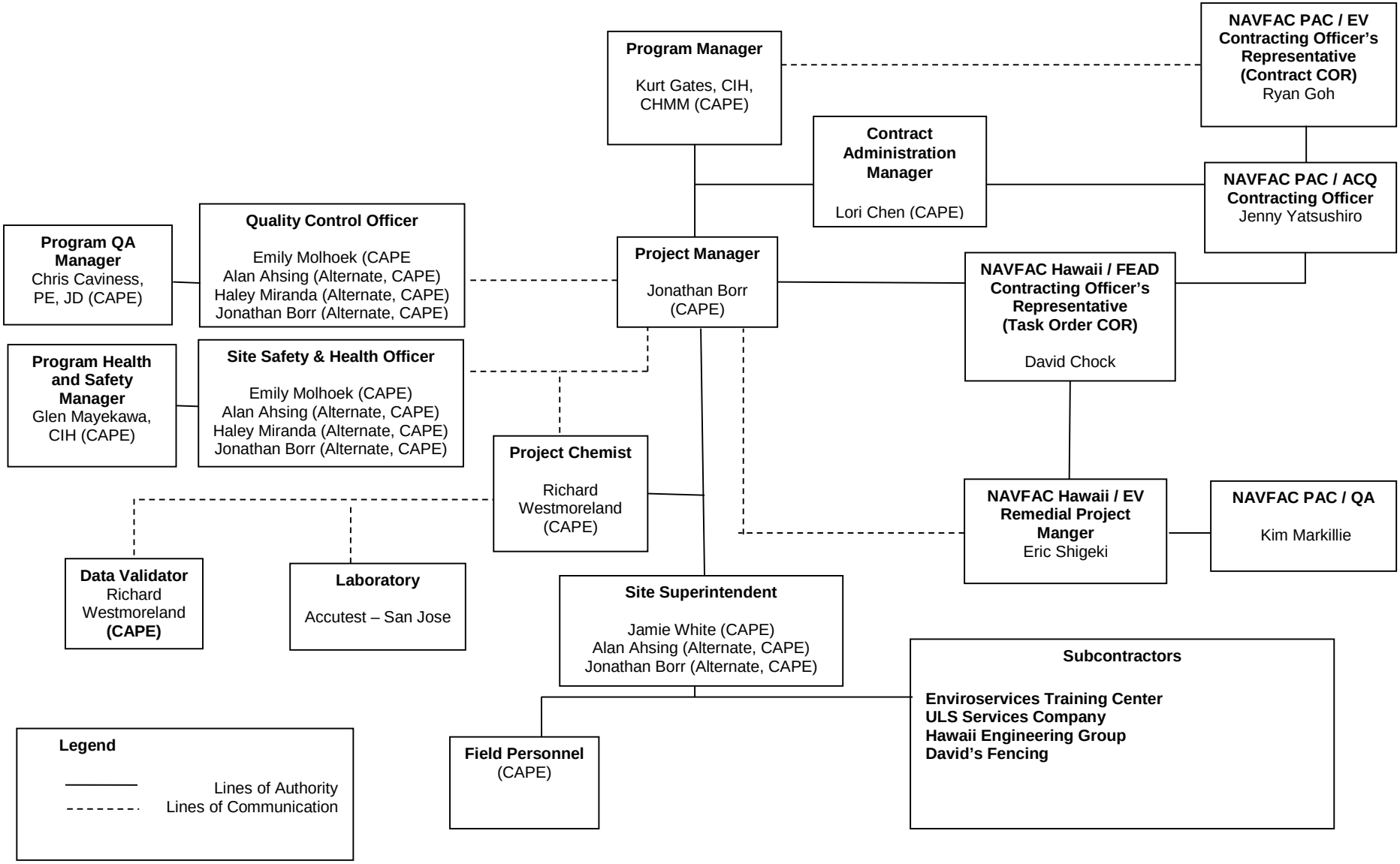
The PGM will be responsible for the overall management of tasks performed under this contract and will be the primary point of contact (POC) for overall contractual issues. He will be responsible for ensuring that practical and effective systems are developed to meet the objectives of the action. The PGM will also ensure that quality work is completed on schedule and within the allocated budget. The PGM reports directly to the NAVFAC Pacific Contracting Officer (CO) or designated representative.

4.2.2 Program Quality Assurance Manager

The Program QA Manager is responsible for developing, maintaining, and ensuring implementation of the contract-wide QC program. This responsibility includes oversight of activities, periodic reviews of the processes being implemented, evaluation of any recommendations made by the project team over the course of the program regarding use of these processes, and continuous improvement evaluations of the quality program. He will provide support to the project team in ensuring that the quality of products and services delivered to NAVFAC Hawaii is in accordance with the requirements described in the contract, CTO plans, drawings, specifications, PWS, and other project directives. The Program QA Manager will report directly to the Corporate Sponsor.

The Program QA Manager is also responsible for addressing any changes to the established contract-wide QA Program Plan with the concurrence of the CO or designated representative, and always be available for consultation when required by the contract or the CO or designated representative.

Figure 4-1: Project Quality Control Plan Organizational Structure



4.2.3 Program Health and Safety Manager

The Program H&S Manager will be responsible for the overall H&S Program and will develop, maintain, and ensure implementation of the H&S systems. This responsibility includes oversight, review, reporting, training, and control of employee H&S processes. The Program H&S Manager will review and approve all H&S-related plans. He will report directly to the PGM under this program.

4.2.4 Project Manager

The primary responsibility of the PM will be the day-to-day management of project resources and activities. Success of the project will be measured by achievement of project QC objectives, goals, and safe completion of the project on schedule and within the established budget. The PM will work closely with the QCO to communicate the QC requirements to the project staff. The PM will report directly to the PGM under this particular contract.

4.2.5 Site Superintendent

The SS will ensure that work at the Site occurs in a safe manner, and in accordance with the approved project Work Plan (WP), PQCP, and Site Safety and Health Plan (SSHP). Specifically, responsibilities will include the following:

- Serving as the primary field POC;
- Field implementation of the CTO, including day-to-day operations;
- Documenting all activities in the Daily Contractor Production Report;
- Oversight of field crews and ensuring that project tasks are completed according to the PWS;
- Sequencing subcontractors into work areas; and
- Working with the PM to plan day-to-day site activities.

4.2.6 Quality Control Officer

The QCO will ensure the proper implementation of the PQCP and SSHP. Specifically, responsibilities will include the following:

- Oversight and enforcement of the SSHP, including stop-work authority;
- Serving as the main POC for any onsite emergency;
- Ensuring compliance with project-specified safety and health requirements, Federal and Occupational Safety and Health Administration (OSHA) regulations, as well as the USACE Safety and Health Requirements Manual (EM 385-1-1, USACE 2008);
- Ensuring compliance with federal, State, and local regulations and requirements as appropriate;
- Developing, maintaining and enforcing the PQCP, and stopping work authority for quality reasons;
- Development and delivery of Daily Quality Control Reports (DQCRs); and
- Performing and maintaining three phases of control for each phase of work, to ensure that work complies with contract requirements.
- Performing inspections, tests, and periodic quality control meetings at the Site to track and report progress.

4.2.7 Project Chemist

The project chemist's responsibilities will include:

- Determining the appropriateness of sampling and analytical methods and laboratory quality systems;
- Overseeing preparation of sampling and testing portions of the Sampling and Analysis Plan;
- Verifying laboratory qualifications and make recommendations for laboratory selection;
- Coordinating with the laboratory during contract execution; and
- Notifying the QCO and Senior Scientist of any problems or nonconformance issues related to environmental sampling and testing as needed.

4.2.8 Subcontractors

All site personnel and subcontractors will be required to adhere to the procedures set forth in this PQCP. The Site Superintendent will be responsible for overall management and coordination of CAPE's site personnel and subcontractors and ensuring they perform all aspects of the work in accordance with the Work Plan, the SSHP, and this PQCP. The QCO will be responsible for ensuring the site personnel and subcontractors perform all aspects of the work in accordance with this PQCP. The SHSS will be responsible for ensuring the site personnel and subcontractors perform all aspects of the work in compliance with the SSHP.

The SS, through a concerted effort with the SHSS and Program H&S Manager, will ensure that site personnel assigned to the project are aware of company and site policies and procedures and abide by them to provide a safe working environment.

4.3 ORGANIZATIONAL CHANGES

When necessary, CAPE will revise the PQCP to reflect changes and submit the changes to the Task Order Contracting Officer's Representative (COR) for acceptance.

5. MEETINGS

While performing work under this CTO, CAPE will take part in various meetings during which they will update the client, and when applicable, other stakeholders, on the progress, results, deviations or modifications, and recommendations for the fulfillment of the scope of work.

5.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

Prior to start of the site work, the QCO will meet with the Task Order COR or designated representative to discuss the PQCP.

During the meeting, a mutual understanding of the system details will be developed, including the forms for recording the QC operations, administration of the system for both on-site and off-site work, management, and the interrelationship of CAPE's management and control with the government's QA, production, and the QCO's duties with the CO or designated representative.

As a minimum, CAPE personnel required to attend will include the PM, SS, and QCO. This meeting will likely be held in conjunction with the Pre-Construction Meeting.

5.2 QUALITY CONTROL MEETINGS

The QCO will conduct regular QC meetings with the Task Order COR, PM, and Site Superintendent after the start of fieldwork and until the CTO fieldwork is complete. The meetings will be recorded in the DQCR. These meetings may be held in conjunction with other meetings (i.e. tailgate safety meetings, progress meetings). At a minimum, the following shall be covered at each meeting:

- Minutes from the previous QC meeting
- Work or testing accomplished since the last QC meeting
- Rework items identified and/or completed since the last QC meeting
- Current schedule, work to be accomplished before the next QC meeting, and the documentation required
- Review the status of submittals
- Coordination and/or notifications required for proposed work
- Completion dates for rework items
- Preparatory, initial, follow-up phase inspections, and testing required
- Resolve any QC/production issues with required documentation
- Revisions to the PQCP, such as changes in procedures.

5.3 ON-SITE MEETINGS

During the course of fieldwork, meetings may take place, whether planned or unplanned, at the site to discuss specific issues or concerns. The QCO will be responsible for documenting discussions and decisions made at the meeting on the DQCR.

5.4 MEETING MINUTES

Minutes of all meetings will be prepared describing the general discussion, decisions, changes in approach, and action items. CAPE will submit the meeting minutes to participants within the timeline specified by the PWS. As a general rule, minutes will be distributed within 48 hours of the meeting.

6. CONTROL

The following are the Definable Features of Work (DFWs) identified for this CTO:

1. Mobilization
2. Delineation/Waste Characterization Sampling
3. Excavation
4. Confirmation Sampling
5. Transportation and Disposal
6. Site Restoration
7. Demobilization

Specific QC activities are defined for each DFW in tables included as Attachment 1 to this PQCP.

6.1 THREE-PHASE CONTROL SYSTEM

The three-phases of control are the core of the Construction Quality Management System and are the means by which CAPE ensures that construction, including that of subcontractors and suppliers, complies with the requirements of the contract. Three-phase control system will be conducted by the QCO for each DFW of the construction work as per the specifications. A DFW is a task that is separate and distinct from all other tasks and has a specific set of control requirements (e.g., concrete placement, soil compaction, and instrumentation).

Each control phase provides an opportunity to prevent deficiencies that result in nonconformance. Implementation of the three-phased QC process is the responsibility of the project team. Surveillance during the execution of these activities will be noted on the appropriate forms contained in Attachment 2. For each task assignment, specific charts, checklists, etc., will be prepared to assist the QCO in ensuring that the work elements are properly performed.

6.1.1 Preparatory Phase

The preparatory meeting will be held before the start of construction and is typically conducted by the QCO (or designated member of the QC team) with other applicable site personnel in attendance. The NAVFAC Hawaii RPM/Task Order COR will also be invited to attend the meeting. Any subcontractors involved in the DFW will participate in this review as well. The QCO will send out notice in advance of the meeting so that appropriate personnel may attend.

During this phase, it is imperative to review the specifications and drawings to ensure all preparatory steps have been taken, to verify that submittals have been prepared and reviewed, qualified manpower is assigned, testing controls are prepared and in place, and safety issues have been identified and addressed. Specifically, this phase will include:

- Review of each paragraph of applicable specifications and drawings;
- Review of provisions that have been made to provide required control testing and inspection;
- Concurrence that required project training and qualifications are complete (QC, H&S, technical, etc.);
- Review to ensure that all materials and/or equipment have been tested, submitted, and approved;
- Review of applicable permit status and requirements;
- Examination of the work area to ensure that all required preliminary work has been completed and is in compliance with the contract;

- Examination of all required materials, equipment, and sample work to ensure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored;
- Review of the appropriate activity hazard analysis (AHA) to ensure safety requirements are met;
- Discussion of construction method and establish construction tolerances and workmanship standards;
- Check to ensure the portion of the plan for the work to be performed has been accepted by the client; and
- Discussion of the initial control phase.

6.1.2 Initial Phase

This phase of inspection will document the completeness and acceptability of the particular items at the beginning of the work activity after a representative portion of the items has been completed. This inspection is typically held with most of the personnel present during the preparatory meeting. This is the time to ensure that CAPE and subcontractor personnel/workers understand, through immediate inspection, the contract standards and the standards of workmanship desired. If there is a difference of opinion in the interpretation of contract requirements, this is the time to settle the issue. The initial inspection phase is a practical method of performing preventive inspection and resolving conflicts. The following will be accomplished during this phase:

- Review of minutes of the preparatory meeting for open items;
- Check of the work to ensure that it is in full compliance with the project requirements;
- Verification of adequacy of controls. Verification of required control inspection and testing are being performed;
- Establishment of level of workmanship and verification that it meets the desired acceptable workmanship standards. Comparison with required sample panels as appropriate;
- Resolution of all differences between personnel and subcontractors;
- Check of safety to include compliance with and upgrading (if necessary) of the SSHP and AHA. Review applicable AHAs with each worker;
- Preparation of documentation of the initial phase inspection, including a narrative description of detailed inspection procedures, minutes of meetings, inspection results, corrective measures, etc., using forms presented in Attachment 2 of this PQCP;
- The initial phase will be repeated for each new crew to work onsite or any time acceptable specified quality standards are not being met.

6.1.3 Follow-up Phase

Follow-up inspection and testing is geared toward a level of effort to verify the continuation of project compliance and standards of workmanship established during the previous two phases. This inspection is typically conducted periodically by the QCO (or designee) to ensure a continuation of satisfactory quality standards. Follow-up inspections will be made a matter of record in the DQCR and inspection checklists for each DFW. The QCO will closely monitor the actual field testing, verifying proper procedure technique, sample handling, and Chain of Custody (COC), if required. The QCO will monitor testing results and compare them with the project requirements, and if acceptable, document the results and provide a timely authorization to proceed with subsequent work. If the QCO determines the test results or work is otherwise not acceptable, he/she will notify the PM for stopping work and initiating a conformance action. Final

follow-up checks will be conducted, and all deficiencies will be corrected before the start of additional DFWs.

6.1.4 Additional Preparatory and Initial Phases

Additional preparatory and initial phases will be conducted on the same DFW if the quality of ongoing work is unacceptable; if there are changes in the applicable QC staff, on-site supervision, or work crew; if work on a DFW is resumed after a substantial period of inactivity; or if other problems develop.

6.2 CONTROL FOR OFF-SITE WORK

When necessary to perform the scope of work for a project, work may take place offsite. This may include analytical testing at a certified laboratory, manufacturing of material or equipment for use or installation at a project site, work performed by subcontractors in fulfilling the project objectives, or other activities. In such cases, CAPE will control the quality and workmanship of products or equipment developed offsite by implementing the same control measures as work that takes place at a project site. This will ensure that products and materials meet the overall quality and technical standards for the CTO as well as the contract and ensure that materials delivered to the job site conform to expected standards.

When a piece of equipment or material is produced offsite, the CAPE Project Engineer and/or QCO will oversee development of the design plans for such equipment or materials. He/she will review shop drawings, calculations, or other relevant data produced by the manufacturer or specialty subcontractor, may visit the manufacturer during or after production to ensure proper construction and adherence to acceptable tolerances, and document changes, modifications, or corrections to the design or construction.

6.3 DEFICIENCY MANAGEMENT

The CAPE quality program evaluates the effectiveness of the company's QC program and ensures continuous improvement in the quality of CAPE's work. The primary goals of CAPE's quality program are to prevent non-conformances and to facilitate continual process improvement. If the first goal is not achieved, the identified deficiencies or non-conformances will be corrected in a timely and cost-effective manner in order to prevent their recurrence. The PQCP will include provisions for preventing quality issues, facilitating process improvements, as well as identifying, documenting, and tracking deficiencies until corrective actions have been verified.

6.3.1 Preventive Measures

While the entire QC program is directed toward problem prevention, certain elements of the program have greater potential to be pro-active. The primary tools for preventing problems include:

- Employee qualification and training
- Preparatory, initial, and follow-up inspections
- Equipment calibration and maintenance

6.3.2 Continual Improvement

All project personnel are encouraged to recommend improvements to work processes and techniques. The intent is to identify activities that are compliant but may be performed in a more efficient or cost-effective manner. Typical quality improvement recommendations include identifying an existing practice that can be improved (e.g., a bottleneck in production) and/or recommending an alternative practice that provides a benefit without compromising the standards of quality.

Project personnel may bring their recommendations to the attention of project management or QC staff through verbal or written means; however, deviations from established protocols will not be implemented without prior written approval by the PM and concurrence of the QCO. When a staff-initiated recommendation results in a tangible benefit to the project, the PM will give public acknowledgement. All

variances from the contract specifications or drawings will be documented using a Field Change Request (FCR) form (Attachment 2). This form will identify the variance, proposed change, technical justification, and cost and schedule impacts (to be determined by the PM as applicable). FCR forms may include either additions or deletions of work elements and may be identified by CAPE, NAVFAC Hawaii, or its agent. All FCR forms will be submitted to the Task Order COR to be reviewed, approved, and signed prior to implementation.

7. TESTING AND INSPECTION

7.1 ANALYTICAL TESTING

CAPE will procure the services of an independent analytical laboratory with Department of Defense (DoD) Environmental Laboratory Accredited Program (ELAP) certification to perform analytical testing required by this CTO. The testing laboratory will have an established and documented quality system in compliance with the DoD Quality Systems Manual for Environmental Laboratories.

Laboratories must possess any required state or host nation certification and/or be accredited for each applicable method by a nationally recognized laboratory accreditation body.

Changes to the Laboratory Accreditation Status will be noted, in writing, to the government within 30 calendar days of the change.

Chemical analysis will be performed using current U.S. Environmental Protection Agency (EPA) procedures and in conformance with DoD Quality Systems Manual for Environmental Laboratories and state agency requirements unless otherwise specified in the PWS.

CAPE will provide the Analytical Results citing applicable contract requirements or test procedures used. Analytical Results will also provide a statement indicating if the analysis performed "conforms" or "does not conform" to the requirements.

7.2 INSPECTION

Inspection activities involve the evaluation of a characteristic as it relates to a specific requirement. Following CTOs directives, CAPE may perform:

7.2.1 Receiving Inspection

Incoming materials will not be used until they have been inspected or tested and found to be conforming to specified requirements, have not been damaged during the delivery process, and storage provided is adequate to preserve the material. Inspection will be provided by a member of the QC Team.

7.2.2 Punch-Out Inspection

A "punch list" of items that do not conform to the approved drawings and specifications will be prepared and included in the QC documentation. The list of deficiencies will include the estimated date by which the deficiencies will be corrected. The QCO or staff will make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, the QCO will notify the government that the facility is ready for the government pre-final inspection.

7.2.3 Pre-Final Inspection

The government and QCO will perform the pre-final inspection to verify that the work is complete and ready to be occupied. A government pre-final punch list may be developed as a result of this inspection. The QCO will ensure that all items on this list have been corrected before notifying the government so that a final inspection with the client can be scheduled. Any items on the pre-final inspections will be corrected in a timely manner. These inspections and any deficiency corrections required by this paragraph will be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates. CAPE will notify NAVFAC Hawaii 14 days prior to the pre-final inspection.

7.2.4 Final Acceptance Inspection

The CAPE PM will notify the Task Order COR when all deficiencies of the punch list from the pre-final inspection have been corrected. The Task Order COR will be notified of the scheduled date at least 14 calendar days before the final acceptance inspection and will be given CAPE's assurance that all specific items previously identified are acceptable, along with all remaining work under the contract. The CAPE

QCO, Site Superintendent, and the Task Order COR will be in attendance at the final acceptance inspection. Additional government personnel including, but not limited to, those from base/civil facility engineer user group and major commands may also be in attendance.

7.3 INSTRUMENTATION/EQUIPMENT TESTING, INSPECTION, AND MAINTENANCE

All equipment used at a project site shall be manufacturer-calibrated to national standards. Each time the instrument is about to be used, calibration shall be verified and tested for functionality. Equipment found to be damaged, inoperable, or out of calibration shall not be used until the discrepancy is corrected and verified by the QCO. As necessary, a detector sensitivity or test grid may be used to test the functionality prior to daily use and results documented in the QCO's logbook. Once equipment has been used, it shall be maintained following manufacturer's recommendations. The QCO will make periodic verification / audits of the logs and procedures and report the findings in the DQCR.

8. QUALITY CONTROL CERTIFICATION

8.1 CONTRACTOR QUALITY CONTROL REPORT CERTIFICATION

Each DQCR will contain the following statement signed by the QCO:

> *"On behalf of the Contractor, I certify that this report is complete and correct, and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report."*

8.2 INVOICE CERTIFICATION

CAPE will provide with each payment request to the Task Order COR or designated representative a certification, attesting that the work for which payment is requested is compliant with contract requirements.

8.3 COMPLETION CERTIFICATION

Upon completion of the work under a CTO, the QCO will present a certificate of completion stating that the "*work has been completed, inspected, tested, and is in compliance with the contract*."

9. QUALITY CONTROL DOCUMENTATION

The QCO serves a critical role in documenting, reporting, and storing data in support of the QC process and its effectiveness in attaining a high quality work product.

9.1 REPORTING REQUIREMENTS

The QCO will complete and maintain the QC records to provide factual evidence of compliance with project requirements and to document all QC activities, including maintaining a record of all tests and inspections performed. These records include all work performed by subcontractors and suppliers. The QCO will sign each report and provide copies to the PM and NAVFAC Hawaii Task Order COR. The primary QC reports are listed below.

9.1.1 Daily Contractor Production Report

The SS is responsible for preparing and submitting a Daily Contractor Production Report documenting the activities and progress to the Task Order COR the next working day after each calendar day that work was performed. The report will document work performed and results used to gauge progress and adherence to schedule and cost. The Daily Contractor Production Report will be signed and dated by the Site Superintendent and document, at a minimum, the following:

- Date of report, report number, name of contractor, contract number, title and location of contract and task order, and superintendent present
- Weather conditions in the morning and afternoon, including maximum and minimum temperatures
- Personnel (including CAPE, subcontractors, and visitors), materials, and equipment on the work site that day
- Job safety actions taken and safety inspections conducted (indicate that safety requirements have been met), including the results on the following:
  - Was a job safety meeting conducted? If so, attach a copy of the job safety meeting minutes
  - Were there any lost time accidents? If so, attach a copy of the completed OSHA report
  - Was trenching, scaffold, high-voltage electrical, or high work done? If so, attach a statement or checklist showing inspection performed
  - Was hazardous material or waste released into the environment? If so, attach description of incident and proposed action)
- Equipment and material received and incorporated into the job
- Construction and plant equipment on the work site, with number of hours used, idle, and down for repair
- Work performed by CAPE and subcontractor personnel, including volumes, rates, and results
- Waste or material accumulated or transported offsite on a daily basis
- Workforce job hours and cumulative hours; and remarks shall be made regarding pertinent information, including directions received, problems encountered during activities, work progress and delays, conflicts or errors in the specifications, field changes, safety hazards encountered, instructions given and corrective actions taken, delays encountered, and a record of visitors to the work site.

9.1.2 Daily Contractor Quality Control Report

The QCO will prepare a DQCR and deliver to the Task Order COR the next working day after each calendar day that work was performed. Reports are prepared for each calendar day of work performed and for every 7 consecutive calendar days of no work.

The DQCR will provide an overview of QC activities performed each day, including those performed on subcontractor and supplier activities. The DQCR will present an accurate and complete picture of QC activities, document both conforming and deficient conditions, and should be precise, factual, legible, and objective. Copies of the supporting documentation, such as checklists and surveillance reports, COC records, and manifests, will be attached. The report will include the following information, at a minimum:

- Control phase and the DFW
- Results of preparatory, initial, and follow-up phase inspections; location of DFW and names of personnel present; findings and measurements made to document adherence to project plans and specifications; and steps taken to correct non-conformances
- Results of the three phases of control for off-site work, if applicable, including actions taken
- Description of daily site work
- Weather conditions, including ambient temperatures, precipitation, and wind estimates
- Type and location of tests performed and results of the tests
- Verbal instructions received from the Task Order COR
- Submittal action
- Inspection results of delivered equipment and materials
- List rework items identified but not corrected by close of business
- Review of subcontractor data, calculations, or drawings
- Results of meetings or communication with vendors, NAVFAC Hawaii, regulators, or others related to the performance and quality of work
- Off-site surveillance of fabricated items
- Remarks containing pertinent information, including directions received, QC problem areas, deviations from the PQCP, construction deficiencies encountered, QC meetings held, acknowledgment that as-built drawings have been updated, corrective direction given by the QCO, and corrective action taken by CAPE
- DQCR certification
- Signature and certification of QCO.

9.1.3 Testing Plan and Log

The QCO will maintain a Testing Plan and Log to track the tests performed both onsite and offsite for a CTO. The log allows the QCO or assigned QC personnel to document these activities from planning through completion. The Testing Plan and Log will be maintained in the project files and attached to the last DQCR of the month.

The log will contain the following items:

- Specification section and contract paragraph number

- Item of work
- Test required
- Accredited/approved laboratory
- Sampled/Tested by
- Location of test (on/offsite)
- Frequency
- Date completed
- Date forwarded to Task Order COR
- Remarks.

9.1.4 Rework Items List

Items requiring rework will be completed in accordance with the Rework Items List. The list will identify the reason or cause for the deficiency and prescribe the appropriate remedy. Once the item has been satisfactorily reworked, it will be closed-out of the Rework Items List and noted in the DQCR. The Rework Items List will be attached to the last DQCR of the month. It will show:

- Items to be reworked
- Date originally discovered
- Date resolved.

9.1.5 Monthly Summary Report of Field Tests

The QCO will submit one monthly summary of field tests attached to the DQCR at the end of each month.

9.1.6 Quality Control Meeting Minutes

The QCO will submit one copy of the meeting minutes within 2 working days of the meeting.

9.1.7 Safety and Health Deficiency Tracking

The QCO shall establish and maintain a safety and occupational health deficiency tracking system in accordance with 01.A.12.d of EM 385-1-1, *Safety and Health Requirements Manual*.

9.1.8 Field Log Book

The QCO will be assigned a QC logbook for documenting details of field activities during QC monitoring activities. The logbook will be a bound manuscript with pre-printed page numbers. The QCO will document his daily duties, summarize field activities, including arrival and departure time, note QC tests and results, depict the site layout, and mark locations of tests and other data. The information in the QC logbook will serve as a detailed description of events to aid in the preparation of the DQCR and in addressing follow-up questions that may arise.

All entries made in the QC logbook will be made in ink. Any changes will be made by a single strike through the error and initials. At the beginning of each day, the QCO will begin on the following page in the logbook. Descriptions will be made in coherent English and in a manner that would allow others to recreate the daily events in the absence of the QCO. At the end of each day, the QCO will mark the remainder of the page with a single line and sign across or under it.

9.2 RECORDS MANAGEMENT

Records are considered completed documents, validated data, and other materials that provide objective evidence of the quality of items or activities. A document that contains objective information can become a record once it is complete and identified as a record. Records include, but are not limited to:

- Work plans, technical proposals, and other work assignment planning documents
- Field plans and procedures
- Training records
- CTO reports, including letter reports
- Field logbooks and project notebooks
- Three phase inspection records
- Daily QC and Production Reports
- COC records
- Audit, surveillance, and independent project self-assessment reports
- Field change notices
- Laboratory data

Records will be maintained in the project office in a manner that prevents deterioration and provides for the safeguarding of the records. A record indexing system that allows for easy retrieval and provides sufficient information to permit the correlation of records with the items or activities to which they apply will be used. Inactive records will be stored for the mutually agreed upon time after which they are either transferred to NAVFAC Hawaii or disposed of.

Disposition of records is controlled and documented. Records are destroyed only after the proper notification to NAVFAC Hawaii and the approval of the PGM.

9.3 CHANGE AND CONTROL PROCEDURES

A formal process identifies, documents, and tracks the status of procedural and condition changes in remedial action work. Changes required due to changes in field conditions that differ from those presented in contract documents will be documented by a Field Change Request (FCR) form (attached in Appendix B).

Proposed changes that have not physically occurred are also documented on an FCR. In instances where the physical work has been completed, the FCR is used to provide the as-built information and allow PM and his/her team the opportunity to review the impact of those changes on other components of the work. The FCR should not be confused with a Nonconformance Report (NCR), as outlined in Section 11.

The FCR is prepared by the Site Superintendent and the QCO, as required, and routed to the PM for review. The PM will discuss potential changes with the appropriate NAVFAC Hawaii Representative and other client personnel, as required. Before routing, the PM will use the document control system to assign an FCR number, retains a copy for the FCR log and contract files, and then forwards a copy of the FCR to the PGM. The QCO will monitor the documentation and provide support.

10. SUBMITTALS

A Submittal Register will be created and maintained for the CTO. All material submittals will be transmitted in accordance with the instructions pertaining to NAVFAC Hawaii.

Preparation of submittals is the responsibility of the CAPE PM using project staff resources. For preparation of technical submittals, appropriate staff will be chosen who possess the background and knowledge required for ensuring that the technical submittal is complete and accurate. The PGM or PM should require a separate technical peer review for highly technical submittals.

The QCO will review submittals for acceptance with QC requirements before transmittal to either NAVFAC Hawaii or other required approval authorities. Submittals requiring modifications or changes will be returned to the originator, subcontractor, or vendor for correction and resubmission. The QC Manager will approve or disapprove the submittal, as appropriate, and will indicate his action by his signature and date before sending back to originator or forwarding to government for approval.

Submittals from subcontractors and vendors will be reviewed for technical content and accepted as a part of this submittal preparation procedure.

10.1 SUBMITTAL REGISTER

Submittals will be listed and tracked using the Submittal Register. Submittals include deliverables, whether generated onsite or offsite by CAPE or subcontractor personnel. The Submittal Register will be updated as needed along the project life. The QCO will review the list and ensure its completeness and may expand general category listings to show individual entries for each item. The Submittal Register will be used as the scheduling document and to control submittals throughout the project.

10.2 SUBMITTAL SCHEDULE

The QCO will monitor a project submittal schedule that reflects the status of project submittals. Submittal activities will be incorporated into the project schedule so that the submittal progress can be tracked in conjunction with the overall progress. Per contract directives (paragraph 7.4.3 of the contract) a 15-working day review cycle by the RPM/Task Order COR shall be incorporated into document review schedules. During periodic QC meetings or progress meetings, the PM will present an updated schedule, showing both actual field progress and deliverable and submittal schedules.

10.3 SUBMITTAL PROCEDURE

All submittals will be submitted in format dictated by the PWS or as required by NAVFAC Hawaii. Manufacturer's descriptive data that have more than one model, size, or type or that show optional equipment will be marked to show the model, size, or type, and all optional equipment proposed for approval. Submittals on component items forming a system or that are interrelated will be submitted at one time as a single submittal to demonstrate that the items have been properly coordinated and will function as a unit.

A Material Approval Submittal Form will be completed for submitting shop drawings, equipment data, manufacturer's literature and certifications, and samples of material. Items to be approved will be clearly tabbed or identified. Submittals will be numbered consecutively, by contract, in the space entitled "Submission No." The number, in addition to the Contract No., will be used to identify each Material Submittal. Re-submissions will be indicated in the appropriate block.

Submittals requiring government approval will be identified on the Material Approval Submittal Form and will be stamped and dated by the government when approved and returned to the CTO PM. The QCO will indicate the action by the government on the Submittal Register.

10.4 RE-SUBMITTAL PROCEDURE

The government may require CAPE to re-submit an item found not to comply with the project requirements. When a submittal has been disapproved and/or returned with comments, a subsequent submittal (re-submittal) will be made in the same manner as the original submittal.

10.5 DEVIATIONS

For submittals that include proposed deviations, the variation will be noted on the transmittal form. CAPE will set forth in writing the reason for any deviations and annotate such deviations on the submittal. The government reserves the right to rescind inadvertent approval of submittals containing unnoted deviations.

10.6 CONTROL OF SUBMITTALS

CAPE will carefully control its procurement operations so that materials and equipment are not ordered until the government has approved the submittal covering the subject material or equipment. Submittal preparation will be planned to allow review and approval time so that materials and equipment are ordered in time not to affect the project schedule.

10.7 INTERNAL REVIEW

To emphasize the importance of an independent technical review (peer review) before transmitting a submittal to NAVFAC Hawaii, a QC Review will be implemented by the PM. The PM and the QCO will identify the reviews required for each document to ensure that the checks are performed.

The QCO will monitor the internal review. If differences are found between the author and the reviewer that remain unresolved, the PM will mediate to find a common ground.

10.8 CERTIFICATION

Prior to delivery or use, project submittals will be reviewed and approved by the QCO. The certification and signature of the Submittal reviewer will be required prior to QCO approval. All submittals prepared by CAPE or its subcontractors will be reviewed for completeness and compliance with the specifications of the contract. Non-conforming submittals will be returned to the originator for corrective action and re-submittal to the QCO.

10.9 TRANSMITTAL TO THE NAVY

CAPE will transmit Submittals via electronic mail and will be accompanied with a highlighted copy of the submittal register form. Transmittal is intended for submitting both “Navy approval” and “information only” submittals. Care will be exercised to ensure the proper listing of the contract specification paragraph pertinent to the data submitted for each item.

10.9.1 Transmittal Form

CAPE will prepare and include a transmittal form with each submittal. The transmittal form will identify CAPE as the contractor, indicate the date of the submittal, and include information prescribed and required by the transmittal form. CAPE will identify submittals with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. CAPE will mark each copy of submittals with the following:

- Project title and location
- Contract number and CTO
- Section and part number of the section by which the submittal is required
- Submittal description number of each component of the submittal
- If a re-submission, an alphabetic suffix on the submittal description to indicate the re-submission

- Name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second tier contractor associated with the submittal
- Product identification and location in project.

10.10 COMMENT RESPONSE MATRIX

Upon receiving comments from Navy, regulatory, or other outside reviewers, CAPE will prepare a comment response matrix to document each reviewer's comment along with a response describing how the comment will be resolved, incorporated, or addressed. In cases where agreement of the response is not reached easily between CAPE and the reviewer, CAPE may request the RPM/Task Order COR to set up a conference call or on-site meeting with reviewers to discuss their comments. The completed comment response matrix will be submitted to the Task Order COR and reviewers via electronic mail before revising the actual report, and adequate time will be allocated to permit reviewers to read and accept or revise CAPE responses. At such a time when all responses are accepted by the Navy, CAPE will incorporate changes into the document and prepare for re-submission.

11. NONCONFORMANCE REPORTING

11.1 NONCONFORMANCE DEFINITION

The definition of a nonconforming condition can range from a departure from established requirements to identification of deficient material, assembly, or construction method. All items determined to be nonconforming must be corrected through systematic corrective actions. Any time a condition exists not in compliance with drawings, specifications, codes, workmanship standards, facility requirements, or NAVFAC Hawaii requirements, the nonconformity must be documented, corrected, and closed-out through the following means.

11.2 DEFICIENCY IDENTIFICATION

Usually, NAVFAC CTOs require the presence of a QCO onsite who traditionally manages the issue of nonconformance and approves the close-out of corrective actions. If a QCO has not been assigned to the project, the PM and/or Site Superintendent will be responsible for managing the nonconformance process. Regardless, all nonconforming items must be reported to the Program QA Manager. Anyone finding a deficient item is responsible for reporting it to the appropriate management staff.

11.3 NONCONFORMANCE DETERMINATION

During routine site activities, the majority of corrective actions can be implemented immediately (within 48 hours) by the work assignment staff and documented in field logbook. If the condition is not quickly corrected, the individual initiates an NCR as shown in Attachment 2 and submits it to the QCO or Program QA Manager. The QCO or Program QA Manager will notify the PM and identify the person responsible for implementing corrective action (often the Site Superintendent), sets a date on which the response is due, and distributes the NCR.

11.4 PLANNING AND IMPLEMENTING THE CORRECTIVE ACTION

The responsible person to initiate corrective actions should identify the cause of the problem, if known or suspected, on the NCR. The responsible person should develop a Corrective Action Plan, identify the date the corrective action has been or will be accomplished, describe the action taken on the form, and return the form to the QCO or Program QA Manager by the response due date. If possible, objective evidence that the corrective action has been completed should be included with the NCR response. If this is not possible, the responsible person should return the NCR by the due date and provide the evidence as soon as possible.

11.5 ACCEPTING CORRECTIVE ACTION

The QCO or Program QA Manager will review the NCR response to determine the adequacy of the corrective action. If the stated corrective action is unacceptable, the NCR will be returned to the responsible person for further discussion and corrective action.

11.6 VERIFYING CORRECTIVE ACTION

If the evidence provided to the QCO or Program QA Manager concerning completed corrective action is acceptable, the NCR will be signed and dated. If evidence is obtained through an audit, surveillance, or follow-up review, the individual conducting the follow-up will sign and date the form once the corrective action has been verified.

11.7 NCR DISTRIBUTION

A distribution list for NCRs will be determined at the initial project-planning meeting. At a minimum, distribution will include the Task Order COR, QCO, PGM, Program QA Manager, PM, SS, and any other applicable client-related individuals.

12. AUDITS AND ASSESSMENTS

Assessments are a learning process intended to increase the user's understanding of the program or system being assessed and to provide a basis for improving such programs or systems. The purpose of assessments is to improve the quality of work by comparing the system or element to the specified requirements. Assessments are conducted at all levels: corporate, contract, project, and activity. Response refers to the actions taken by the assessed organization as a result of the assessment. Typically, responses involve corrective actions to rectify the deficiencies identified in the assessment.

Assignments will be monitored and assessed as deemed appropriate by the Program QA Manager. The following sections identify and describe many assessment types. The requirement to conduct applicable assessment types may be further defined in the work plans and field plans. The PGM, PM, or the Program QA Manager may specify additional assessments as necessary to ensure that the quality of work meets NAVFAC and CAPE's expectations. Assessment reports generated under the SBRAC contract will be made available to the NAVFAC Task Order COR/RPM upon request.

12.1 MANAGEMENT SYSTEM REVIEWS

Management systems reviews are self-assessments conducted annually, or as determined appropriate by the Program QA Manager, to establish whether the quality management structure, policies, and procedures are adequate to ensure quality data. Management systems reviews may cover multiple contracts and quality plans. The primary focus of the management systems review is performance improvement through:

- Fostering individual ownership of the quality program by increasing employee involvement in quality;
- Encouraging employees to routinely identify opportunities for quality improvement;
- Meeting with management, technical, and QA staff to solicit specific suggestions to improve quality, such as more practical implementation methods, procedural modifications, etc.;
- Training the management, technical, and QC staff on quality plan requirements;
- Communicating lessons learned from other management systems reviews; and
- Checking on implementation and effectiveness of the quality program within the office.

12.2 PROJECT AUDITS

Project audits may be conducted on CAPE and subcontractor work activities by QC staff independent of the work activities. The implementation and use of appropriate quality measures identified in this PQCP, work plans, field plans, specifications, procedures, and any other applicable document specifying requirements can be used for checking during the audit. The auditor will also ensure that obsolete documentation has been removed from project work areas and check briefly on preparation of required deliverables and the condition of project files.

Project auditors will be trained in auditing procedures and authorized by the Program QA Manager. The responsibilities and procedures for planning, conducting, reporting, and closing out audits are specified in Auditing Procedure.

12.3 LABORATORY AUDITS

Laboratory audits will be conducted as required by each CTO or as determined by the Program QA Manager by authorized technical staff that is independent of the activities audited. Their technical competence is necessary to determine if the technical work performed by laboratories follow the current documented procedures and requirements.

12.4 PROJECT SELF-ASSESSMENTS

Project self-assessments are evaluations of work activities conducted by project personnel who are knowledgeable in the project requirements to determine if the technical requirements are being met. They are intended to provide rapid feedback to the project staff to facilitate timely corrective action.

The PGM makes the selection of assignments or activities for project self-assessment and the personnel to conduct them with the assistance of the Program QA Manager or QCO. Project self-assessments are conducted using a standardized or customized checklist.

Attachment 1
Schedule of QC Observations and Testing
By Definable Feature of Work

TABLE 1
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Mobilization			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review licenses, permits, applications, and certifications	Check and ensure proper backup documentation supports operations for dig permit, removal, disposal, etc.	One time, and as needed	Appropriately licensed to perform activities in Hawaii, and all certifications are up to date. Obtain all permits, submit applications, and obtain clearances prior to start of fieldwork.
Obtain site entry authorization	Ensure personnel meet security clearances if any and proper ID as per client's requirements.	One time	Access granted.
Identify area of activity, and utility location	Site Survey: Assess results of available document review and site visit. Schedule on site joint utility locations meeting.	One time, and as needed	Confirmation from COR.
Identify location of previous borings	Assess results of available document review and site visit	One time	Results of survey correspond with existing sample location figures.
Review approved plans	Review and discuss project plans with all project and field staff and applicable subcontractors.	Each staff member and subcontractor	Required signatures in Work Plans.
Mobilize personnel	Verify OSHA training and medical monitoring are current. QCO certification on file.	Each individual	All individuals must have appropriate certifications and training records.
Mobilize equipment	Arrange delivery of appropriate equipment.	Each piece	All equipment must be in proper working order.
Set-up of work zones.	Identify work zones and appropriate placement of support facilities. Review process for management and disposal of soil.	One time; and as needed	Responsible personnel demonstrate understanding of how to perform tasks correctly and safely. Proper procedures in-place for sampling, excavation, and transportation and disposal.

DEFINABLE FEATURE OF WORK: Mobilization			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
INITIAL PHASE			
Review approved plans	Verify that all personnel have read and are knowledgeable of work plans.	One time	Personnel demonstrate understanding of work plans.
Mobilize personnel	Maintain copies of personnel certifications and training records onsite.	Each individual	All necessary personnel certifications and training records are onsite.
Mobilize equipment	Physical examination of equipment to ensure compliance with project requirements and in good working order.	Each piece	All equipment must have current inspection record onsite indicating that equipment is in proper working order.
Set-up work zones.	Verify proper placement of work zones. Verify that excavated soil is managed appropriately.	Inspect and document	Work zones are in proper place and disposal documentation is on site.
FOLLOW-UP PHASE			
Review approved plans	Verify that all personnel have read and are knowledgeable of work plans.	Ongoing	Personnel demonstrate understanding of work plans.
Mobilize personnel	Maintain copies of personnel certifications and training records onsite.	Ongoing	All necessary personnel certifications and training records are onsite.
Mobilize equipment	Physical examination of equipment to ensure compliance with project requirements and in good working order.	Ongoing	All equipment must have current inspection record onsite indicating that equipment is in proper working order.
Set-up of work zones.	Inspect site conditions and safety.	Ongoing	Responsible personnel demonstrate understanding of how to perform tasks correctly and safely. Proper procedures in-place for sampling, excavation, and transportation and disposal.

TABLE 2
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Delineation and Waste Characterization Sampling			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY OR OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review approved plans	Review and discuss approach for sampling and analysis, review UFP-SAP, review AHAs.	One time per site	Required signatures in Work Plans.
Work area	Identify sampling location and ensure all required safety precautions are taken. Ensure a site inspection is performed before intrusive work is allowed to start. • ID potential hazards • Utility survey complete • All required safety precautions are taken to prevent damage to or compromise the integrity of any structure. • Coordination of activities with client representative. Ensure boring locations are marked	One time per site	In accordance with Work Plans and results of utility clearance.
Materials and equipment	Ensure sufficient supplies: • Sample containers, disposable gloves, PPE, and chains of custody. • Decontamination materials, if using. • Ensure sampling equipment is available and in good working conditions. • Drill rig and/or hand sampling equipment has been inspected and is in good working order.	Daily during sampling effort	In accordance with Work Plans.
INITIAL PHASE			
Collection of samples	Observation of sampling locations, sample collection, preservation, handling and recording	One time per site	COR, RPM and QCO agree on quality of workmanship.
FOLLOW-UP PHASE			
Sample collection	• Observation of sampling locations, sample collection, preservation, handling and recording • Document your activities and notes pertaining to each sample	Each container with corresponding Chain of Custody	Outlined in SAP.
Analytical data review	Laboratory data and QC meet project requirements	Ongoing	Outlined in SAP.

TABLE 3
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Excavation			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review plans and specs	Review and discussion of excavation approach, review previous data, survey results and delineation sampling data to determine excavation extents, review AHAs.	As needed	Timely notification of Excavation.
Work area	Observation • Identify potential hazards • Review underground utility toning results • Ensure all required safety precautions are taken to prevent damage to the integrity of any structure. • Hawaii One-Call underground utility clearance and NAVFAC Dig Permit initiated and completed. • Coordination of activities with client representative.	One time	SSHO, QCO, and Site Supervisor are in agreement.
Equipment and Materials	Observation. • Ensure equipment is clean and in proper working condition. • Ensure coordination with trucking contractor and set date to mobilize staff, equipment and subcontractor.	As needed	Equipment checklists area complete.
Excavation	Final check to ensure excavations will occur in approved locations.	One time	All delineation soil sampling results are received and concentrations are below cleanup goals.
INITIAL PHASE			
Work area	Check required safety precautions are followed to prevent damage to or compromise the integrity of any structure.	Ongoing	SSHO, QCO, and Site Supervisor are in agreement.
Excavation	Ensure excavation is performed in marked locations, according to plans, and all health and safety engineering controls are in place.	Ongoing	COR, RPM and QCO agree quality standards are met.
FOLLOW-UP PHASE			
Excavation	Ensure excavation is performed in marked locations and according to plans.	Ongoing	Quality from initial phase is maintained.

TABLE 4
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Confirmation Sampling			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY OR OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review approved plans	Review and discuss approach for sampling and analysis, review UFP-SAP, review AHAs.	One time per site	Required signatures in Work Plans.
Work area	Identify sampling location and ensure all required safety precautions are taken.	One time per site	In accordance with Work Plans and results of utility clearance.
Materials and equipment	Ensure sufficient supplies: • Sample containers, disposable gloves, PPE, and chains of custody. • Decontamination materials, if using. • Ensure sampling equipment is available and in good working conditions.	Daily during sampling effort	In accordance with Work Plans.
INITIAL PHASE			
Collection of first sample	Observation of sample collection, preservation, handling and recording	One time per site	COR, RPM and QCO agree on quality of workmanship.
FOLLOW-UP PHASE			
Sample collection	• Observation of sample collection, preservation, handling and recording • Document activities and note any deficiency	Each container with corresponding release	Quality standards from Initial Phase are maintained.
Analytical data review	Laboratory data and QC meet project requirements	Ongoing	Outlined in SAP.

TABLE 5
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Transportation and Disposal			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review approved plans and specification	Observation. • Review all testing and characterization requirements. • Ensure all submittals have been submitted and approved by the required approving authority before work is allowed to start. • Ensure all sampling waste profiles are complete and review transportation and disposal requirements. • Review AHAs for this work.	One time	Appropriately licensed to perform activities in Hawaii, and all certifications are up to date. Obtain all permits, submit applications, and obtain clearances prior to start of fieldwork. Required signatures in Work Plans.
Personnel	Ensure personnel are properly equipped to handle the waste with fitted personal protective equipment.		All individuals must have appropriate certifications and training records.
Waste management	Ensure that: • All permits required for transportation of waste are in place. • Containers are suitable to receive and retain contaminated materials, are properly stored and labeled. • Ensure that disposal facility has agreed to accept waste. • Coordinate with trucking contractor and set date to mobilize staff, equipment and subcontractor. • Required Sampling and Analytical services necessary for disposal have been provided. • Coordinate with base personnel for onsite storage.	One time	Management practices are performed according to Work Plans and State and Federal regulations.
INITIAL PHASE			
Waste management	Observation. • Check to ensure proper handling, labeling, and covering of material being loaded. • Manifests are properly executed and signed and drivers have proper documentation. • Ensure all trucks are using authorized haul routes	Ongoing	SSHO, QCO, and Site Supervisor are in agreement.

FOLLOW-UP PHASE Review paperwork from disposal facility and waste manifests.	Review. Ensure all paperwork is completed as applicable.	Ongoing	QCO and designated signature authority are in agreement.
Observe proper handling	Observation. Ensure all trucks are using authorized haul routes.	Ongoing	SSHO, QCO, and Site Supervisor are in agreement.
Review disposal data	Review/Observation. Ensure disposal is in accordance with approved plans.	Ongoing	COR, RPM and QCO agree quality standards are met.
Make and record observations	Prepare DQCRs, and note any deficiencies, keep records of waste leaving the site.	Ongoing	COR, RPM and QCO agree quality standards are met.

TABLE 6
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Backfill/ Site Restoration			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review plans and specs	Review and discussion of backfilling and grading approach, review AHAs.	One time, coordination, review AHAs	Confirmation soil sampling results are below cleanup goals.
Work area	Ensure a site inspection/survey has been performed before backfilling work is allowed to start. • Identify potential hazards • Ensure all required safety precautions are taken to prevent damage to or compromise the integrity of any structure. • Coordination of activities with client representative.	One time	Survey results/drawings are approved. All individuals must have appropriate certifications and training records.
Equipment and Materials	Observation. • Ensure equipment is clean and in proper working conditions.	As needed	All equipment must have current inspection record onsite indicating that equipment is in proper working order.
Backfilling/grading	Final check to ensure backfilling/grading will happen in approved locations.	One time	QCO, SSHO, SS, RPM, and COR are in agreement.
INITIAL PHASE			
Work area	Check required safety precautions are followed to prevent damage to or compromise the integrity of any structure.	Ongoing	Responsible personnel demonstrate understanding of how to perform tasks correctly and safely. Proper procedures in-place for backfilling.
Backfilling/grading	Ensure backfilling/grading is performed in marked locations according to plans.	Ongoing	COR, RPM and QCO agree quality standards are met.
FOLLOW-UP PHASE			
Backfilling/grading	Ensure backfilling/grading is performed in marked locations according to plans.	Ongoing	Quality from initial phase is maintained.

TABLE 7
SCHEDULE OF QC OBSERVATIONS AND TESTING BY DEFINABLE FEATURE OF WORK

DEFINABLE FEATURE OF WORK: Demobilization			
QC TASK	**INSPECTION ACTIVITY**	**TEST FREQUENCY or OBSERVATION DESCRIPTION**	**ACCEPTANCE CRITERIA**
PREPARATORY PHASE			
Review approved plans	Observation. Review and discuss approach for demobilization.	One time	All other field activities have been completed and site restoration has been completed.
Schedule equipment and any material left for demobilization	Verification	One time	QCO, SSHO, and Site Supervisor are in agreement. Coordination with all personnel has been completed.
INITIAL PHASE			
Demobilize personnel materials and equipment	Ensure personnel return security badges, car permits etc	One time	COR, RPM and QCO agree quality standards are met.
FOLLOW-UP PHASE			
Demobilize	Ensure COR accepts work	One time	COR and RPM concurrence project is complete.

Attachment 2
PQCP Forms

320-5 PREPARATORY PHASE INSPECTION / MEETING

Contract Number:		**Task Order No:**			
CAPE Project No.:		**Date:**			
Project Location:					
DFW:		**Spec Sect.**		**Date**	

1. PREPARATORY PHASE INSPECTION / MEETING ATTENDEES:

	NAME	POSITION	COMPANY / CLIENT
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

2. PREPARATORY PHASE INSPECTION CHECKLIST:

A. DOCUMENT REVIEW:

Done	N/A	Description	Results	Action Items
☐	☐	Review each paragraph of applicable specifications and all related drawings.		
☐	☐	Review standards and procedures referenced on drawings and in specifications.		
☐	☐	Review of the Project Shop Drawings.		

B. SUBMITTAL STATUS REVIEW:

Review of all Submittal requirements to ensure that all materials and/or equipment have been tested, submitted, and approved.

☐	☐	Have all materials been submitted, tested, and approved?	☐ Yes ☐ No	
☐	☐	Has all equipment been submitted, tested, and approved?	☐ Yes ☐ No	

C. OFFSITE DISPOSAL OF MATERIALS:

☐	☐	Have all materials for disposal offsite been sampled and properly characterized for disposal?	☐ Yes ☐ No ☐ N/A	
☐	☐	Have Landfills been contacted and received copy of waste characterization results?	☐ Yes ☐ No ☐ N/A	

320-5 PREPARATORY PHASE INSPECTION / MEETING

Contract Number:		**Task Order No:**			
CAPE Project No.:		**Date:**			
Project Location:					
DFW:		**Spec Sect.**		**Date**	

☐	☐	Have all Parties related to the approval process for hauling offsite been contacted and have they approved disposal methods?	☐ Yes ☐ No ☐ N/A	
☐	☐	Has it been verified that the Transporter of the material is properly licensed for hauling of this material?	☐ Yes ☐ No ☐ N/A	
☐	☐	Has the process/procedure for signing Waste Manifests been clearly established?	☐ Yes ☐ No ☐ N/A	
D. WORK AREA INSPECTION:				
☐	☐	Has all required preliminary work been completed and accepted to allow this DFW to start?	☐ Yes ☐ No ☐ N/A	
☐	☐	Are all required Permits received and on file on the jobsite and/or properly posted?	☐ Yes ☐ No ☐ N/A	
E. MATERIAL AND EQUIPMENT INSPECTION:				
☐	☐	Are all required materials on hand (or scheduled for delivery to avoid schedule delays)?	☐ Yes ☐ No ☐ N/A	
☐	☐	Is all material properly stored and protected, as applicable?	☐ Yes ☐ No ☐ N/A	
☐	☐	Are all pieces of equipment or modules on hand (or scheduled for delivery to avoid schedule delays)?	☐ Yes ☐ No ☐ N/A	
☐	☐	Is all equipment or modules properly stored and protected, as applicable?	☐ Yes ☐ No ☐ N/A	
F. REVIEW OF SAFETY REQUIREMENTS:				
☐	☐	*Review approriate AHAs to ensure safety requirements are met.* Comments:		

320-5 PREPARATORY PHASE INSPECTION / MEETING

Contract Number:		**Task Order No:**			
CAPE Project No.:		**Date:**			
Project Location:					
DFW:		**Spec Sect.**		**Date**	

G. REVIEW OF WORK PERFORMANCE / TESTING / INSPECTION REQUIREMENTS:				
☐	☐	Discuss procedures to accomplish the work, including points of control.		
☐	☐	Establish construction tolerances and workmanship standards for this DFW.		
☐	☐	Review provisions that have been made to provide required quality control (check applicable one)		
		☐ Subcontractor / Consultant		
		☐ QC Officer or another member of QC Team		
		☐ 3rd Party Inspection		
☐	☐	Quality Control Testing:		
		Tests to be Performed:		
		Frequency of Tests:		
		Testing by Whom:		
		When:		
		Where:		
		Has Testing Facility Been Approved?	☐ Yes ☐ No	
		For Testing performed on site, has testing equipment and test methods been submitted?	☐ Yes ☐ No	
		Has Testing Equipment been calibrated before use or calibration certificate been provided before use?	☐ Yes ☐ No	
☐	☐	Verify that portion of Work Plan for work to be performed has been accepted by the government.		
☐	☐	Discuss the Initial Control Phase.		

I hereby declare that: The above required materials delivered to the job site and methods and procedures are certified to fully comply with the project requirements.

Quality Control Representative: _____

320-6 INITIAL PHASE INSPECTION / MEETING

Contract Number:		**Task Order No:**			
CAPE Project No.:		**Date:**			
Project Location:					
DFW:		**Spec Sect.**		**Date**	

1. INITIAL PHASE INSPECTION / MEETING ATTENDEES:

	NAME	POSITION	COMPANY / CLIENT
1			
2			
3			
4			
5			
Was Client Representative notified?			☐ Yes ☐ No

2. INITIAL PHASE INSPECTION CHECKLIST:

A. GENERAL ITEMS:

Done	N/A	Description	Results	Action Items
☐	☐	Check preliminary work and review minutes of the Preparatory Inspection / Meeting.		
☐	☐	Check that materials and equipment being used comply with project requirements.		
☐	☐	Check the work to ensure it is full compliance with the project requirements.		

B. CONTROLS TO ASSURE FULL COMPLIANCE:

		Controls	Testing
☐	☐	☐ QC Officer Observations ☐ Qualified Inspector ☐ 3rd Party Inspection & Testing ☐ Other, _____	☐ Checked Testing procedure ☐ Checked Instrumentation Calibration ☐ Checked recording Forms & Tracking ID No. ☐ None

C. ESTABLISH LEVEL OF WORKMANSHIP:

☐	☐	Work Location:		
		Is a sample panel required?	☐ Yes	☐ No
		Is initial work considered as a sample?	☐ Yes	☐ No
☐	☐	Check for omissions and resolve any differences or interpretations with the government/client representative.		
☐	☐	Check safety to include compliance with Safety Plan and Activity Hazard Analyses. Review the Activity Hazard Analyses.		
☐	☐	Were procedures and work methods witnessed in strict compliance with project requirements?	☐ Yes ☐ No	
☐	☐	Is a re-inspection required?	☐ Yes ☐ No	

D. BRIEF SUMMARY OF INITIAL INSPECTION PROCEDURE AND RESULT, POINTS OF CONCERN, ETC.:

Quality Control Representative: _____

320-7 FOLLOW-UP PHASE INSPECTION / MEETING

Contract Number:		**Task Order No:**			
CAPE Project No.:		**Date:**			
Project Location:					
DFW:		**Spec Sect.**		**Date**	

1. INITIAL PHASE INSPECTION / MEETING ATTENDEES:

	NAME	POSITION	COMPANY / CLIENT
1			
2			
3			
4			
5			
Was Client Representative notified?			☐ Yes ☐ No

2. INITIAL PHASE INSPECTION CHECKLIST:

A. GENERAL ITEMS:

Done	N/A	Description	Results	Action Items
☐	☐	Check preliminary work and review minutes of the Preparatory Inspection / Meeting.		
☐	☐	Check that materials and equipment being used comply with project requirements.		
☐	☐	Check the work to ensure it is full compliance with the project requirements.		

B. CONTROLS TO ASSURE FULL COMPLIANCE:

		Controls	Testing
☐	☐	☐ QC Officer Observations ☐ Qualified Inspector ☐ 3rd Party Inspection & Testing ☐ Other, _____	☐ Checked Testing procedure ☐ Checked Instrumentation Calibration ☐ Checked recording Forms & Tracking ID No. ☐ None

C. ESTABLISH LEVEL OF WORKMANSHIP:

☐	☐	Work Location:		
		Is a sample panel required?	☐ Yes	☐ No
		Is initial work considered as a sample?	☐ Yes	☐ No
☐	☐	Check for omissions and resolve any differences or interpretations with the government/client representative.		
☐	☐	Check safety to include compliance with Safety Plan and Activity Hazard Analyses. Review the Activity Hazard Analyses.		
☐	☐	Were procedures and work methods witnessed in strict compliance with project requirements?	☐ Yes ☐ No	
☐	☐	Is a re-inspection required?	☐ Yes ☐ No	

D. BRIEF SUMMARY OF INITIAL INSPECTION PROCEDURE AND RESULT, POINTS OF CONCERN, ETC.:

Quality Control Representative: _____

320-8 PRE-FINAL INSPECTION / PUNCHLIST

Contract Number:		**Task Order No:**	
CAPE Project No.:		**Date:**	
Project Location:			
Specific Area of Inspection:			

1. PRE-FINAL INSPECTION PARTICIPANTS:

	NAME	POSITION	COMPANY / CLIENT
1			
2			
3			
4			
5			
Was Client Representative notified?			☐ Yes ☐ No

2. BRIEF DESCRIPTION OF WORK PERFORMED AS DESCRIBED IN TASK ORDER SOW:

3. TYPE OF INSPECTION:

☐ Visual Inspection of the Work
☐ Documentation Review

Note: As part of the Pre-Final Inspection, status of all requirements of Task Order must be reviewed - as-built drwgs, O&M Manuals, Warranties, etc.

4. REFERENCE DOCUMENTS (CHECK ALL THAT APPLY):

☐ Drawings ☐ Work Plans
☐ Specifications ☐ Other _____

5. FINDINGS (LIST ALL ITEMS NOT CONFORMING TO REQUIREMENTS OF REFERENCE DOCUMENTS):

Item	Description of Deficiency	Reference Document	Estimated Date of Completion
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			

Quality Control Representative: _____

320-9 FINAL ACCEPTANCE INSPECTION

Contract Number:		**Task Order No:**	
CAPE Project No.:		**Date:**	
Project Location:			
Specific Area of Inspection:			

1. FINAL INSPECTION PARTICIPANTS:

	NAME	POSITION	COMPANY / CLIENT
1			
2			
3			
4			
5			
6			

2. BRIEF DESCRIPTION OF WORK PERFORMED AS DESCRIBED IN TASK ORDER SOW:

3. TYPE OF INSPECTION:

- ☐ Visual Inspection of the Work
- ☐ Documentation Review

4. REFERENCE DOCUMENTS (CHECK ALL THAT APPLY):

- ☐ Drawings
- ☐ Specifications
- ☐ Work Plans
- ☐ Other _____

5. FINDINGS:

6. REMARKS:

- ☐ Project meets SOW Requirements
- ☐ Project does not meet all SOW Requirements and a Re-Inspection must be scheduled.

Date Scheduled for Re-Inspection: _____

Additional Remarks:

Quality Control Representative: _____

CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE			
CONTRACT NO	TITLE AND LOCATION	REPORT NO	
CONTRACTOR	SUPERINTENDENT		
AM WEATHER	PM WEATHER	MAX TEMP (F)	MIN TEMP (F)

WORK PERFORMED TODAY

Schedule Activity No.	DEFINABLE FEATURE OF WORK, WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? (If YES attach copy of the meeting minutes)	☐ YES	☐ NO	TOTAL WORK HOURS ON JOB SITE, THIS DATE, INCL CON'T SHEETS	
WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? (If YES attach copy of completed OSHA report)	☐ YES	☐ NO	CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT	
WAS CRANE/MANLIFT/TRENCHING/SCAFFOLD/HV ELEC/HIGH WORK/ HAZMAT WORK DONE? (If YES attach statement or checklist showing inspection performed.)	☐ YES	☐ NO		
WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? (If YES attach description of incident and proposed action.)	☐ YES	☐ NO	TOTAL WORK HOURS FROM START OF CONSTRUCTION	

Schedule Activity No.	**DEFINABLE FEATURE OF WORK AND** LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED ☐ SAFETY REQUIREMENTS HAVE BEEN MET.

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Definable Feature of Work and Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	Owner	Definable Feature of Work and Description of Construction Equipment Used Today (incl Make and Model)	Hours Used

Schedule Activity No.	DEFINABLE FEATURE OF WORK AND REMARKS

CONTRACTOR/SUPERINTENDENT DATE

CONTRACTOR PRODUCTION REPORT

(CONTINUATION SHEET)

CONTRACT NO	TITLE AND LOCATION	DATE
		REPORT NO

WORK PERFORMED TODAY

Schedule Activity No.	DEFINABLE FEATURE OF WORK, WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRADE	HRS

Schedule Activity No.	DEFINABLE FEATURE OF WORK AND LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB (INDICATE SCHEDULE ACTIVITY NUMBER)

Schedule Activity No.	Submittal #	Definable Feature of Work and Description of Equipment/Material Received

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY. INDICATE HOURS USED AND SCHEDULE ACTIVITY NUMBER.

Schedule Activity No.	Owner	Definable Feature of Work and Description of Construction Equipment Used Today (incl Make and Model)	Hours Used

Schedule Activity No.	DEFINABLE FEATURE OF WORK AND REMARKS

INCLUDE ALL PERSONNEL WORK HOURS IN THE WORK PERFORMED SECTION ON THIS SHEET
INTO THE FRONT CONTRACTOR PRODUCTION REPORT

CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

REPORT NO

PHASE	CONTRACT NO	CONTRACT TITLE

PREPARATORY

WAS PREPARATORY PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

Schedule Activity No.		Index #

INITIAL

WAS INITIAL PHASE WORK PREFORMED TODAY? YES ☐ NO ☐

IF YES, FILL OUT AND ATTACH SUPPLEMENTAL INITIAL PHASE CHECKLIST.

Schedule Activity No.		Index #

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Definable Feature of Work, Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)

Schedule Activity No.	Definable Feature of Work and Description

REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)

Schedule Activity No.	Definable Feature of Work and Description

REMARKS (Also Explain Any Follow-Up Phase Checklist Item From Above That Was Answered "NO"), Manuf. Rep On-Site, etc.

Schedule Activity No.	Definable Feature of Work and Description

On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.

AUTHORIZED QC MANAGER AT SITE DATE

GOVERNMENT QUALITY ASSURANCE REPORT

DATE

QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT

Schedule Activity No.	Definable Feature of Work and Description

GOVERNMENT QUALITY ASSURANCE MANAGER DATE

CONTRACTOR QUALITY CONTROL REPORT

DATE

(CONTINUATION SHEET)
(ATTACH ADDITIONAL SHEETS IF NECESSARY)

REPORT NO.

PHASE	CONTRACT NO	CONTRACT TITLE

FOLLOW-UP

WORK COMPLIES WITH CONTRACT AS APPROVED DURING INITIAL PHASE? YES ☐ NO ☐

WORK COMPLIES WITH SAFETY REQUIREMENTS? YES ☐ NO ☐

Schedule Activity No.	Definable Feature of Work, Description of Work, Testing Performed & By Whom, Definable Feature of Work, Specification Section, Location and List of Personnel Present

320-18 FIELD TESTING REPORT

Contract Number:		**Task Order No:**		
CAPE Project No.:		**Date:**		
Project Location:				
DFW:		**Spec Sect.**		**Date**
Testing Performed by:				

1. DESCRIPTION OF WORK TESTED:

Accredited / Approved Laboratory		**Location of Test (on / offsite)**

2. TYPE OF TESTING PERFORMED:

Test Number	Type of Test	Frequency	Date Completed	Date Fowared to NTR

☐ In Progress ☐ Final

3. REFERENCED DRAWINGS / STANDARDS:

4. COMMENTS:

5. SKETCH, IF APPLICABLE:

Testing Individual: _____

Quality Control Representative: _____

320-19 REWORK ITEMS LIST

Contract Number:		**Task Order No:**		
CAPE Project No.:		**Date:**		
Project Location:				
DFW:		**Spec Sect.**		**Date**

1. ITEMS TO BE REWORKED:
2. DATE ORGINALLY DISCOVERED:
3. DATE RESOLVED:

Quality Control Representative: _____

320-20 MONTHLY SUMMARY REPORT OF FIELD TESTS

Contract Number:		**Task Order No:**		
CAPE Project No.:		**Date:**		
Project Location:				
DFW:		**Spec Sect.**		**Date**
1. SUMMARY OF FIELD TESTS:				

Quality Control Representative: _____

320-21 SAFETY AND HEALTH DEFICIENCY TRACKING

Contract Number:		**Task Order No:**		
CAPE Project No.:		**Date:**		
Project Location:				
DFW:		**Spec Sect.**		**Date**

1. DATE OF DEFICIENCY IDENTIFIED:

2. DESCRIPTION OF DEFICIENCY:
3. NAME OF PERSON RESPONSIBLE FOR CORRECTING DEFICIENCY:
4. PROJECTED RESOLUTION DATE:
5. DATE ACTUALLY RESOLVED:

Quality Control Representative: _____

320-3 FIELD CHANGE REQUEST (FCR)

Contract Number:		**Task Order No:**	
CAPE Project Number:		**Date:**	
Project Location:		**FCR No.:**	
Project Description:			

CHANGE IN: (Check One)	**IMPACT:** (Check all that apply)	**ACTION REQUIRED** (Check all that apply)
☐ A Field Condition ☐ B Construction / Production ☐ C Other, Explain	☐ Scope of Work (SOW) ☐ Schedule ☐ Budget ☐ Approved Plans and Documents ☐ Other, Explain	☐ Review of Cost Impact ☐ Update Schedule to Reflect Change ☐ Review/Approval by Project Manager ☐ Review/Approval by Client Representative ☐ Submit Request for Modification ☐ Other, Explain
Explanation:	Explanation:	Explanation:

1. CHANGE REQUEST INFORMATION:

1. Description of Needed Change: **Sketch Attached:** ☐ Yes ☐ No

2. Reason for Needed Change:

3. Consequences of Failure to Implement Change:

4. Other work that will be affected by the Change:

2. SIGNATURES AND DATE:

CAPE QC OFFICER		**DATE**	
CAPE PROJECT MANAGER		**DATE**	
CAPE SITE SUPERINTENDENT		**DATE**	
CAPE PROJECT ENGINEER		**DATE**	
CLIENT REPRESENTATIVE		**DATE**	

320-4 NONCONFORMANCE REPORT (NCR)

Contract Number:		**Task Order No:**	
CAPE Project Number:		**Date:**	
Project Location:		**NCR No.**	
Project Description:			

1. NONCONFORMANCE DESCRIPTION:			
IDENTIFIED BY:		**DATE**	

2. CORRECTIVE ACTION REQUIRED TO RECTIFY AND PREVENT RECURRENCE:			
PREPARED BY:		**DATE**	
TO BE PERFORMED BY:		**DATE**	
TO BE VERIFIED BY:		**DATE**	

3. CORRECTIVE ACTION TAKEN / COMPLETED:			
PERFORMED BY:		**DATE**	
VERIFIED BY:		**DATE**	

4. REMARKS:

Attachment 3
Qualifications of the QCO and Alternate QCO

EMILY MOLHOEK
QUALITY CONTROL OFFICER

PROFESSIONAL QUALIFICATIONS

Ms. Molhoek is an environmental professional with over seven years of experience in safety and quality supervision of environmental projects. She is qualified to perform quality control, and safety supervision roles.

EDUCATION

- BS, Geology, Grand Valley State University (2002).
- MSc., Geology, University of Alaska Fairbanks (2007).

CERTIFICATIONS AND TRAINING

- USACE Construction Quality Management for Contractors (2014)
- 40-Hr NAVFAC Construction Safety Hazard Awareness Training for Contractors (2014)
- 30-Hr OSHA Construction S&H Training (2014)
- 40-Hr OSHA Hazardous Materials/Waste Health and Safety Training (2008)
- 8-Hr HAZWOPER Refresher Training (2014)
- 8-Hr HAZWOPER Supervisor Training (2012)
- 10-Hr OSHA Construction Safety and Health Training (2013)
- Excavations Competent Person Training (2014)
- 8-Hr Permit-Required Confined Space Training (2014)
- DOT/ HazMat Transport (2014)
- CPR/First Aid/AED (2014)
- Blood Borne Pathogens Training (2014)
- Skid Steer Loader Operator Training (2008)
- AHERA Asbestos Building Inspector Certification (2009)

EXPERIENCE AND BACKGROUND

- Responsible for oversight and direction of teams of subcontractors during site investigations, excavations and remediation system installation activities.
- Conducted daily safety meetings.
- Established required levels of protection for site personnel during site activities.
- Performed air monitoring during various field events, including drilling for environmental investigation, and remediation system installation.

EMPLOYMENT HISTORY

CAPE, Honolulu, HI: Project Scientist (2014 – Present)
Versar, Inc., Westminster, CO: Associate Geologist (2012 – 2014)
Sivuniq, Inc., Anchorage, AK: Environmental Geologist (2010 – 2012)
GeoTrans, Inc., Ann Arbor, MI: Staff Geologist (2008 – 2010)

ALAN AHSING, STS
ALTERNATE QUALITY CONTROL OFFICER

PROFESSIONAL QUALIFICATIONS

Environmental and safety and health (S&H) professional with more than twenty years of experience in environmental remediation/construction and more than three years of Site Safety and Health Officer (SSHO) experience.

EDUCATION

- HS: Graduate, Kamehameha Schools (1986)
- College: Senior, Hawaiian Studies-Hawaiian Language, University of Hawaii at Manoa (1986-1992).

CERTIFICATIONS AND TRAINING

- Safety Trained Supervisor (STS), BCSP-CCHEST (2008)
- 40-Hr HAZWOPER training (1997) and current refresher training (2015)
- 8-Hr HAZWOPER Manager and Supervisor training (2013)
- First-aid/CPR/AED training (2013); Bloodborne pathogen training (2013)
- 30-Hr OSHA Construction S&H training (2008)
- 40-Hr NAVFAC Construction Safety Hazard Awareness Training for Contractors (2013)
- CAPE SSHO Training (2013)
- USACE Construction Quality Management for Contractors training (2014)
- Confined Space Requirements Competent Person (CP) training (1997; 2012)
- Safe Shoring Practices CP training (2012)
- Safe Scaffolding Practices CP training (2012)
- Safe Fall Protection Practices CP training (2012)
- Lead Health Hazard Training (2014).

EXPERIENCE AND BACKGROUND

- Acted as SSHO and operational supervisor for construction/hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Supervised excavation/trenching and elevated work location operations
- Conducted daily safety meetings and activity hazard analysis (AHA) reviews
- Performed safety inspections/audits and conducted incident investigations
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration and maintenance of air monitoring instruments.

EMPLOYMENT HISTORY

CAPE, Honolulu HI: SSHO/Foreman/Equipment Operator (EO) (2013-present)
Raising the Standard (RTS) Consulting, HI: STS/Safety Officer (2012)
Engineering/Remediation Resources Group (EERG), HI: SSHO/Foreman/EO (2011-2012)
Environmental Chemical Corporation (ECC), HI: Foreman/EO/Laborer (2003-2011; 1996-2000)

CARRIE PLATH
ALTERNATE QUALITY CONTROL OFFICER

PROFESSIONAL QUALIFICATIONS

Environmental and safety and health (S&H) professional with more than nine years of experience in safety supervision of safety, and environmental consulting.

EDUCATION

- BS, Geology and Geophysics, University of Hawaii at Manoa (2004).

CERTIFICATIONS AND TRAINING

- 40-Hr HAZWOPER training (2005)
- 8-Hr HAZWOPER Refresher Training (2014)
- 8-Hr HAZWOPER Manager and Supervisor training (2008)
- OSHA 10 Construction S&H Training (2008)
- 30-Hr OSHA Construction S&H Training (2009)
- First-aid/CPR/AED training (2012)
- Bloodborne pathogen training (2012)
- 40-Hr Construction Safety Hazard Awareness Training for Contractors (2011)
- USACE Construction Quality Management for Contractors training (2011)
- Excavations Competent Person Training (2014)
- 8-Hr Permit-Required Confined Space Training (2014)
- DOT/ HazMat Transport (2012)
- Arsenic and Lead Awareness Training (2012).

EXPERIENCE AND BACKGROUND

- Provided SSHO support for hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Conducted daily safety meetings and monthly supervisor safety meetings
- Performed safety inspections/audits
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration of monitoring instruments.

EMPLOYMENT HISTORY

CAPE, HI: Project Manager (2011-present)
Wil Chee Planning, Inc., HI: (2010–2011)
AECOM, HI: (2005-2010).

JONATHAN BORR, EIT
ALTERNATE QUALITY CONTROL OFFICER

PROFESSIONAL QUALIFICATIONS

Safety and health (S&H) professional with more than fifteen years of experience in safety supervision of construction, quality control, safety, and environmental consulting.

EDUCATION

- BS, Environmental Engineering, Syracuse University, NY, 1999.

CERTIFICATIONS AND TRAINING

- Engineer in Training (EIT) (2001)
- 40-Hr HAZWOPER training (2000) and current refresher training (2015)
- 8-Hr HAZWOPER Manager and Supervisor training (2002)
- First-aid/CPR/AED (2015) training; Bloodborne pathogen training (2012)
- 10-Hr OSHA Construction S&H training (2005; 2008)
- 30-Hr OSHA Construction S&H training (2010)
- 40-Hr NAVFAC Construction Safety Hazard Awareness for Contractors (2010; 2013)
- Safe Shoring Practices training (2005)
- 8-Hr Permit-Required Confined Space Entry training (2003)
- Scaffold Safety training (2010); Fall Protection Competent Person training (2005)
- USACE Construction Quality Management for Contractors training (2007; 2012)
- Anti-Terrorism Level 1 Awareness training (2011)
- DOT Hazardous Materials Transportation training (2006; 2011; 2014)
- IATA Dangerous Goods Transportation training (2007; 2011; 2014)
- Lead Health Hazard Training (2014)
- Asbestos Awareness training (2008); Lead Awareness training (2008)
- Defensive Driver Safety training (2009); AMEC First-Step Safety Leadership (2010-AMEC)
- Project Management training (2010-AMEC; 2005-Tetra Tech).

EXPERIENCE AND BACKGROUND

- Acted as QC Officer/SSHO providing S&H support for construction/hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Supervised confined space entry, excavation and elevated work location operations
- Conducted daily safety meetings and monthly supervisor safety meetings
- Performed safety inspections/audits and conducted incident investigations
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration and maintenance of air monitoring instruments
- Conducted air monitoring for combustible gas, oxygen, H_2S, CO, VOCs, asbestos and lead.

EMPLOYMENT HISTORY

CAPE, Honolulu HI: Project Manager; Project Engineer (2011-present)
AMEC, Honolulu, HI: Staff Engineer (2006-2011)
Dawson Group, Honolulu, HI: Staff Engineer (2005-2006)
Earth Tech, Honolulu, HI: Staff Engineer (2002-2005)
Atlantic Testing Laboratories, Cicero, NY: Construction Materials Technician (1999)
Unilever Home and Personal Care, Trumbull, CT: Process Engineering Intern (1998)
Syracuse University, NY: Civil and Environmental Engineering Dept. Assistant (1995-1997).

HALEY MIRANDA
ALTERNATE QUALITY CONTROL OFFICER

PROFESSIONAL QUALIFICATIONS

Ms. Miranda is an environmental professional with experience in safety and quality supervision of environmental projects. She is qualified to perform quality control, and safety supervision roles.

EDUCATION

- BS, Chemical Engineering, University of Nevada – Reno (2013).

CERTIFICATIONS AND TRAINING

- 40-Hr OSHA HAZWOPER Training (2014) and current refresher training (TBD)
- 8-Hr HAZWOPER Supervisor Training (2014)
- First-Aid/CPR/AED training (2014) and Bloodborne Pathogens Training (2014)
- USACE Construction Quality Management for Contractors (2015)
- DOT Hazardous Materials Training (2014)
- Excavation Competent Person Training (2014)
- Confined Space Training (2014)
- Lead Hazard Awareness Training (2014).

EXPERIENCE AND BACKGROUND

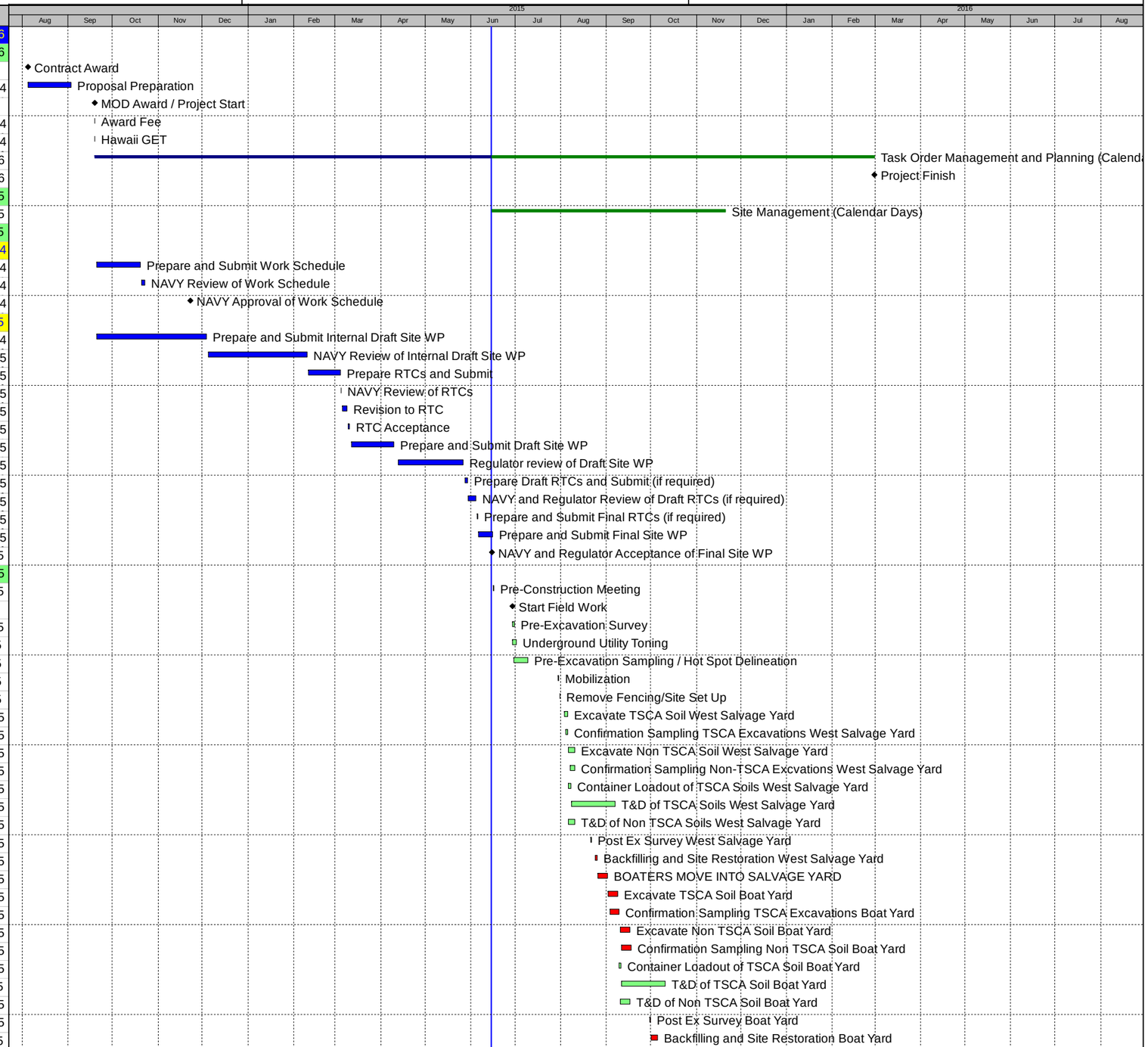
- Provided S&H oversight during HAZWOPER project activities.
- Conducted daily safety meetings.
- Established required levels of protection for site personnel during site activities.
- Performed air monitoring for HAZWOPER site work.

EMPLOYMENT HISTORY

CAPE, Honolulu, HI: Staff Engineer (2014 – Present)
Newmont Mining Corporation, Elko, NV: Junior Metallurgist (2013).

Appendix B
Project Schedule

Activity ID	Activity Name	Orig Dur	Start	Finish
CTO025 Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, HI		528	05-Aug-14	29-Feb-16
Task 1: Task Order Management Planning		528	05-Aug-14	29-Feb-16
A1000	Contract Award	0	05-Aug-14	
A1010	Proposal Preparation	30	05-Aug-14	03-Sep-14
A1020	MOD Award / Project Start	0	19-Sep-14	
A1030	Award Fee	1	19-Sep-14	19-Sep-14
A1040	Hawaii GET	1	19-Sep-14	19-Sep-14
A1050	Task Order Management and Planning (Calendar Days)	284	19-Sep-14	29-Feb-16
A1060	Project Finish	0		29-Feb-16
Task 2: Site Management		159	15-Jun-15	20-Nov-15
A1070	Site Management (Calendar Days)	159	15-Jun-15	20-Nov-15
Task 3: Site Work Plans and Submittals		268	20-Sep-14	15-Jun-15
Work Schedule		51	20-Sep-14	23-Nov-14
A1080	Prepare and Submit Work Schedule	30	20-Sep-14	20-Oct-14
A1090	NAVY Review of Work Schedule	21	21-Oct-14 A	23-Oct-14
A1100	NAVY Approval of Work Schedule	0		23-Nov-14
Site Work Plan		268	20-Sep-14	15-Jun-15
A1110	Prepare and Submit Internal Draft Site WP	60	20-Sep-14	04-Dec-14
A1120	NAVY Review of Internal Draft Site WP	30	05-Dec-14	10-Feb-15
A1130	Prepare RTCs and Submit	7	11-Feb-15 A	04-Mar-15
A1140	NAVY Review of RTCs	14	05-Mar-15 A	05-Mar-15
A1141	Revision to RTC	1	06-Mar-15 A	09-Mar-15
A1142	RTC Acceptance	1	10-Mar-15 A	11-Mar-15
A1160	Prepare and Submit Draft Site WP	7	12-Mar-15 A	10-Apr-15
A1170	Regulator review of Draft Site WP	30	13-Apr-15 A	27-May-15
A1280	Prepare Draft RTCs and Submit (if required)	7	28-May-15	30-May-15
A1330	NAVY and Regulator Review of Draft RTCs (if required)	14	30-May-15	04-Jun-15
A1370	Prepare and Submit Final RTCs (if required)	1	05-Jun-15 A	05-Jun-15
A1400	Prepare and Submit Final Site WP	5	06-Jun-15 A	15-Jun-15
A1410	NAVY and Regulator Acceptance of Final Site WP	0		15-Jun-15
Task 4: Field Work		171	16-Jun-15	03-Dec-15
A1190	Pre-Construction Meeting	1	16-Jun-15*	16-Jun-15
A1191	Start Field Work	0	29-Jun-15*	
A1192	Pre-Excavation Survey	2	29-Jun-15*	30-Jun-15
A1193	Underground Utility Toning	3	29-Jun-15	01-Jul-15
A1265	Pre-Excavation Sampling / Hot Spot Delineation	8	30-Jun-15	09-Jul-15
A1270	Mobilization	1	30-Jul-15	30-Jul-15
A1271	Remove Fencing/Site Set Up	1	31-Jul-15	31-Jul-15
A1290	Excavate TSCA Soil West Salvage Yard	3	03-Aug-15	05-Aug-15
A1291	Confirmation Sampling TSCA Excavations West Salvage Yard	2	04-Aug-15	05-Aug-15
A1300	Excavate Non TSCA Soil West Salvage Yard	3	06-Aug-15	10-Aug-15
A1305	Confirmation Sampling Non-TSCA Excvations West Salvage Yard	2	07-Aug-15	10-Aug-15
A1310	Container Loadout of TSCA Soils West Salvage Yard	2	06-Aug-15	07-Aug-15
A1311	T&D of TSCA Soils West Salvage Yard	30	08-Aug-15	06-Sep-15
A1320	T&D of Non TSCA Soils West Salvage Yard	3	06-Aug-15	10-Aug-15
A1321	Post Ex Survey West Salvage Yard	1	21-Aug-15	21-Aug-15
A1340	Backfilling and Site Restoration West Salvage Yard	2	24-Aug-15	25-Aug-15
A1341	BOATERS MOVE INTO SALVAGE YARD	7	26-Aug-15	01-Sep-15
A1350	Excavate TSCA Soil Boat Yard	4	02-Sep-15	08-Sep-15
A1351	Confirmation Sampling TSCA Excavations Boat Yard	4	03-Sep-15	09-Sep-15
A1352	Excavate Non TSCA Soil Boat Yard	5	10-Sep-15	16-Sep-15
A1353	Confirmation Sampling Non TSCA Soil Boat Yard	5	11-Sep-15	17-Sep-15
A1354	Container Loadout of TSCA Soil Boat Yard	2	09-Sep-15	10-Sep-15
A1355	T&D of TSCA Soil Boat Yard	30	11-Sep-15	10-Oct-15
A1356	T&D of Non TSCA Soil Boat Yard	5	10-Sep-15	16-Sep-15
A1357	Post Ex Survey Boat Yard	1	30-Sep-15	30-Sep-15
A1358	Backfilling and Site Restoration Boat Yard	3	01-Oct-15	05-Oct-15

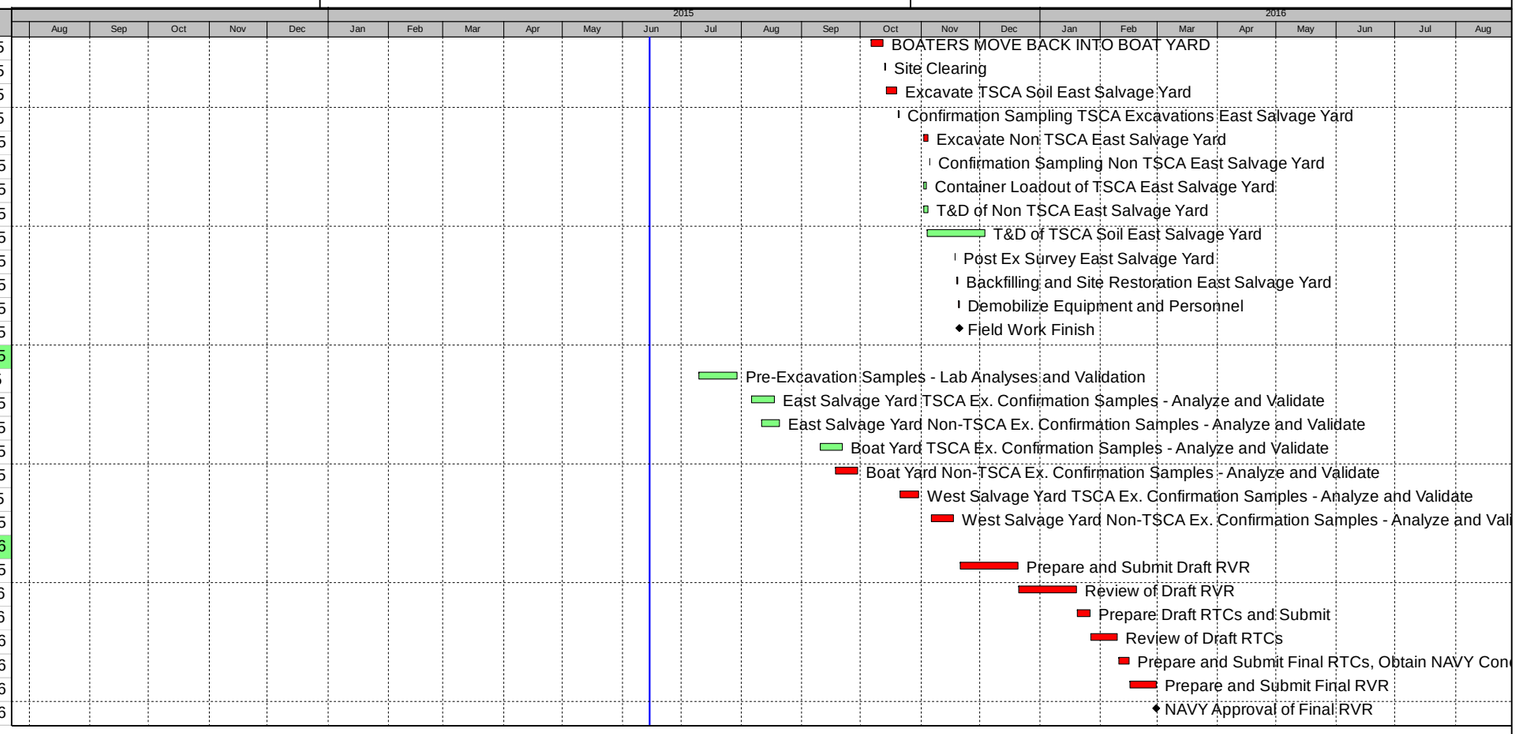


Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: All Activities

Date	Revision	Checked	Approved

Activity ID	Activity Name	Orig Dur	Start	Finish
A1359	BOATERS MOVE BACK INTO BOAT YARD	7	06-Oct-15	12-Oct-15
A1360	Site Clearing	1	13-Oct-15	13-Oct-15
A1380	Excavate TSCA Soil East Salvage Yard	4	14-Oct-15	19-Oct-15
A1381	Confirmation Sampling TSCA Excavations East Salvage Yard	1	20-Oct-15	20-Oct-15
A1382	Excavate Non TSCA East Salvage Yard	3	02-Nov-15	04-Nov-15
A1383	Confirmation Sampling Non TSCA East Salvage Yard	1	05-Nov-15	05-Nov-15
A1384	Container Loadout of TSCA East Salvage Yard	2	02-Nov-15	03-Nov-15
A1385	T&D of Non TSCA East Salvage Yard	3	02-Nov-15	04-Nov-15
A1386	T&D of TSCA Soil East Salvage Yard	30	04-Nov-15	03-Dec-15
A1387	Post Ex Survey East Salvage Yard	1	18-Nov-15	18-Nov-15
A1388	Backfilling and Site Restoration East Salvage Yard	1	19-Nov-15	19-Nov-15
A1390	Demobilize Equipment and Personnel	1	20-Nov-15	20-Nov-15
A1391	Field Work Finish	0		20-Nov-15
Task 5: Laboratory Analyses		92	10-Jul-15	17-Nov-15
A1361	Pre-Excavation Samples - Lab Analyses and Validation	14	10-Jul-15	29-Jul-15
A1362	East Salvage Yard TSCA Ex. Confirmation Samples - Analyze and Validate	8	06-Aug-15	17-Aug-15
A1420	East Salvage Yard Non-TSCA Ex. Confirmation Samples - Analyze and Valid	8	11-Aug-15	20-Aug-15
A1430	Boat Yard TSCA Ex. Confirmation Samples - Analyze and Validate	8	10-Sep-15	21-Sep-15
A1440	Boat Yard Non-TSCA Ex. Confirmation Samples - Analyze and Validate	8	18-Sep-15	29-Sep-15
A1450	West Salvage Yard TSCA Ex. Confirmation Samples - Analyze and Validate	8	21-Oct-15	30-Oct-15
A1451	West Salvage Yard Non-TSCA Ex. Confirmation Samples - Analyze and Valic	8	06-Nov-15	17-Nov-15
Task 6: Remediation Verification Report (RVR)		101	21-Nov-15	29-Feb-16
A1200	Prepare and Submit Draft RVR	30	21-Nov-15	20-Dec-15
A1210	Review of Draft RVR	30	21-Dec-15	19-Jan-16
A1220	Prepare Draft RTCs and Submit	7	20-Jan-16	26-Jan-16
A1230	Review of Draft RTCs	14	27-Jan-16	09-Feb-16
A1240	Prepare and Submit Final RTCs, Obtain NAVY Concurrence	6	10-Feb-16	15-Feb-16
A1250	Prepare and Submit Final RVR	14	16-Feb-16	29-Feb-16
A1260	NAVY Approval of Final RVR	0		29-Feb-16



Remaining Level of Effort | Actual Work | Critical Remaining Work
Actual Level of Effort | Remaining Work | Milestone

TASK filter: All Activities

Date	Revision	Checked	Approved

Appendix C
Sampling and Analysis Plan

Final

Sampling and Analysis Plan Removal Action at Salvage Yard

MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

SAP Worksheet #1: Title and Approval Page

SAMPLING AND ANALYSIS PLAN

June 2015

Removal Action at Salvage Yard
Marine Corps Base Hawaii, Kaneohe, Hawaii

Prepared for:
Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JBPHH HI 96860-3139

Prepared by:
Cape Environmental Management, Inc.
155 Kapalulu Place, Suite 111
Honolulu, HI 96819

Prepared under:
N62742-10-D-1804
CTO 0025

Review Signature:		8 June 2015
	Jonathan Borr, Project Manager	Date
Approval Signature:	Wayne Vermeychuk — Digitally signed by Wayne Vermeychuk DN: cn=Wayne Vermeychuk, o=CAPE Environmental, Inc., ou=Chemistry Services, email=wvermeychuk@cape-inc.com, c=US Date: 2015.06.12 19:37:34 -04'00'	
	Wayne Vermeychuk, Chemistry QC Manager	Date

EXECUTIVE SUMMARY

INTRODUCTION

This Sampling and Analysis Plan (SAP) has been prepared by Cape Environmental Management, Inc. (CAPE) under Contract Task Order (CTO) No. 0025 of the Remedial Action Contract for Sites in Hawaii and Other Areas for Naval Facilities Engineering Command (NAVFAC), Pacific, Contract No. N62742-10-D-1804. The purpose of this CTO is to perform a Removal Action at Salvage Yard located at Marine Corps Base Hawaii (MCBH), Kaneohe, Hawaii (Figure1-1).

PURPOSE AND OBJECTIVES

The purpose of the removal action is to excavate polychlorinated biphenyl (PCB)-contaminated soil to reduce potential risks to current and future human receptors that could be exposed to PCBs at the site, and reduce offsite migration of PCB-contaminated surface soil (Intrinsik 2014). The objective will be to excavate PCB-contaminated soil with concentrations above the Project Action Level (PAL) of 10 milligram per kilogram (mg/kg) based on historical sampling results and additional pre-excavation delineation sampling results obtained during the Removal Action. The PAL and cleanup goal is based on the TSCA high occupancy cleanup level.

BACKGROUND

The Salvage Yard is located in the south-central portion of Kaneohe, adjacent to Kaneohe Bay. MCBH uses the majority of the Site to store unused equipment and materials. Currently the Site contains the Marina Secondary Boat Storage Area (in the western portion, used by Marina Operations for boat storage), the Vehicle Impoundment Lot, a covered concrete pad area used for storage of old generators, the abandoned Dry Ice Blast Building (Building 6502), a Wetland area, and excess material storage (Figure 1-2). Historically the Site was used as a storage area for transformers and drums of waste liquids (mostly waste oils). Additionally, until 1978 a small area at the northwest corner of the Site was used to dispose of dilute pesticide rinsate.

Environmental concerns have been previously addressed in a number of investigations and reports. Investigations have indicated that the Site contains total PCB concentrations above the proposed 10 mg/kg project action limit (PAL) for soil (Element Environmental 2014). PCB concentrations at various depths are illustrated in Figure 1-3.

PROJECT TASKS

Project tasks include mobilization, utility clearances, surveying, waste characterization and pre-excavation delineation sampling, soil excavation, waste transportation and disposal, confirmation soil sampling, backfill, site restoration, and demobilization. This SAP provides the details of pre-excavation delineation and confirmation soil sampling.

REPORTING

All findings, results, and surveys will be presented in a Remediation Verification Report (RVR).

TABLE OF CONTENTS

SAP Worksheet #1: Title and Approval Page ii
SAP Worksheet #2: Sampling and Analysis Plan Identifying Information 1
SAP Worksheet #3: Distribution List 4
SAP Worksheet #4: Project Personnel Sign-Off Sheet 5
SAP Worksheet #5: Project Organizational Chart 6
SAP Worksheet #6: Communication Pathways 7
SAP Worksheet #7: Personnel Responsibilities Table 8
SAP Worksheet #8: Special Personnel Training Requirements Table 9
SAP Worksheet #9: Project Scoping Session Participants Sheet 10
SAP Worksheet #10: Conceptual Site Model 13
SAP Worksheet #11: Project Quality Objectives/Systematic Planning Process Statements 18
SAP Worksheet #12: Measurement Performance Criteria 21
SAP Worksheet #13: Secondary Data Criteria and Limitations Table 22
SAP Worksheet #14: Summary of Project Tasks 23
SAP Worksheet #15: Reference Limits and Evaluation Tables 26
SAP Worksheet #16: Project Schedule/Timeline Table 27
SAP Worksheet #17: Sampling Design and Rationale 28
SAP Worksheet #18: Location-Specific Sampling Methods/SOP Requirements Table 32
SAP Worksheet #19: Field Sampling Requirements Table 33
SAP Worksheet #20: Field QC Sample Summary Table 34
SAP Worksheet #21: Project Sampling SOP References Table 35
SAP Worksheet #22: Field Equipment Calibration, Maintenance, Testing, and Inspection Table 36
SAP Worksheet #23: Analytical SOP Reference 37
SAP Worksheet #24: Analytical Instrument Calibration Table 38
SAP Worksheet #25: Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table 39
SAP Worksheet #26: Sampling Handling System 40
SAP Worksheet #27: Sample Custody Requirements 41
SAP Worksheet #28: Laboratory QC Samples Table 43
SAP Worksheet #29: Project Documents and Records Table 45
SAP Worksheet #30: Analytical Services Table 46
SAP Worksheet #31: Planned Project Assessments Table 47
SAP Worksheet #33: QA Management Reports Table 49
SAP Worksheets #34-36: Data Verification and Validation (Steps I and IIa/IIb) Process Table 50
SAP Worksheet #37: Usability Assessment 51
REFERENCES 54

TABLE OF CONTENTS

FIGURES

Figure 1-1: Site Location

Figure 1-2: Site Layout

Figure 1-3: PCB Concentration and Depths

Figure 5-1: Excavation Areas

Figure 5-2: Excavation Areas A

Figure 5-3: Excavation Areas B

Figure 5-4: Excavation Areas C

Figure 5-5: Excavation Areas D

Figure 5-6: Excavation Areas E

Figure 5-7: Excavation Areas F

Figure 5-8: Excavation Areas G

Figure 5-9: Excavation Areas H

Figure 5-10: Excavation Areas I

ATTACHMENTS

Attachment 1 Procedures from the Project Procedures Manual, U.S. Navy Environmental Restoration Program (ERP), NAVFAC Pacific, February 2007

Procedure I-A-6: IDW Management

Procedure I-A-8: Sample Naming

Procedure I-B-1: Soil Sampling

Procedure I-F: Equipment Decontamination

Procedure III-D: Logbooks

Procedure III-E: Recordkeeping, Sample Labeling, and Chain-of-Custody Procedures

Procedure III-F: Sample Handling, Storage, and Shipping Procedures

Attachment 2 Laboratory DoD ELAP Certificate of Accreditation

ACRONYMS AND ABBREVIATIONS

≥	Greater than or equal to
±	Plus or minus
°C	Degrees Centigrade
µg/kg	Microgram per kilogram
µg/cm^2	Microgram per square centimeter
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below ground surface
CA	Corrective Action
CAPE	Cape Environmental Management, Inc
CCV	Continuing calibration verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIH	Certified industrial hygenist
COC	Contaminant of Concern
COR	Contracting Officer's Representative
CSM	Conceptual Site Model
CTO	Contract Task Order
DDT	Dichlorodiphenyltrichloroethane
DL	Detection Limit
DOH	Department of Health, State of Hawaii
DoD	United States Department of Defense
DON	Department of Navy
DOT	Department of Transportation
DQI	Data Quality Indicator
DQO	Data Quality Objective
DU	Decision Unit
EAL	Environmental Action Level
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
EPA	United States Environmental Protection Agency
ER	Environmental Restoration
ERP	Environmental Restoration Program
ft	feet/foot
GC-ECD	Gas chromatograph-electron capture detector
GPS	Global Positioning System
IAW	Initial Assessment Study
IDW	Investigative-Derived Waste
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
LIMS	Laboratory Information Management System
LOD	Limit of Detection
LOQ	Limit of Quantitation
MCCS	Marine Corps Community Services
mg/kg	Milligram per kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
N/A	Not applicable
NAVFAC Hawaii	Naval Facilities Engineering Command, Hawaii
NEDD	Naval Electronic Data Deliverable
NIRIS	Naval Installation Restoration Information Solution
No.	Number
oz.	Ounce
PAH	Polycyclic Aromatic Hydrocarbon

PAL	Project Action Level
PARCCS	Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity
PCB	Polychlorinated biphenyl
PDF	Portable Document Format
PM	Project Manager
PQO	Project Quality Objective
PSQ	Project Study Question
QA	Quality Assurance
QAO	Quality Assurance Officer
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCO	Quality Control Officer
QL	Quantitation Limit
QSM	Quality Systems Manual
RL	reporting limit
RPD	Relative Percent Difference
RPM	Remedial Project Manager
RSD	Relative Standard Deviation
RSE	Remedial Site Evaluation
RVR	Remediation Verification Report
SAP	Sampling and Analysis Plan
SI	Site Investigation
SOP	Standard Operating Procedure
SSHO	Site Safety and Health Officer
TGM	Technical Guidance Manual
TSA	Technical Systems Audit
TSCA	Toxic Substances Control Act
TSDF	Treatment Storage and Disposal Facility
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plan
UFP-SAP	Uniform Federal Policy Sampling and Analysis Plan
UIC	Underground Injection Control
U.S.	United States
UTM	Universal Transverse Mercator
USDA	U.S. Department of Agriculture
WP	Work Plan

SAP Worksheet #2: Sampling and Analysis Plan Identifying Information

Site Name/Number: Salvage Yard MCBH, Kaneohe, Hawaii

Operable Unit: not applicable (N/A)

Contractor Name: Cape Environmental Management, Inc. (CAPE)

Contract Number: N62742-10-D-1804

Contract Title: Remedial Action Contract for Sites in Hawaii and Other Areas for Naval Facilities Engineering Command, Pacific

Contract Task Order: CTO 0025

1. This Sampling and Analysis Plan (SAP) was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Plans (UFP-QAPP)* (EPA 2005), NAVFAC Pacific 2010 UFP SAP Template, and the United States Environmental Protection Agency (EPA) *Guidance for Quality Assurance Project Plans, EPA QA/G-5* (EPA 2002).

2. Identify regulatory program: Salvage Yard MCBH is subject to corrective action requirements of the comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the Toxic Substances Control Act (TSCA) for Polychlorinated biphenyls (PCBs) (40 CFR 761). State of Hawaii Department of Health will provide oversight in which they provide review and guidance throughout the CTO in coordination with NAVFAC Hawaii.

3. This SAP is a project-specific SAP.

4. List organizational partners (stakeholders) and identify the connection with lead organization:

   The State of Hawaii Department of Health (DOH) have regulatory jurisdiction over the Salvage Yard MCBH Site and provides review and guidance to NAVFAC Hawaii.

5. Lead organization: The United States (U.S.) Navy is the lead organization.

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

SAP Worksheet #	Required Information	Crosswalk to Related Information
A. Project Management and Objectives		
Documentation		
1	Title and Approval Page	
2	SAP Identifying Information	
3	Distribution List	
4	Project Personnel Sign-Off Sheet	
Project Organization		
5	Project Organizational Chart	
6	Communication Pathways	
7	Personnel Responsibilities Table	
8	Special Personnel Training Requirements Table	Not Applicable
Project Planning/Problem Definition		
9	Project Scoping Session Participants Sheet	
10	Conceptual Site Model	
11	Project Quality Objectives/Systematic Planning Process Statements	
12	Field quality control (QC) Samples	
13	Secondary Data Criteria and Limitations Table	Not Applicable
14	Summary of Project Tasks	
15	Reference Limits and Evaluation Tables	
16	Project Schedule/Timeline Table	
B. Measurement/Data Acquisition		
Sampling Tasks		
17	Sampling Design and Rationale	
18	Location-Specific Sampling Methods/SOP Requirements Table	
19	Field Sampling Requirements Table	
20	Field QC Sample Summary Table	
21	Project Sampling SOP References Table	Attachments 1 through 8

SAP Worksheet #	Required Information	Crosswalk to Related Information
22	Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Not Applicable
Analytical Tasks		
23	Analytical SOP References Table	
24	Analytical Instrument Calibration Table	
25	Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	
Sample Collection		
26	Sample Handling System	
27	Sample Custody Requirements	
QC Samples		
28	Laboratory QC Samples Table	
Data Management Tasks		
29	Project Documents and Records Table	
30	Analytical Services Table	
C. Assessment Oversight		
31	Planned Project Assessments Table	
32	Assessment Findings and Corrective Action (CA) Responses Table	
33	QA Management Reports Table	
D. Data Review		
34-36	Data Verification and Validation (Steps I and IIa/IIb) Process Table	
37	Usability Assessment	

Notes:
QA quality assurance
QC quality control
SOP standard operating procedure

SAP Worksheet #3: Distribution List

This worksheet identifies all personnel/entities who receive copies of the SAP, subsequent SAP revisions, addenda, and amendments.

SAP Recipients	Title	Organization	Telephone Number (optional)	E-mail Address or Mailing Address
Eric Shigaki	Remedial Project Manager (RPM)	U.S. Navy, NAVFAC Hawaii	808-471-1171 x264	eric.shigaki@navy.mil
David Chock	Task Order Contracting Officer's Representative (COR)	U.S. Navy, NAVFAC Hawaii	808-474-3220 x286	david.chock@navy.mil
Kim Markillie	NAVFAC QA Manager	Navy RPM Interface	(808) 472-1465	kim.markillie@navy.mil
Eric Sadoyama	RPM	DOH	808-586-0955	eric.sadoyama@doh.hawaii.gov
Jonathan Borr	Project Manager (PM)	CAPE	808-791-6885	jborr@cape-inc.com
Emily Molhoek	Site Safety and Health Officer (SSHO)/Quality Control Officer (QCO)	CAPE	907-223-9942	emolhoek@cape-inc.com
Jamie White	Site Superintendent	CAPE	808-479-2324	jwhite@cape-inc.com
Wayne Vermeychuk	Chemistry QC Manager	CAPE	770-908-7200	wvermeychuk@cape-inc.com
Richard Westmoreland	Project Chemist	CAPE	865-481-0839	rwestmoreland@cape-inc.com
Richard Westmoreland	Data Validator	CAPE	865-481-0839	rwestmoreland@cape-inc.com
Tony Vega	PM	Accutest – San Jose	408-588-0200	tonyv@accutest.com

SAP Worksheet #4: Project Personnel Sign-Off Sheet

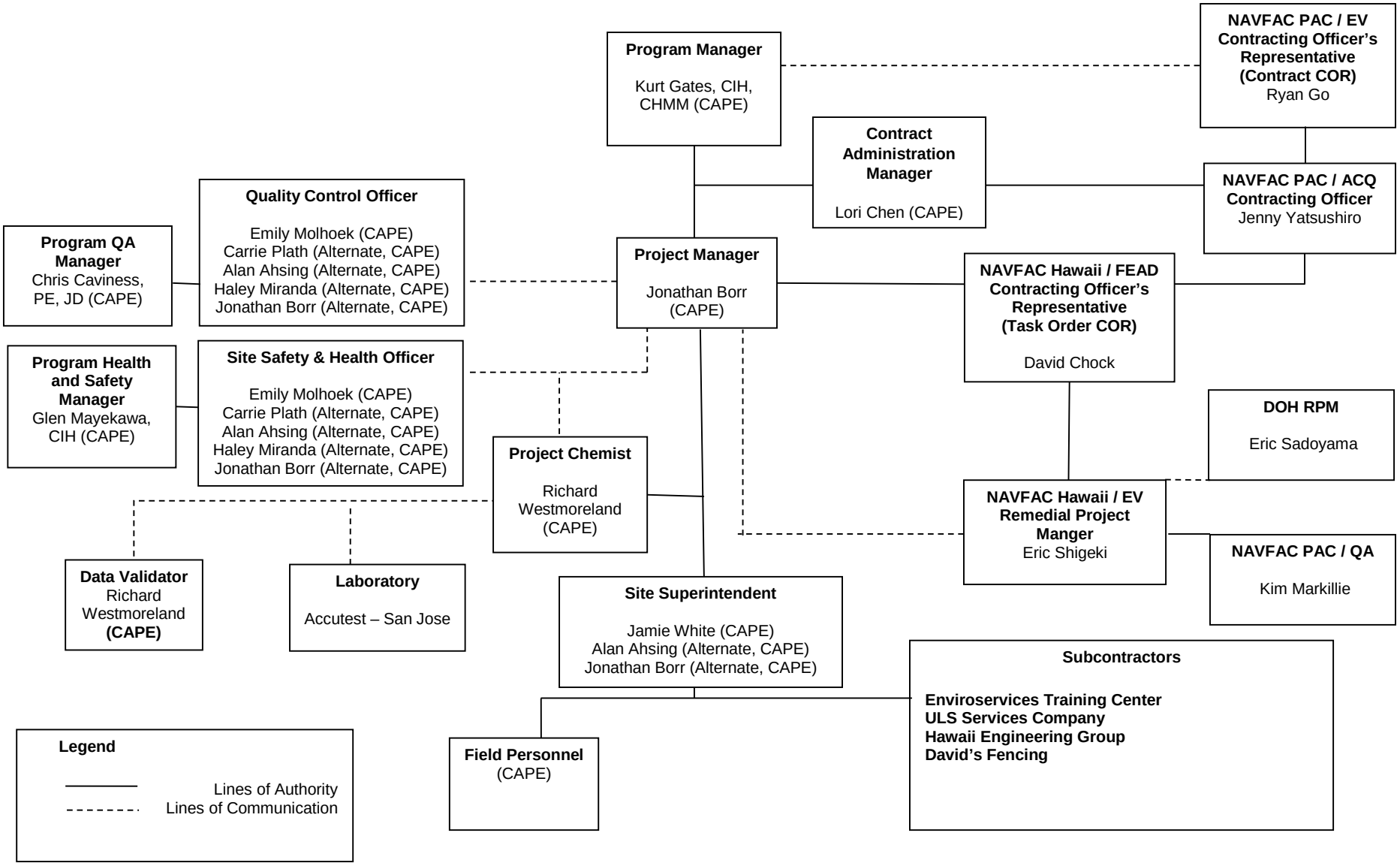
The final version of this SAP will be delivered to all project personnel involved with implementing any portion of the SAP. They will all be given sufficient time to read and ask questions about the content of the SAP before the field investigation commences.

Certification: I have had the opportunity to read and ask questions about this SAP. My signature below certifies that I understand the procedures, equipment, and restrictions of this plan and agree to abide by them.

Name	Organization / Title / Role	Telephone Number	Signature/ E-mail receipt	SAP Section Reviewed	Date SAP Read
Jonathan Borr	CAPE / PM	808-791-6885		All	8 June 2015
Wayne Vermeychuk	CAPE / Chemistry QC Manager	770-908-7200		All	

PM Project Manager
RPM Remedial Project Manager
QC Quality Control
SAP Sampling and Analysis Plan

SAP Worksheet #5: Project Organizational Chart



SAP Worksheet #6: Communication Pathways

The communication pathways for the SAP are shown below.

Communication Drivers	Responsible Entity	Name	Phone Number	Procedure (Timing, Pathway To/From, etc.)
Regulatory Agency Interface	Navy RPM	Eric Shigaki	808-471-1171 x264	The RPM will forward all project documentation to the appropriate regulatory agencies as necessary and is the primary contact with the CAPE PM.
Navy RPM Interface	NAVFAC QA Manager	Kim Markillie	(808) 472-1465	The NAFAC QA Manager requests information, and provides input for the RPM on laboratory deviations; reviews documents and determines if a Level I or II QAPP/SAP is required for projects.
Field Progress Reports	CAPE Quality Control Officer (QCO)	Emily Molhoek or alternate	907-223-9942 (Mobile)	The QCO will provide field progress reports to the CAPE PM daily.
Stop Work due to Safety Issues	CAPE Site Safety and Health Officer (SSHO)	Emily Molhoek or alternate	907-223-9942 (Mobile)	The SHSS is responsible for enforcement of the Site Health and Safety Plan.
SAP/WP Changes prior to Field/ Laboratory work	CAPE PM	Jonathan Borr	808-791-6885 (Office) 808-544-8015 (Mobile)	The PM will incorporate all changes to the SAP/WP prior to field/laboratory work and is the primary contact between CAPE and the Navy
SAP/WP Changes in the Field	CAPE QCO	Emily Molhoek or alternate	907-223-9942 (Mobile)	The QCO will notify the CAPE PM of minor changes to the SAP and justifications by phone within 4 hours of the first occurrence. Major changes to the SAP/WP will require Navy and Regulatory approval prior to execution
Field Corrective Actions (CAs)	CAPE QCO	Emily Molhoek or alternate	907-223-9942 (Mobile)	The need for CA for field issues will be determined by the QCO and will be communicated to the PM.
Sample Receipt Variances	Accutest – San Jose	Tony Vega	408-588-0200	All QA/QC issues with project field samples will be reported by the subcontract laboratory QA Managers to the CAPE Project Chemist and Chemistry QC Manager within 2 business days.
Reporting Lab Quality Variances	CAPE Project Chemist	Richard Westmoreland	865-481-0839	All QA/QC issues with lab data quality will be reported by the data validator to the CAPE Project Chemist and Chemistry QC Manager within 2 business days.
Analytical CAs	CAPE Project Chemist	Richard Westmoreland	865-481-0839	The need for CA for analytical issues will be determined by the CAPE Project Chemist.
Reporting Data Validation Issues	CAPE Chemistry QC Manager	Wayne Vermeychuk	770-908-7200	All data validation issues will be reported by the CAPE Chemistry QC Manager to the CAPE data validator within 2 business days.
Data Validation CAs	CAPE Chemistry QC Manager	Wayne Vermeychuk	770-908-7200	The need for CA for data validation issues will be determined by the CAPE Chemistry QC Manager

SAP Worksheet #7: Personnel Responsibilities Table

Name	Title/Role	Organizational Affiliation	Responsibilities
Eric Shigaki	RPM	U.S. Navy, NAVFAC Hawaii	Manages the oversight of the project for NAVFAC Hawaii and responds to DOH
David Chock	Task Order COR	U.S. Navy, NAVFAC Hawaii	Manages the oversight of the project for NAVFAC Hawaii and responds to DOH
Jonathan Borr	PM	CAPE	Manages all project-related activities
Emily Molhoek	SSHO	CAPE	Oversees all project-related safety and health activities
Jonathan Borr/Carrie Plath/ Alan Ahsing/Haley Miranda	Alternate SSHO	CAPE	Back up SSHO, Provides technical support
Emily Molhoek	QCO	CAPE	Oversees all project-related QA/QC activities
Jonathan Borr/Carrie Plath/ Alan Ahsing/Haley Miranda	Alternate QCO	CAPE	Back up QCO, Provides technical support
Wayne Vermeychuk	Chemistry QC Manager	CAPE	Oversees all chemistry-related QA/QC activities
Richard Westmoreland	Project Chemist	CAPE	Oversees and reviews all laboratory procedures and actions. Coordinates data validation. Conducts data usability assessments and project-specific lab assessments
Richard Westmoreland	Data Validator	CAPE	Conducts data validation
Tony Vega	Analytical Laboratory	Accutest – San Jose	Conducts analytical services and reports data to project chemist

SAP Worksheet #8: Special Personnel Training Requirements Table

Project Function	Specialized Training By Title or Description of Course	Training Provider	Training Date	Personnel/Groups Receiving Training	Personnel Titles/ Organizational Affiliation	Location of Training Records/Certificates

NOT APPLICABLE

Note: The above table is used to identify and describe any specialized/non-routine project-specific training requirements or certifications needed by personnel in order to successfully complete the project or task. Safety training is **not** considered specialized training; the OPNAV 5090.1 training requirements represent routine, minimum requirements that are mandatory for all United States Department of Navy (DON) projects.

SAP Worksheet #9: Project Scoping Session Participants Sheet

A formal scoping session was not held for this project, but CAPE submitted a summary of the sampling program to the Navy with the proposal package. After a review and comment period of Draft Work Plans, the following sampling program was determined:

9.1 Project Objective

The purpose of the removal action is to excavate polychlorinated biphenyl (PCB)-contaminated soil to reduce potential risks to current and future human receptors that could be exposed to PCBs at the site, and reduce offsite migration of PCB-contaminated surface soil. The objective will be to excavate PCB-contaminated soil with concentrations above the PAL of 10 milligram per kilogram (mg/kg) based on the TSCA high occupancy cleanup level for soil.

9.2 Pre-Excavation Delineation Sampling

Excavation boundaries and depths have been approximated using a large set of historical data from the Site. Prior to excavation, additional soil samples will be collected and analyzed for PCBs as Aroclors to address data gaps and to better define excavation extents. Pre-excavation soil samples will be collected down to the planned excavation depth for that sampling location, plus one sampling interval deeper. The deepest sample will be placed on hold pending analysis of sample above it, and will only be analyzed in the event that the sample above it has a PCB concentration exceeding the PAL. Sampling intervals will be 0-6 inches, 6-12 inches, 12-24 inches, 24-48 inches, and 48-60 inches; samples will not be collected if groundwater is encountered. Pre-excavation delineation sampling will be performed using a slide hammer sampler or hand auger. Pre-excavation delineation sampling locations are shown on Figures 5-2 through 5-10.

Sampling design and rationale are described in Worksheet #17.

9.3 Pre-Excavation Waste Characterization Sampling

In addition to pre-excavation delineation sampling, waste characterization soil samples will be collected prior to excavation from each excavation area to provide concentrations of potential background chemicals in the soil, these background concentrations are typically requested by the disposal facility if generator knowledge is deemed insufficient by the disposal facility. The results assure the disposal facility background chemicals are below the requirements set forth in their federally issued disposal permit.

If the landfill requests these analyses, a composite soil sample will be collected. Excavation boundaries are divided by disposal characteristic (TSCA regulated and CERLCLA non-hazardous shown on Figure 5-2 through 5-10). One composite sample will be collected to represent the TSCA regulated excavation area, and a single composite sample collected to represent both CERCLA non-hazardous excavation areas

An estimated fifteen samples will be collected from areas with PCB concentrations between 10 and 50 mg/kg. This waste characterization data will be used for non-hazardous waste characterization transportation and disposal requirements. Additionally, an estimated six composite sample will be collected from the areas determined to contain PCBs in excess of 50 mg/kg.

9.4 Excavation, Load Out and Confirmation Sampling

Excavation work will be completed in three phases, the first phase is the Western Salvage Yard, the second phase is the Boat Storage Yard, and the third phase in the Eastern Salvage Yard. This phasing of work serves two purposes: 1) After the first phase of excavation and site restoration at the Western Salvage Yard, the boats in the Boat Storage Yard will move to the Western Salvage Yard 2) By the time the first and second phases are completed it is expected to be the end of the bird nesting season, and the third phase of excavation and site restoration at the Eastern Salvage Yard can be performed. Essentially, the excavation, confirmation sampling, backfilling, and site restoration process will be fully completed in each phase before moving onto the next phase. Within each phase, TSCA-regulated waste soil will be removed first, followed by the CERCLA non-hazardous waste soil.

TSCA regulated waste soil will be direct loaded into supersacks using a metal soil load out hopper. The filled supersack will be placed onto a pallet for handling. Each supersack will be labeled and weighed by scale to ensure the maximum weight does not exceed 2,200 pounds. Once all TSCA-regulated soil has been removed as delineated by historical results and pre-excavation delineation sample results, preliminary confirmation samples will be collected according to procedures detailed in this SAP as needed and submitted to the laboratory with a 3-day turn-around time (TAT). If an initial confirmation sample result indicates that PCB concentrations in a TSCA regulated excavation remain above 50 mg/kg, additional soil will be excavated and placed into supersacks for disposal. After removal of the additional soil identified as TSCA regulated is completed, confirmation sampling will be repeated. When confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed or excavation has reached the boundary limitations (groundwater or structural), excavation of CERCLA non-hazardous soils will commence in that excavation. Note that if the results indicate that all soil has been removed to the PAL, no further excavation is required and the post excavation survey and site restoration can commence in this specific excavation.

Supersacks will stored in a designated support zone to be covered by plastic sheeting at the end of the work day for protection from degradation due to weathering.

CERLCA non-hazardous soil will be direct loaded into dump trucks or plastic lined roll off bins for disposal at PVT landfill. Once the soil has been excavated to the designated excavation boundary, confirmation samples will be collected according to this SAP as needed and submitted for 3-day TAT. If an initial confirmation sample indicates that PCB concentrations in a CERCLA Non-Hazardous excavation remain above the PAL, additional soil will be excavated and placed into the dump truck or roll off bin for disposal. After removal of the additional soil identified above the PAL is completed, confirmation sampling will be repeated. If confirmation sampling results indicate that all soil within that excavation with concentrations above the PAL has been removed or excavation has reached a boundary limitation (groundwater or a building), no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

In locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration less than the PAL, this sampling point will be used as a confirmation sample. Once enough excavation confirmation sampling points meet the confirmation sampling coverage requirements set forth in this SAP or the boundary limitations are reached, the excavation is considered completed and no further excavation will be required.

Spoil piles not yet loaded into supersacks, dump trucks or roll off bins will be covered with plastic sheeting at the end of the work day to prevent erosion during non-work hours. Confirmation sampling is discussed further in worksheet #17.

9.6 Site Restoration and Demobilization

A demarcation liner (polypropylene black woven stabilization fabric or equivalent) will be placed at the base of the excavations, to mark the separation of clean backfill from the existing native soil. The excavation will then be backfilled with virgin material from the quarry or clean certified material in mechanically compacted lifts no greater than eight inches thick. The imported backfill will be free of organics with no particle size greater than 3-inches in diameter. If the imported backfill is not virgin material or clean certified, it will be sampled to ensure it is not contaminated prior to backfilling. The base backfill material is expected to be clean certified crushed concrete. In pre-excavation graveled areas (typically roads) the top 3 inches of backfill will be 1-inch minus rock/gravel so as to match pre-excavation conditions. At pre-excavation vegetated areas, the top 6 to 8 inches will be backfilled with commercial topsoil. Grass seeding will be completed at the areas requiring commercial topsoil.

Any damage to the surrounding areas that may occur during this project will also be restored to its original condition or better; any concrete removed will be replaced in kind.

Upon the completion of field activities, it is anticipated that a dry decontamination method will be utilized for construction equipment; however, the appropriate equipment decontamination method used will be at the discretion of the SSHO. Further details of dry decontamination procedures are discussed in the SSHP (WP, Appendix D). Following equipment decontamination, all on-site equipment, material, and personnel will be demobilized from the project site. The final inspection with NAVFAC Hawaii personnel will be conducted following the completion of the fieldwork.

SAP Worksheet #10: Conceptual Site Model

10.1 OVERVIEW

This Sampling and Analysis Plan (SAP) has been prepared for the Naval Facilities Engineering Command Hawaii (NAVFAC Hawaii) under Contract Number N62742-10-D-1804, Contract Task Order (CTO) 25. The purpose of this CTO is to perform a PCB-contaminated soil removal action at the Salvage Yard (henceforth referred to as "the Site"), located at MCBH, Kaneohe, Oahu, Hawaii (Figure 1-1).

10.2 SITE DESCRIPTION, HISTORY, AND ENVIRONMENTAL SETTING

The Salvage Yard is located in the south-central portion of MCBH, southeast of the intersection of First and D Streets, adjacent to Kaneohe Bay. MCBH is located on the southeast (windward) side of Oahu, encompassing the entire 2,951 acre Mokapu Peninsula (Figure 1-1). The Site is surrounded by a marina inlet to the West, a wetland area (known as the Salvage Yard Wetland) which faces Kaneohe Bay to the south and east, and open space and Buildings 139 and 140 (occupied by the Installation's Public Works Department) to the north. The ground surface is variable across the site, and includes concrete, asphalt, and unpaved fill and wetland areas.

The MCBH uses the majority of the Site to store unused equipment and materials. Currently the Site contains the Marina Secondary Boat Storage Area (in the western portion, used by Marina Operations for boat storage), the Vehicle Impoundment Lot, a covered concrete pad area used for storage of old generators, the abandoned Dry Ice Blast Building (Building 6502), a Wetland area, and excess material storage including wooden pallets, construction lumber, toilets, large diameter clay pipes, water heaters, air conditioner units, concrete manholes, piles of asphalt patching, and miscellaneous piles of sand, aggregate and excess soil generated during various construction projects around the installation. Structures, etc, are shown on the site map (Figure 1-2).

The Salvage Yard Site was created between 1939 and 1945 during construction of MCBH (U.S. Department of Agriculture [USDA] Soil Conservation Service [SCS] 1972) and is located on fill land. Limited filling activities at the subject property have continued until recent times. The fill material used to create the property were primarily composed of materials dredged from Kaneohe Bay; over the years dredge materials and soils (along with minor amounts of metal rebar, pipes, wood, construction rubble, and waste material that was incorporated with the fill as soils were plowed) have been continuously placed into the Salvage Yard to fill low-lying areas. Historically the Site was used as a storage area for transformers and drums of waste liquids (mostly waste oils). The transformer storage area is currently bare soil. Additionally, until 1978 a small area at the northwest corner of the Site was used to dispose of dilute pesticide rinsate.

Environmental concerns have been previously addressed in a number of investigations and reports (Section 10.3). Investigations have indicated that the Site contains total PCB concentrations above the proposed 10 milligram per kilogram (mg/kg) project action limit (PAL) for soil (maximum of 1800 mg/kg) (Element 2014).

10.2.1 Topography

The site is situated at an elevation of approximately three feet above mean sea level. The Site is located on the south-western edge of the Mokapu Peninsula, the topography of which is dominated by remnant volcanic features, which produced layered ash deposits.

10.2.2 Geology and Soils

The Site is located on fill land that was largely created between 1939 and 1945 during construction of MCBH. Fill materials are primarily composed of coral reef and shell fragments, as well as marine mud dredged from Kaneohe bay. According to soil boring logs in the project area, surface soil consists of light to dark brown sandy, gravelly coralline fill material (believed to be approximately 5 to 10 feet thick), underlain by wet gray clayey, anoxic sand with shell fragments (Element 2014).

10.2.3 Groundwater and Surface Water Hydrogeology

The groundwater beneath the subject property consists of a shallow and unconfined sedimentary aquifer. The shallow and unconfined sedimentary aquifer is ecologically important, but not suitable for human consumption. A deeper, confined, basal aquifer exists several hundred feet below the ground surface and is not hydrologically-connected to the shallow aquifers beneath the site. The shallow aquifer is generally encountered at depths ranging from 1 to 4 feet bgs. MCBH lies seaward of the Underground Injection Control (UIC) line; therefore it is considered to be located above non-drinking water aquifers (Element 2014).

10.2.4 Wildlife

The majority of the Site, terrestrial areas, is not a significant ecological habitat resource. The Salvage Yard Wetland, located in the southern/eastern portion of the Site (Figure 1-2), is a federally protected wetland that is home to the native Hawaiian Stilt.

10.3 HISTORY AND RESULTS OF PREVIOUS INVESTIGATIONS

Previous environmental investigations involving the Salvage Yard MCBH are summarized in the sections below.

10.3.1 1984 Initial Assessment Study

This Initial Assessment Study (IAS) evaluated sites posing potential health or ecological risks. The study found that transformers potentially containing PCBs had been historically stored on the Site. No signs of stained soil were visible, and a soil sample collected from the transformer storage area in 1982 contained less than 20 ppm PCBs (the detection limit of the analytical technique at the time of the study). The study recommended no confirmation studies for the Salvage Yard Site (Luecker et al. 1984), however, in a U.S. Environmental Protection Agency (EPA) Region 9 letter dated August 2, 1996, addressed to the Pacific Division, Naval Facilities Engineering Command ([PACDIV], now known as Naval Facilities Engineering Command [NAVFAC] Pacific), the EPA requested that additional confirmation sampling be performed at the Site prior to close-out (EPA 1996).

10.3.2 2010 Sample Collection

In April 2010 soil sampling was conducted in support of the preparation of an Environmental Assessment (EA) for the improvements project, one of the proposed improvements involved paving the Boat Storage Area and additional areas located in the western portion of the Salvage Yard Site. A single incremental surface soil sample (0 to 0.5 feet [ft] below ground surface [bgs]) collected from the boat storage area contained trace to low levels of diesel, oil, lead, 4,4'-DDT, and nine PAH compounds. Additionally, PCBs were detected in exceedance of the DOH environmental action limits (EALs) for unrestricted and industrial land use (Element 2010).

10.3.3 2013 Site Inspection

In 2012 a site inspection (SI) was performed, to evaluate potential soil and groundwater contamination. The Site was broken up into 11 decision units (DUs); elevated levels of PCBs were identified as potential human health risks associated with ongoing commercial exposure. Sampling methodology involved collection of both incremental and discrete surface samples, incremental subsurface soil samples, and shallow groundwater samples. Incremental samples were collected from four depth intervals (0 to 0.5 ft bgs, 0.5 to 1 ft bgs, 1 to 2 ft bgs, and 2 to 4 ft bgs), with the exception of the two wetland DUs where just surface incremental samples were collected. Discrete surface soil samples were collected from 30 sample locations within eight main DUs (Salvage Yard and Marina areas). All discrete surface soil samples were collected as splits of the incremental samples. Of a total of 240 primary samples, Aroclor 1260 equaled or exceeded the residential environmental action level (EAL) of 1.1 mg/kg in 49 samples. Concentrations ranged from 1.1 to 75 mg/kg. The highest levels of PCBs detected in surface soil samples were concentrated in the

northwest corner of the Salvage Yard and within the Marina boat storage area. PCBs were not detected in the groundwater of any monitoring wells.

It should be noted that all surface incremental results were below Tier 1 industrial EALs, with the exception of PCBs in 0.5 ft bgs in the DU adjacent to the coast in the Marina boat storage area (7.9 mg/kg). Sampling indicated that elevated PCB contamination was primarily in the west and northwest sections of the Site, and in isolated hotspots in the central portion as well as wetland sections of the Site. The highest concentrations of PCBs was presumed to extend to a maximum depth of 2 ft bgs. The SI recommended collection of additional data to better delineate the lateral and vertical extent of PCB contamination at the Site, as well as a comprehensive assessment of the potential risk posed to human and ecological receptors at the Site (Element 2013).

10.3.4 2014 Screening Human Health Risk Assessment/ Screening Level Ecological Risk Assessment

The screening risk assessment was intended to aid risk managers in the development of the Removal Site Evaluation (RSE). In 2013 and 2014, discrete PCB samples were collected from areas where elevated PCB levels were observed during the 2012 investigation, to address characterization concerns (Intrinsik 2014). This assessment included a Screening Human Health Risk Assessment (SHHRA) and a Screening Level Ecological Risk Assessment (SLERA).

The SHHRA, which follows Hawaii Department of Health (DOH) environmental hazard evaluation guidance, applying both Tier 1 and 2 EALs in the screening process, concluded that the hazards posed by PCBs in Site soils may warrant remedial action. The calculated risk in many of the areas is driven by a single or handful of very high PCB levels, therefore a targeted soil removal action in some areas would likely lower the residual human health risk to acceptable levels for receptors.

The SLERA was performed following USEPA risk assessment guidance, and was limited to the two Wetland DUs, DU-16 and DU-17, where ecological receptors are present. During the SLERA, hazards quotients (HQs) were calculated and used to quantify potential ecological risks in the Wetland. An HQ less than or equal to one indicates the chemical is unlikely to cause adverse ecological effects (USEPA 1997). The HQs for aquatic plants did not exceed one for PCBs. The sediment invertebrate low effects range-HQs exceed one for PCBs in both DUs, however only the DU-17 PCB concentrations result in median effects range-HQs above this threshold. For the Hawaiian Stilt, the HQs exceed one for PCBs in DU-17. The SLERA concluded that the adjacent Salvage Yard areas have much higher detected PCB concentrations than the areas in the wetland, therefore installing berms at the upland areas of the Site to prevent run-off to the wetland (effectively removing the source) could be a sufficient option limiting transport of PCB contamination.

10.3.5 2014 Remedial Site Evaluation

For the RSE, the Site was divided into ten DUs, based on the 2012 SI results. Five of the DUs are located in the main Salvage Yard area, three in the unpaved marina boat storage area, and two in the wetland area. Soil sampling during this evaluation targeted three discrete depths in each DU: 0 to 0.5 bgs, 0.5 to 1 ft bgs, and 1 to 2 ft bgs. Samples were also collected from 2 to 4 ft bgs in two of the main Salvage Yard area DUs. Samples were collected from locations following grids to provide coverage of the DUs. Surface water samples were collected from two ponds during two sampling events (one in the wet season, and one in the dry season).

PCB concentrations exceeded the Tier 1 residential EAL in 195 of the 911 soil samples collected. The highest levels of PCBs in site soils are concentrated in the northwest corner of the Salvage Yard, as well as within the current Marina boat storage area. Localized areas of PCB contamination were identified in adjacent DUs. Over all, exceedances of the residential soil PCB EAL decreased with sample depth, although some exceedances were observed in samples collected from 4 ft bgs in one DU in the northeast corner of the Site. PCBs were not detected in surface water samples (Element 2014).

Contaminated soil volumes were estimated using Surfer ® Surface Mapping System modeling software, which uses the Kriging method to interpolate concentrations between data points. Interpolated areas were calculated in AutoCAD ® and multiplied by depth of contamination to estimate soil volumes. The RSE concluded that the volume of soil with PCB concentrations between 10 and 50 mg/kg was approximately 1,890 Cubic Yards (CY); the volume of soil with PCB concentrations greater than 50 mg/kg was estimated to be approximately 365 CY.

The RSE states that future remedial activities performed at this Site will comply with the substantive requirements of TSCA for PCB remediation wastes, and that the requirements of 40 CFR 761.61(a), "Self-implementing On-Site Cleanup and Disposal of PCB Remediation Waste", will serve as a general guide for developing appropriate sampling, analysis, disposal, and decontamination procedure for the removal actions.

10.4 NATURE AND EXTENT OF CONTAMINATION

The spatial extent of PCB contamination based on data from the 2013 SI and the 2014 RSE is presented in figures 5-1 through 5-10. The depth of contamination ranges from surface soil to 4 ft bgs, though the majority is concentrated in the surface soils.

10.5 FATE AND TRANSPORT EVALUATION

Fate and transport processes affect the migration and fate of chemicals in soil and other media. The following generalized discussion is provided to characterize and understand the fate and transport processes relevant to PCBs. An understanding of the fate, distribution, and transport mechanisms is essential for evaluating the potential risk posed by PCBs, and assessing the need for remedial action.

PCBs are resistant to chemical degradation, tend to persist in the environment, and can easily cycle between air, water, and soil. If released to soil, PCBs experience tight adsorption with adsorption generally increasing with the degree of chlorination of the PCB. Aroclor 1260 is a PCB mixture that is highly viscous in nature. Aroclor 1260 has a lower tendency to leach than the lower chlorinated PCBs (ATSDR 2001).

According to DOH guidance, contaminants such as PCBs readily bind to soil particles and will be present primarily in the sorbed phase. The ability of a contaminant to bind to soil is very much tied to the nature and concentration of the contaminant, the presence of other contaminants, the soil mineralogy and chemistry (including organic carbon and clay content) and the time elapsed since the release of the contaminant. Distribution of PCBs in soil based on contaminant properties and soil characteristics assumed in Tier 1 leaching models published by DOH is as follows: 99.7 percent occurs in the sorbed phase, 0.3 percent is in the dissolved phase, and 0.01 percent is in vapor phase. PCBs are almost entirely adsorbed to soil particles. Based on DOH Tier 1 leaching models, the assumed mobility of PCBs in soil leachate is slight (DOH 2007).

10.6 PRELIMINARY EXPOSURE ASSESSMENT

The Conceptual Site Model (CSM) for this removal action is described below in terms of the chemical of concern (COC), PCBs, and the potential pathways to human and ecological receptors. The preliminary exposure assessment is based on historical information on the release of PCBs into the environment and soil sampling results from previous investigations. The objective of the removal action is to eliminate direct exposure of PCBs to human receptors at the Site by removing soil that contains total PCB concentrations above the cleanup goal of 10 mg/kg.

10.6.1 Contaminant Release Mechanisms

Historically the Site was used as a storage area for transformers and drums of waste liquids (mostly waste oils); spills from these stored wastes are the primary source of contamination at the Site.

10.6.2 Human Receptors

The current use of the Site is commercial/ industrial, this usage is unlikely to change; though limited recreational use is possible for some of the areas. The potential immediate threat to public health or welfare is exposure to PCB-contaminated surface soil and offsite migration of PCB-contaminated surface soil. Current human receptors may be exposed to PCB-contaminated surface soil (0 to 2 ft bgs) via direct contact, which includes incidental ingestion, dermal contact, and inhalation of dust particles in outdoor air. Current and future human receptors include outdoor employees, construction workers, and recreational visitors. Hypothetical future receptors include outdoor commercial employees, construction workers, recreational visitors and residents.

17.1.1. Ecological Receptors

The Salvage Yard Wetland, located in the southern/eastern portion of the Site (Figure 1-2), is a federally protected wetland that is home to the native Hawaiian Stilt, among other species of flora and fauna. The wetland continues to be used by native bird species and a few native plant species remain (Element 2014). Contaminated surface soil from upland areas of the Site may drain into the wetland as a result of runoff, or be transported via dust in outdoor air and deposited as sediments in the wetland. Potentially contaminated sediment and surface water in the wetland are potential sources of chemicals to aquatic plants, animals directly exposed to the sediments or surface water, and to higher trophic level animals through direct ingestion and food chain transfer. However, PCVBs were not detected in the surface water samples collected during the RSE. In identifying complete exposure pathways, all potentially complete exposure routes were considered (i.e., direct contact/uptake and ingestion). Direct contact is the only exposure route between sediment and aquatic plants or benthic invertebrates. Incidental ingestion of soil and biotic uptake are the identified exposure routes for birds.

10.7 SUMMARY AND RECOMMENDED ACTION

PCB contamination in soil exists as a result of possible spills of transformer oils and other waste products that were stored on Site in the past. During the previous investigations, both surface and subsurface soil samples exceeded the PAL of 10 mg/kg.

Based on a review of historical site usage and the investigation data, PCBs as Aroclors are the only COCs in soil. Lead concentrations detected above the DOH Tier 1 EAL of 200 mg/kg were primarily in surface soil, which will be removed with the PCB-contaminated soil during the Removal Action. Therefore, the objective of this removal action is to remove PCB-contaminated soil exceeding the PAL of 10 mg/kg for total PCBs (illustrated in Figures 5-1 to 5-10), thereby eliminating the direct exposure pathway for human and ecological receptors.

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

11.1. What Is The Environmental Question That Is Being Answered?

The objective of this removal action is to remove PCB-contaminated soil exceeding the PAL (10 mg/kg) for total PCBs, thereby eliminating the direct exposure pathway risk for human receptors.

The environmental questions to be answered associated with this removal action are:

- ***Delineation Sampling*** - Has sufficient data been collected through the historical sampling results and proposed pre-excavation delineation sampling activities to determine that the PCB-impacted area above the PAL has been delineated laterally and vertically?
- ***Confirmation Sampling*** - Do historical sampling results, pre-excavation delineation samples, and confirmation samples post excavation support the decision that the residual PCB concentrations are equal to or below the PAL?
- ***Waste Characterization Sampling*** – Has sufficient data been collected through historical sampling results and proposed pre-excavation delineation sampling activities to classify the soil investigation-derived waste (IDW) for appropriate disposal?

11.2. Who Will Use The Data?

The data will be used by NAVFAC Hawaii and DOH.

11.3. What Are The Project Action Levels?

The PAL for total PCBs is set at 10 mg/kg, based on the TSCA high occupancy cleanup level. See Worksheet #15 for detailed PALs and the procedure for calculating total PCBs using Aroclor analytical data from USEPA SW-846 Method 8082A.

11.4. What Will The Data Be Used For?

Historical sampling results will be used to determine excavation boundaries and data gaps. The identified data gaps will be addressed by collection of discrete pre-excavation delineation soil samples to further define the excavation vertical and lateral boundaries.

In instances where the excavation was extended to a pre-excavation delineation sampling location or surveyed historical sampling location, that data will serve as a confirmation soil sampling location. These samples and discrete confirmation soil samples collected post excavation as required to meet the minimum sampling coverage requirements (see Section 17.3) will be used to verify concentrations of excavation floors and sidewalls are below the PAL, and that the removal action is complete.

Waste characterization samples will be collected as composite samples prior to excavation for disposal requirements. Soil with total PCB concentration above 50 mg/kg will be classified as TSCA regulated waste. Soil with PCB concentrations below 50 mg/kg will be classified as CERCLA non-hazardous waste. Other general analytes will be tested for as required by the disposal facility in the composite samples to meet the waste disposal facility acceptance criteria. Refer to Section 7 of the WP for details of waste characterization sampling and management.

11.5. What Types Of Data Are Needed (Matrix, Target Analytes, Analytical Groups, Field Screening, Onsite Analytical Or Offsite Laboratory Techniques, Sampling Techniques)?

Discrete pre-excavation delineation and post-excavation soil samples will be collected and analyzed for PCBs as Aroclors by EPA Method 8082 at an off-site Department of Defense (DOD) Environmental Laboratory Accreditation Program (ELAP) certified laboratory.

As per concurrence from the Navy QAO, though soil samples for waste characterization will be collected, the details of the waste characterization sampling and analysis will not be included in the laboratory-related Worksheets in this SAP.

11.6. ARE THERE ANY SPECIAL DATA QUALITY NEEDS, FIELD OR LABORATORY, IN ORDER TO SUPPORT ENVIRONMENTAL DECISIONS?

Duplicate samples and matrix spike/matrix spike duplicate (MS/MSD) samples will be collected during discrete delineation sampling and confirmation sampling at rates of 10 percent and 5 percent, respectively.

11.7. WHERE, WHEN, AND HOW SHOULD THE DATA BE COLLECTED/GENERATED?

Soil samples will be collected from the Boat Storage Area, Western Salvage Yard, and Eastern Salvage Yard in surface and subsurface soil.

.Pre-excavation delineation soil samples are expected to be collected in June 2015. At the designated pre-excavation delineation sampling locations (Figures 5-2 through 5-10) soil samples will be collected up to the bottom excavation depth plus one sampling interval deeper. Soil sampling intervals will be 0 to 6 inches, 6 to 12 inches, 12 to 24 inches, and 24 to 48 inches, and 48 to 60 inches. For example, if historical data indicated the required excavation depth to meet the PAL is 12 inches, the pre-excavation delineation sampling locations around that excavation would have sampling interval depths of 0 to 6 inches, 6 to 12 inches, and 12 to 24 inches. The 12 to 24 inch deep sample would be placed on hold, and only analyzed if the shallower interval is above the PAL.

Pre-excavation delineation soil samples will be collected with hand sampling methods, either with a spit spoon slide hammer sampler or hand auger.

Confirmation sampling is expected to take place from July to October 2015. Confirmation soil samples will be collected using discrete sampling methodology on the excavation floors and sidewalls as required to meet minimum sampling coverage requirements after excavations. Discrete sampling methodology for confirmation of soil concentrations meeting cleanup goal of 10 mg/kg and completion of removal action will be implemented to better identify potential over-excavation directions in each excavation area in the field as opposed to over-excavation of excavation boundaries that have a total PCB concentration below the PAL. This is preferred due to multiple non-contiguous excavation areas at the site. Confirmation soil samples will be collected using disposable scoops.

No samples will be collected below the groundwater table. See Worksheet #17 for further details on the sampling design and rationale.

11.8. LIST THE PRINCIPAL STUDY QUESTIONS (PSQS) AND ALTERNATIVE ACTIONS:

PSQ 1 (Delineation): Do data demonstrate that the Site has been appropriately delineated?

Alternative Actions for PSQ 1:

If the data demonstrates that the Site has been appropriately delineated, then proceed with excavation.

If the data demonstrates that the Site has not been appropriately delineated, then further actions (including revising area boundaries, and/or additional sampling) will be considered. Additional efforts will be documented in the Remediation Verification Report (RVR).

PSQ 2 (Confirmation): Are total PCB concentrations of confirmation samples at or below PALs presented in Worksheet#15?

Alternative Actions for PSQ 2:

Excavations with TSCA Regulated Waste Soil: If an initial confirmation sample indicates that PCB concentrations in a TSCA regulated excavation remain above 50 mg/kg, additional soil will be excavated and placed into supersacks for disposal. After removal of the additional soil identified as TSCA regulated

is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed or excavation has reached boundary limitations (groundwater table, a permanent structure), excavation of CERCLA non-hazardous soils will commence in that excavation, or if the results indicate that all soil has been removed to the PAL, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

Excavations with only CERCLA Non-Hazardous Waste Soil: If an initial confirmation sample indicates that PCB concentrations in a CERCLA Non-Hazardous excavation remain above the PAL, additional soil will be excavated and placed into the dump truck or roll off bin for disposal. After removal of the additional soil identified above the PAL is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations above the PAL has been removed or excavation has reached boundary limitations, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

As described in Section 11.4, in locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration less than the PAL, this sampling point will be used as confirmation of removal. Once enough excavation confirmation sampling points meet the confirmation sampling coverage requirements or the boundary limitations are reached, the excavation is considered completed and no further excavation will be required.

If excavation to the PAL is not feasible, examples include soil with PCB concentrations above the PAL below groundwater or underneath structures, land use controls or other site-specific risk-based cleanup goals will be considered. Additional efforts will be documented in the RVR.

SAP Worksheet #12: Measurement Performance Criteria

Field QC Table

Matrix	Soil
Analytical Group	PCB – SW 8082A
Concentration Level	Low

QC Sample	Analytical Group or Analyte	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria
Equipment Blank[1]	PCB	0%	N/A	N/A
Field Duplicate	PCB	10%	precision	Relative Percent Difference (RPD) ≤ 30 %
Field Replicate	PCB	10%	Precision	Relative Standard Deviation (RSD) ≤ 30 %
MS/MSD	PCB	5%	precision and accuracy	Laboratory Specific (approximately 40% - 140%)

Notes:

[1] Equipment blank will not be collected for this project since only disposable sampling equipment will be used.

SAP Worksheet #13: Secondary Data Criteria and Limitations Table

Secondary Data	Data Source (originating organization, report title and date)	Data Generator(s) (originating organization, data types, data generation / collection dates)	How Data Will Be Used	Limitations on Data Use

NOT APPLICABLE

SAP Worksheet #14: Summary of Project Tasks

This worksheet presents a summary of the project sampling and analysis tasks. The field activities will employ sampling procedures and methodologies in accordance with those described in the Standard Operating Procedures (SOPs) listed in Worksheet #21 of this SAP. Worksheets #17 and #18 detail the sampling activities that will be conducted during the removal action. A summary of the sampling program is provided below:

- Collect and analyze discrete delineation soil samples to determine extent of the excavations;
- Collect waste characterization samples for disposal requirements; and
- Collect and analyze confirmation soil samples at excavation floors and sidewalls.

14.1 QC Tasks

Field QC samples consist of a field duplicates collected during delineation and confirmation soil sampling. For every 10 discrete samples collected, one duplicate sample will be collected (or at least one if less than 10 samples are collected) as a co-located sample. All samples will be collected with disposable sampling equipment, so field blank or equipment blank samples are not required. The following laboratory QC samples will be analyzed consistent with the relevant analytical method: Matrix spike/matrix spike duplicate (MS/MSD), laboratory control sample (LCS)/LCS duplicate (LCSD), method specific calibrations, and laboratory blanks. MS/MSDs will be collected in the field in the same manner as the parent sample. Temperature blanks, provided by the laboratory, will be included in each sample cooler.

14.2 Data Management Tasks for Analysis, Reporting, and Storage

Following laboratory analysis of the project samples, analytical results will be supplied to CAPE by the laboratory in the standard Naval Electronic Data Deliverable (NEDD) format. All sample results will be reported in dry weight measurements. The laboratory analytical records will be flagged as "analytical results not validated, pending validation". These draft records will be compared to the planned test and sample receipt records to ensure completeness of the data deliverables. Following validation, CAPE will load the validated electronic data deliverable (EDD) into the project database, update the records with any applied qualifiers and reason codes, and flag all validated results with data qualifying codes (e.g. UJ, J etc.). The validated data will then be uploaded to the Navy database Naval Installation Restoration Information Solution (NIRIS) in Naval EDD (NEDD) format.

Once the data validation records are updated in the database, CAPE will perform a 20 percent check of analytical records from the database to hard copy analytical reports and a 100 percent check of hand entered field data by comparing the field data sheets to field data in the database. If any systemic errors are identified in the analytical records, then a full 100 percent check will be performed on the relevant data deliverables.

14.3 Electronic Data

The laboratory will provide complete EDD files, portable document format (PDF) files of the data deliverables for all project data, plus a hard copy of data deliverables for all results. The EDD provided by the laboratories will be in NEDD format to facilitate efficient data transfer to NIRIS. All other data generated in the field, and reports generated for the project, will be stored in both hard copy and electronic data file forms by the Project Team as described in Worksheet #29.

NIRIS shall be used to collect, store, and manage all NAVFAC Environmental Restoration (ER) data and documents in accordance with NAVFAC policy, ensuring that ER data and documents are maintained and accessible over the lifecycle of the ER program. All data and documents collected and prepared under the ER program will be submitted to NAVFAC in compliance with NIRIS specifications. Data and documents may include:

- Environmental sample data;

- Spatial data specifically managed by the ER program (i.e., land survey data);
- CD-ROM Requirements; and
- Land Use Control information, as applicable.

During project planning, CAPE will meet with the RPM and NIRIS Regional Database Manager, if necessary, to discuss which NEDD tables are required to be populated in order to load data collected during the project into NIRIS. Commonly used NEDD tables include: Location, Sample Identification and Location with coordinates (if applicable), and Analytical Results with data validation qualifiers. CAPE will contact the RPM to coordinate access to the NAVFAC portal and NIRIS and any training on using NIRIS as necessary.

14.4 Documentation and Records

Field logs, field forms, chains-of-custody, correspondence, and project reports will be maintained in PDF at the CAPE Honolulu office at completion of the project.

14.5 Data Usability Assessment

Data usability will be evaluated by the Project Chemist and the Project Team. The Project Chemist is identified as the lead member of the Team for the data usability assessment. The data usability assessment will entail a review of the data, project quality objectives (PQOs), laboratory data reports, data validation reports, qualifications to the data, findings of the field audit, performance criteria, and any deviations from planned activities. The details are presented in Worksheet #37.

14.6 Decontamination Procedures

Delineation and waste characterization soil samples will be collected using a hand sampling methods (slide hammer sampler with disposable acetate liners or hand auger). Tooling that comes in direct contact with soil will be decontaminated between sampling locations using Alconox or Liquinox (or a comparable detergent) or a steam pressure washer. If a hand auger is used, it will be decontaminated between locations using similar techniques. Decon water will be containerized and disposed. Confirmation soil samples will be collected using disposable equipment intended for one-time use.

14.7 Investigation-Derived Waste

Any investigative-derived waste (IDW) generated over the course of the field investigation will be disposed of with the excavated soils. Soil samples analyzed in the laboratory will be disposed of by the laboratory. Used personal protective equipment (PPE) and disposable sampling equipment will all be disposed as municipal trash. Decontamination water from the slide hammer or auger will be drummed and stored on site until sampling results identify disposal requirements. Refer to Attachment 3 for detailed IDW management procedures.

14.8 Field Staff Briefing

Prior to the initiation of site activities, the PM and/or the field task manager will conduct a pre-work or "kick-off" orientation for all employees carrying out the soil sampling activities in the field. At that time, this SAP will be discussed in detail, including: PQOs, site history, target chemicals of potential concern, sampling methodology, analytical procedures, and health and safety. In addition to the kick-off meeting, "tailgate" safety meetings will be conducted each morning by the site health and safety officer or for all phases of work. Topics of discussion will include: work tasks and associated hazards, work zones and designated PPE, emergency procedures, evacuation routes, and prior safety problems. Additional briefings will be held and documented prior to commencing work in areas with new tasks and/or health and safety hazards.

14.9 Sample Identification, Documentation and Shipment

Refer to Worksheet #27.

14.10 Photographs

Photographs will be taken at sampling locations and other areas of interest onsite or in the sampling area. They will serve to verify information entered in the field logbook. A photograph log will be added to the RVR.

14.11 Agricultural Requirements for Sample Shipment

All appropriate Department of Transportation (DOT) regulations (e.g., 49 Code of Federal Regulations, Parts 171-179) will be followed for the shipment of soil samples. Shipment of sample coolers to the mainland U.S. from locations outside the continental U.S. is controlled by the U.S. Department of Agriculture (USDA) and is subject to their inspection and regulation. USDA regulations pertaining to the shipment of soil samples require that a valid USDA permit be maintained by the receiving laboratory. A copy of the soil permit will accompany each sample cooler.

SAP Worksheet #15: Reference Limits and Evaluation Tables

Matrix: **Soil**

Analytical Group: **Total PCBs**

Analyte	CAS No.	Project Cleanup Goal (µg/kg)	Project Cleanup Goal Reference[2]	Project LOQ Goal (µg/kg)	Laboratory-Specific Limits (µg/kg)		
					LOQ	LOD	DL
Aroclor 1016	12674-11-2	10,000	TSCA	3,300	12	3.0	3.0
Aroclor 1221	11104-28-2	10,000	TSCA	3,300	24	9.0	8.0
Aroclor 1232	11141-16-5	10,000	TSCA	3,300	12	6.0	3.7
Aroclor 1242	53469-21-9	10,000	TSCA	3,300	12	3.0	2.8
Aroclor 1248	12672-29-6	10,000	TSCA	3,300	12	3.0	2.1
Aroclor 1254	11097-69-1	10,000	TSCA	3,300	12	9.0	3.1
Aroclor 1260	11096-82-5	10,000	TSCA	3,300	12	3.0	1.1
Aroclor 1262	37324-23-5	10,000	TSCA	3,300	12	N/A	N/A
Aroclor 1268	11100-14-4	10,000	TSCA	3,300	12	N/A	N/A
Total PCBs	N/A	10,000 [1]	TSCA	N/A	N/A	N/A	N/A

[1] PCBs for this project will be reported as Total PCB. The total PCB concentration will be derived and reported two ways: 1) by summing only the lab-detected concentrations of each Aroclor listed above and 2) by summing all Aroclors included in the method using the detection limit for Aroclors that were not detected above the reporting limit.

[2] The Project Action Level for the removal action will be the TSCA high-occupancy action level (when covered with appropriate cap) for total PCBs, 10 mg/kg (10,000 µg/kg).

µg/kg microgram per kilogram
CAS Chemical Abstracts Service
DL detection limit
DOH State of Hawaii Department of Health
LOD limit of detection
LOQ limit of quantitation
N/A not applicable
No. number
PCB polychlorinated biphenyl

SAP Worksheet #16: Project Schedule/Timeline Table

Schedule is included in Work Plan as Appendix B.

SAP Worksheet #17: Sampling Design and Rationale

17.1 PRE-EXCAVATION DELINEATION SAMPLING

Pre-excavation delineation samples will be collected and analyzed for PCBs as Aroclors by USEPA Method 8082A to improve delineation and determine excavation extents. At the designated pre-excavation delineation sampling locations (Figures 5-2 through 5-10) soil samples will be collected up to the bottom excavation depth plus one sampling interval deeper (this final sampling interval will be put on hold (i.e. sent to the lab but not analyzed immediately) pending laboratory results of the shallower sampling interval). Soil sampling intervals will be 0 to 6 inches, 6 to 12 inches, 12 to 24 inches, and 24 to 48 inches, and 48 to 60 inches. For example, if historical data indicated the required excavation depth to meet the PAL is 12 inches, the pre-excavation delineation sampling locations around that excavation would have sampling interval depths of 0 to 6 inches, 6 to 12 inches, and 12 to 24 inches (hold sample).

Samples will not be collected if groundwater is encountered. Pre-excavation delineation sampling will be performed using a slide hammer sampler. A back up sampling method would be to use a hand auger. The slide hammer sampler is the preferred method since it has an inner disposable 1-inch acetate sleeve. The hand auger requires full decontamination between each soil boring location, which increases the length of time required to collect a sample, the process also generates decontamination water which requires storage, testing and disposal.

- A manual split spoon slide hammer sampler with disposable 1-inch acetate sleeves will be used to collect the soil samples.
- Put on a new, clean and chemical resistance pair of disposable gloves (Nitrile or equivalent) for each sampling interval.
- The acetate sleeve will be removed from inside the split spoon slide hammer sampler and cut open to collect the soil samples.
- The soil from each sampling interval will be placed in a pre-cleaned 4-ounce wide-mouthed glass jars.
- Completely fill the jar with soil. Cap the jar and place sample label on the jar.
- Place a stake, pin flag, or survey "whiskers" at the location to mark that location on the site.
- Put sufficient ice bags in the cooler to maintain the cooler temperature at $4 \pm 2°$ Centigrade (°C).
- Prepare a Chain of Custody and place it in a sealable plastic bag.
- Record the sampling depth, location on the map and the description of the sample.
- Transport the sample to an off-site Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) certified laboratory for the required analyses. In this case, the lab has a sample drop off facility where they prepare the sample cooler for shipment in accordance with the NAVFAC SOP for sample shipping. Upon receipt of the samples, the laboratory will initiate internal tracking procedures by logging the samples in Laboratory Information Management System (LIMS).
- Sample holding time tracking begins with the collection of samples and continues until the analysis is complete. Holding times required for methods planned for this removal action will be specified in Worksheet #19.

The results of PCB analysis will be reported as total PCBs. The total PCB concentration will be derived two ways: 1) by summing only the lab-detected concentrations of each Aroclor listed in Worksheet #15

and 2) by summing all Aroclors included in the method using the detection limit for Aroclors that were not detected above the reporting limit.

17.2 CONFIRMATION SAMPLING

Confirmation soil samples will be collected and analyzed for PCBs as Aroclors by USEPA Method 8082A. In locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration below the PAL, this sampling point will be used as confirmation of removal. The confirmation soil sampling process described below is for cases where additional confirmation soil sample require collection to meet the minimum sampling coverage requirements.

- One discrete sidewall sample (historical, pre or post excavation) is required every approximate 20 ft along the excavation perimeter.
- One discrete floor sample (historical, pre or post excavation) is required for every approximate 400 square feet.
- A disposable scoop or trowel will be used.
- Put on a new, clean and chemical resistance pair of disposable gloves (Nitrile or equivalent) for each sample.
- Scoop the soil sample into a 4 oz. wide-mouth glass jars.
- Completely fill the jar with soil. Cap the jar and place sample label on the jar.
- Place a stake, pin flag, or survey "whiskers" at the location to mark that location on the site.
- Put sufficient ice bags in the cooler to maintain the cooler temperature at $4 \pm 2°$ Centigrade (°C).
- Place the jar into a sealed plastic baggie and place inside the cooler.
- Record the sampling depth, location on the map and the description of the sample.
- Prepare a Chain of Custody and place it in a sealable plastic bag
- Transport the sample to an off-site Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) certified laboratory for the required analyses. In this case, the lab has a sample drop off facility where they prepare the sample cooler for shipment in accordance with the NAVFAC SOP for sample shipping. Upon receipt of the samples, the laboratory will initiate internal tracking procedures by logging the samples in Laboratory Information Management System (LIMS).
- Sample holding time tracking begins with the collection of samples and continues until the analysis is complete. Holding times required for methods planned for this removal action will be specified in Worksheet #19.

The results of PCB analysis will be reported as total PCBs. The total PCB concentration will be derived two ways: 1) by summing only the lab-detected concentrations of each Aroclor listed in Worksheet #15 and 2) by summing all Aroclors included in the method using the detection limit for Aroclors that were not detected above the reporting limit.

17.3 WASTE CHARACTERIZATION SAMPLING

Prior to excavation, waste characterization soil samples will be collected from each excavation area. Background chemical concentrations are typically requested by the disposal facility if generator knowledge is deemed insufficient for the disposal facility to ensure they are below the requirements set forth in their federally issued disposal permit. A composite soil sample consisting of a minimum of 6 increments

representative of the excavation area and excavation depths will be collected. The boundary or boundaries of the excavation are drawn by disposal characteristic (TSCA regulated and CERLCLA non-hazardous) shown on Figures 5-2 through 5-10.

Figure 5-2 shows two CERLCA non-hazardous excavation areas. In this case a single composite sample would be collected to represent both excavations. On Figure 5-3, there is one TSCA regulated excavation area and two CERCLA non-hazardous excavation areas. A composite sample would be collected to represent the TSCA regulated excavation area, and a single composite sample collected to represent both CERCLA non-hazardous excavation areas. In total, it is estimated that fifteen composite samples will be collected from CERLCA non-hazardous excavation areas to be analyzed for PVT Landfill acceptance criteria parameters. An estimated six samples will be collected from TSCA regulated excavations to confirm that lead TCLP concentrations are below RCRA hazardous waste levels. Waste Characterization sampling procedures are detailed below.

- A manual split spoon slide hammer sampler with disposable 1-inch acetate sleeves will be used to collect the soil samples (if excavation is 1-ft deep or greater). If the excavation is 6 inches deep disposable scoops will be used to collect the soil aliquots.
- Each designated excavation unit will be divided into six approximately equal grids. Within the approximate center of each grid the split spoon slide hammer sampler with acetate sleeve will be hammered to the excavation depth.
- The acetate sleeve will be removed from inside the split spoon slide hammer sampler and cut open to collect the soil samples.
- Soil aliquots will be collected until the bottom excavation depth, at intervals of 0 to 6 inches, 6 to 12 inches, 12 to 24 inches, and 24 to 48 inches, and 48 to 60 inches. All soil aliquots will be placed in a plastic baggie.
- After thoroughly mixing the soil within the plastic baggie, two 8-oz jars will be filled with the soil for lab analysis.
- Completely fill the jar with soil from the plastic baggie. Cap the jar and place sample label on the jar.
- Put sufficient ice bags in the cooler to maintain the cooler temperature at $4 \pm 2°$ Centigrade (°C). P
- Place the jars into a sealed plastic baggie and place inside the cooler.
- Prepare a Chain of Custody and place it in a sealable plastic bag.
- Record the sampling depth, location on the map and the description of the sample.
- Transport the sample to an off-site Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) certified laboratory for the required analyses. In this case, the lab has a sample drop off facility where they prepare the sample cooler for shipment in accordance with the NAVFAC SOP for sample shipping. Upon receipt of the samples, the laboratory will initiate internal tracking procedures by logging the samples in Laboratory Information Management System (LIMS).
- Sample holding time tracking begins with the collection of samples and continues until the analysis is complete.

The disposal facility may request analysis of volatiles chemical compounds to ensure background chemical concentrations are acceptable for waste acceptance. If this is required by the disposal facility Terra Core containers will be used. The procedure to collect a soil sample using Terra Core containers is described below:

- Have ready a 40 milliliter (mL) glass volatile organic analysis (VOA) vial containing the appropriate preservative. With the plunger seated in the handle, push the Terra Core® into plastic baggie containing the composite waste characterization sample. A filled chamber will deliver approximately 5 or 10 grams of soil.
- Wipe all soil or debris from the outside of the Terra Core® sampler. The soil plug should be flush with the mouth of the sampler. Remove any excess soil that extends beyond the mouth of the sampler.
- Rotate the plunger that was seated in the handle top 90° until it is aligned with the slots in the body.
- Place the mouth of the sampler into the 40 mL VOA vial containing the appropriate preservative and extrude the sample by pushing the plunger down.
- Quickly place the lid back on the 40 mL VOA vial. Note: When capping the 40 mL VOA vial, be sure to remove any soil or debris from the top and/or threads of the vial.
- Place signed and dated custody seals over the lids and place the jars in a resealable bag. Label the resealable bags the same as the sample jars.
- Put sufficient ice bags in the cooler to maintain the cooler temperature at $4 \pm 2°$ Centigrade (°C).
- Place the resealable bag inside the cooler.
- Prepare a Chain of Custody and place it in a sealable plastic bag.
- Record the sampling depth, location on the map and the description of the sample.
- Transport the sample to an off-site Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP) certified laboratory for the required analyses. In this case, the lab has a sample drop off facility where they prepare the sample cooler for shipment in accordance with the NAVFAC SOP for sample shipping. Upon receipt of the samples, the laboratory will initiate internal tracking procedures by logging the samples in Laboratory Information Management System (LIMS).
- Sample holding time tracking begins with the collection of samples and continues until the analysis is complete.

17.4 SAMPLE CONTAINERS

All discrete sampling containers will be pre-cleaned jars supplied by the contract laboratory. Containers will be stored within coolers in clean areas to prevent exposure to fuels, solvents, and other contaminants. The sample jar will be labeled with sample identification number and associated information as described in Worksheet #27. The label will be covered with a clear, waterproof tape to protect against accidental dislodging during transportation to the laboratory. The glass jar containing the soil sample will be enclosed in a sealable plastic bag, and placed in a cooler for shipment to the laboratory.

17.5 QUALITY CONTROL

Field duplicates will be collected at a 10 percent frequency, and MS/MSD pairs will be collected at a 5 percent frequency. A minimum of one duplicate and one MS/MSD will be collected. Samples are anticipated to be collected with disposable sampling equipment, so equipment rinsate blanks are not necessary during confirmation sampling activities. Field QC sample requirements will be detailed on Worksheet #20.

SAP Worksheet #18: Location-Specific Sampling Methods/SOP Requirements Table

Table 18-1: Pre-Excavation Delineation Sampling Methods/SOP Requirements

Sampling Location	Matrix	Sample Depths (inches below ground surface)	Analytical Group	Number of Primary Samples	Number of Hold Samples	Sampling SOP Reference
All Areas	Soil	0-6, 6-12, 12-24, 24-48, 48-60	PCBs	172	101	ERP Procedure I-B-1, Soil Sampling (NAVFAC 2007)

Table 18-2: Confirmation Sampling Methods/SOP Requirements Table

Sampling Location	Anticipated Excavation Depth (inches below ground surface)	Matrix	Sample Depths (in bgs)	Analytical Group	Number of Primary Samples	Sampling SOP Reference
Excavation floor and Sidewalls	6 to 60	Soil	0 to 60	PCBs	TBD in Field based upon the size of the excavation	ERP Procedure I-B-1, Soil Sampling (NAVFAC 2007)), TGM (DOH 2009)

ERP Environmental Restoration Program
ft bgs feet below ground surface
SOP Standard Operating Procedure
TBD To be determined
TGM Technical Guidance Manual

SAP Worksheet #19: Field Sampling Requirements Table

Matrix	Analytical Group	Preparation and Analytical Methods/SOP Reference	Containers (number, size, and type)	Sample Volume	Preservative	Maximum Holding Time
Soil, Discrete Samples	PCBs as Aroclors	3550B, Ultrasonic Extraction/EPA SW-846 and 8082A, PCBs by Gas Chromatography/EPA SW-846	One 4 oz. jar	30 grams	Cool to 4 ± 2° C	14 days for extraction and 40 days for analysis

EPA Environmental Protection Agency, United States
oz. Ounce
PCB Polychlorinated Biphenyl

SAP Worksheet #20: Field QC Sample Summary Table

Table 20-1: Delineation QC Sample Summary

Matrix	Analytical Group	Sampling Location	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks(1)	No. of Equip. Blanks(2)	Total No. of Samples to Lab
Soil	PCBs as Aroclors	Northeast Area	273	27	14	0	0	314

Notes:
[1] Field blanks will not be required since disposable sampling equipment will be used.
[2] Equipment Blanks will not be required since disposable sampling equipment will be used.
MS/MSD matrix spike/matrix spike duplicate
No. Number
PCB Polychlorinated Biphenyl

Table 20-2: Confirmation QC Sample Summary

Matrix	Analytical Group	Sampling Location	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs	No. of Field Blanks(1)	No. of Equip. Blanks(2)	Total No. of Samples to Lab
Soil	PCBs as Aroclors	Excavation Floor	Every 400 square feet	1 Every 10 sampled	1 Every 20 sampled	0	0	TBD in Field based upon the size of the excavation
Soil	PCBs as Aroclors	Excavation Sidewalls	Every 20 feet	1 Every 10 sampled	1 Every 20 sampled	0	0	TBD in Field based upon the size of the excavation

Notes:
[1] Field blanks will not be required since disposable sampling equipment will be used.
[2] Equipment Blanks will not be required since disposable sampling equipment will be used.
MS/MSD matrix spike/matrix spike duplicate
No. Number
PCB Polychlorinated Biphenyl
TBD To be determined

SAP Worksheet #21: Project Sampling SOP References Table

Reference Number	Title, Revision Date, and / or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure I-B-1: Soil Sampling	NAVFAC Pacific ER Program	Disposable Sampling Equipment	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure I-F: Equipment Decontamination	NAVFAC Pacific ER Program	Decontamination supplies	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure I-A-6: IDW Management	NAVFAC Pacific ER Program	None	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure I-A-8: Sample Naming	NAVFAC Pacific ER Program	None	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure III-D: Logbooks	NAVFAC Pacific ER Program	None	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure III-E: Recordkeeping, Sample Labeling, and Chain-of-Custody Procedures	NAVFAC Pacific ER Program	None	N
Attachment 1	NAVFAC Project Procedures Manual (NAVFAC 2007) ER Procedure III-F: Sample Handling, Storage, and Shipping Procedures	NAVFAC Pacific ER Program	None	N

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

Field Equipment	Activity	Frequency	Acceptance Criteria	CA	Resp. Person	SOP Reference	Comments

NOT APPLICABLE

SAP Worksheet #23: Analytical SOP Reference

Lab SOP Number	Title, Revision Date, and/or Number	Definitive or Screening Data	Matrix and Analytical Group	Instrument	Organization Performing Analysis	Modified for Project Work? (Y/N)
SV001-11	Analysis of Organochlorine Pesticides and Polychlorinated Biphenyls (PCBs) By GC/ECD SW-846 EPA Method 608_8081_8082, Effective 3/14/2014)	Definitive	Soil and PCBs as Aroclors	Gas Chromatograph -electron capture detector (GC-ECD)	Accutest – San Jose	N

SAP Worksheet #24: Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference
GC-ECD (PCB)	Minimum five-point initial calibration for target analytes, lowest concentration standard at or near the reporting limit	Initial calibration prior to sample analysis	One of the options below: 1): RSD for each analyte ≤ 20%; 2) Linear least squares regression: r ≥ 0.995; 3) non-linear regression: COD (r^2) ≥ 0.99, minimum of 6 points for second order.	Evaluate standards, chromatography, and detector response. If problem found with above, correct as appropriate, then repeat initial calibration	Lab Manager / Analyst	TA-GS-0351
GC-ECD	Retention Time Window Position Establishment	Once per ICAL, for each analyte and surrogate.	Set position using the mid-point standard of the ICAL when ICAL is performed. On days when ICAL is not performed, use initial continuing calibration verification (CCV).	NA	Analyst	TA-GS-0351
GC-ECD	Second-source calibration verification	Immediately following ICAL.	All project analytes within ± 20% of the expected value from the ICAL.	Evaluate data. If problem (e.g., concentrated standard, plugged injector needle) found, correct, then repeat second source verification. If still fails, repeat initial calibration.	Lab Manager / Analyst	TA-GS-0351
GC-ECD	Daily calibration verification	Prior to sample analysis, after every 10 field samples, and at the end of the sequence.	All project analytes within ± 20% of the expected value from the ICAL.	Evaluate standard, chromatography, and detector response. If problem found with above, correct as appropriate, then repeat CCV. If still fails, repeat initial calibration. Re-analyze all samples since the last successful calibration verification	Lab Manager / Analyst	TA-GS-0351

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

Instrument/ Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
GC-ECD	Change septum, clean injection port, change or clip column, install new liner	Detector signals and chromatogram review (e.g. Peak Shapes, Resolution, Baseline S/N Ratio)	Instrument performance and sensitivity	As needed	CCV passes criteria	Re-inspect injector port, cut additional column, reanalyze CCV, recalibrate instrument	Accutest – San Jose Chemist	TA-GS-0351

SAP Worksheet #26: Sampling Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT	
Sample Collection (Personnel/Organization):	CAPE
Sample Packaging (Personnel/Organization):	CAPE
Coordination of Shipment (Personnel/Organization):	CAPE
Type of Shipment/Carrier:	Fed Ex to Accutest – San Jose
SAMPLE RECEIPT AND ANALYSIS	
Sample Receipt (Personnel/Organization):	Accutest – San Jose
Sample Custody and Storage (Personnel/Organization):	Accutest – San Jose
Sample Preparation (Personnel/Organization):	Accutest – San Jose
Sample Determinative Analysis (Personnel/Organization):	Accutest – San Jose
SAMPLE ARCHIVING	
Field Sample Storage (No. of days from sample collection):	Coolers with ice will be shipped to Accutest laboratory within 24 hours of sample collection
Sample Extract/Digestate Storage (No. of days from extraction/digestion):	Per Contract (40 days from the extraction/digestate date)
SAMPLE DISPOSAL	
Personnel/Organization:	Accutest – San Jose
Number of Days from Analysis:	Per Contract

SAP Worksheet #27: Sample Custody Requirements

This worksheet was prepared in accordance with the SOPs provided in Attachment 4, Attachment 6, and Attachment 7. Please refer to these SOPs for detailed information.

27.1 Turnaround Time

Pre-Excavation Delineation samples = 14 day TAT

Pre-Excavation Waste Characterization samples = 14 day TAT

Confirmation samples = 3 days

27.2 Sample Packing and Shipping

Standard samples for laboratory analysis will be placed in containers and preserved as described in Worksheet #19. Procedures for sample packaging are outlined in the ER Procedure III-F: Sample Handling, Storage, and Shipping Procedures (NAVFAC 2007) (Worksheet #21). Samples will be placed in glass jar/bottle with Teflon lids (Worksheet #19) and each sample container will be placed inside a self-sealing plastic bag. Sample containers will be kept upright in the cooler on ice directly after sample collection and labeling. The sample coolers will be dropped off at Accutest – Honolulu for packaging and shipment to Accutest – San Jose according to SOPs listed in Worksheet #21. Samples will be properly classified to assure the protection of personnel involved in the shipment of samples and to maintain the integrity of the samples. The Project Chemist (or designated representative) will contact the laboratory as necessary to inform them of samples being shipped from the site, arrival time, and special handling or analytical procedures required. Samples will be delivered to the laboratory within 48 hours from shipment.

The following information will be clearly printed in indelible ink in unabbreviated form on a label attached to the shipping container:

- Laboratory name and address
- Return name and address.

27.3 Laboratory Sample Custody Procedures (receipt of samples, archiving, and disposal)

All samples received by the laboratory will be handled according to the laboratory's Quality Assurance (QA) Manual.

27.4 Sample Identification Procedures

Refer to Attachment 4 of this SAP for the sample naming SOP.

Sample containers should be identified with the following minimum information:

- Site name and location
- Sample identification number
- Sample collection location
- Collection date (month/day/year) and time (military)
- Sample preservation method (chemical or physical, such as ice; indicate if sample must be light-protected)
- Analysis requested (analytical group)
- Sampler's initials

27.5 Chain-of-Custody Procedures

The custody seal and Chain-of-Custody Record will be completely filled out, as appropriate. The custody seal will be attached to the outside of the shipping container in such a manner that the seal must be broken

to allow access to the container. The custody seal will provide the sample collection date and the sampler's initials.

All sample shipments will be accompanied by the Chain-of-Custody Record identifying its contents. This record will be used to document sample custody transfer from the sampler, to other sampling team members (if necessary), to the courier, and finally to the analytical laboratory. Chain-of-Custody Record ensures that samples can be traced from the time of field collection until they are received and analyzed by the analytical laboratory. The original custody record is shipped along with the samples, while the initiator of the record retains a copy. The information required for the Chain-of-Custody Record includes:

- Type of sample (grab or composite) and matrix
- Analytical method numbers and parameter names
- Sample number
- Signature of sampler
- Date and time of sample collection
- Project name, location, and address
- Signatures of persons involved in the chain of possession

When responsibility for a group of samples changes several times, each custodian is not required to retain a copy of the Chain-of-Custody Record, as long as the original custody record indicates that each person accepting the samples has subsequently relinquished custody appropriately. Chain-of-Custody forms will be completed according to the following protocol:

- The originator fills in all requested information from the sample labels
- The originator signs the "Relinquished by" box and keeps the copy
- The original record sheet is shipped with the samples. A plastic shipping envelope will be taped to the inside of the cooler top, and the remaining two copies of the Chain-of-Custody Record will be filed with the representative sampling documents
- The person receiving custody checks the sample label information against the custody record. He/she also checks sample condition and notes anything unusual under "Remarks" on the custody form
- The person receiving custody signs in the adjacent "Received by" box and keeps the original
- The Date/Time will be the same for both signatures, since custody must be transferred between two individuals. However, when samples are shipped via common carrier (e.g., Federal Express), the date/time will not be the same for both signatures
- When samples are shipped via common carrier, the original custody form is shipped with the samples and the shipper (e.g. Field Sample Custodian) keeps the copy. The shipper also keeps all shipping paper, bills of lading, etc.
- In all cases, it must be readily seen that the person receiving custody has relinquished it to the next custodian
- If samples are left unattended or a person refuses to sign, this must be documented and explained on the Chain-of-Custody Record.

SAP Worksheet #28: Laboratory QC Samples Table

Matrix	Soil
Analytical Group	PCBs as Aroclors
Analytical Method/ SOP Reference	EPA Method 8082A/Polychlorinated Biphenyls by Gas Chromatography (EPA 2007)

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria[1]
Method blank	One per preparation batch	No target analytes ≥ ½ RL and > 1/10 the amount measured in any sample or 1/10 the regulatory limit (whichever is greater). For common laboratory contaminants, no analytes detected >RL in accordance with DoD Quality Systems Manual (QSM) requirements.	Verify instrument clean (evaluate calibration blank & samples prior to method blank), then reanalyze. Evaluate to determine if systematic issue within laboratory, correct, then re-prepare and reanalyze the method blank and all samples processed with the contaminated blank in accordance with DoD QSM requirements	Lab Manager / Analyst	Accuracy/Bias Contamination	No target analytes ≥ ½ RL in accordance with DoD QSM requirements
LCS	One LCS per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits in accordance with DoD QSM requirements	Reanalyze LCS once. If acceptable, report. Otherwise, evaluate and re-prep and reanalyze the LCS and all samples in the associated prep batch for failed analytes, if sufficient sample material is available.	Lab Manager / Analyst	Precisions and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits

MS/MSD for all analytes	One MS/MSD pair per preparation batch	QC acceptance criteria as specified by DoD; or laboratory statistically derived control limits in accordance with DoD QSM requirements	Examine the project specific data quality objectives (DQOs). Evaluate the data, and re-prepare/reanalyze the native sample and MS/MSD pair as indicated.	Lab Manager / Analyst	Precision and Accuracy/Bias	QC acceptance criteria: as specified by DoD; or laboratory statistically derived control limits
Surrogate standards	All field and QC samples.	In accordance with DoD QSM criteria and requirements	Determine if matrix effect or laboratory caused, then re-extract and reanalyze all affected samples in accordance with DoD QSM requirements	Lab Manager / Analyst	Accuracy/Bias	QSM or laboratory statistically derived control limits
Precision and Recovery Limits	**Analyte**	**Precision (RPD)**		**Recovery Limits (LCS/MS/MSD)**		
	PCBs as Aroclors	30 %		40-140 %		

Notes:
LCS laboratory control sample;
LCSD laboratory control sample duplicate
MS Matrix Spike
MSD Matrix Spike Duplicate
[1] Recovery and precision limits are from the DoD Quality Systems Manual (QSM). If no limit is available in the QSM, the laboratory historical control limits are used (as per the QSM). Laboratory historical control limits are subject to change as a result of periodic re-evaluation. Limits in use at the time of sample analysis are available from the laboratory.

SAP Worksheet #29: Project Documents and Records Table

Document	Where Maintained
Sample Collection and Field Measurement Records Soil sample logs Chain-of-Custody records Air waybills Documentation of deviation from methods Documentation of internal QA review Identification of QC samples Sample locations (global positioning system [GPS] or Universal Transverse Mercator [UTM] coordinates) Photographs and/or digital videos	All records generated in the field will be stored in a field binder and kept in the custody of the field crew. These records will be periodically delivered to the CAPE PM. Once in the possession of the CAPE PM, the records will be stored in the project file in a secured file cabinet. After project close-out, the official project files will be archived at CAPE's Honolulu office. The point of contact for this information is Jonathan Borr, jborr@cape-inc.com, 808-791-6885.
Analytical Records Chain-of-Custody records Sample receipt forms and sample tracking forms Raw data Identification of QC samples Communication logs Definitions of laboratory qualifiers Documentation of laboratory method deviations Instrument calibration reports Laboratory sample identification numbers Reporting forms, completed with actual results Signatures for laboratory sign-off (e.g., lab QA manager) EDDs (NEDD format)	
Project Data Assessment Records Data validation reports Laboratory QA plans Laboratory accreditation certificates	

SAP Worksheet #30: Analytical Services Table

This worksheet identifies all laboratories that will provide analytical services for the project. All samples will be shipped to and coordinated by Accutest in Honolulu, Hawaii. The required data package turn-around time and deliverable requirements are also identified in this worksheet.

The Primary Laboratories are:

Accutest – Honolulu Service Center (sample drop off location)
197 Sand Island Access Road #203, Honolulu, HI 96819
(808) 843-0655
Accutest – San Jose (sample analysis location)
2105 Lundy Avenue, San Jose, CA 95131
Tony Vega (408) 588-0200

Backup Laboratory is:

Accutest – Mid-West (sample analysis location)
4036 Youngfield Street, Wheat Ridge, CO 80033
(303) 425-6021
The turn-around time for waste characterization samples is 14 days.

The turn-around time for confirmation samples is 3 days.

All hard copy laboratory data package deliverables shall contain all mandatory requirements identified in Appendix E of the DoD QSM.

All electronic laboratory data package deliverables shall be in NEDD format.

SAP Worksheet #31: Planned Project Assessments Table

This worksheet identifies the different type of assessments for evaluating the project activities. The table below identifies the type, frequency, and responsible parties of planned assessment activities that will be performed for the project. Laboratory assessments are not anticipated for this project because only laboratories that maintain current DoD Environmental Laboratory Accreditation Program (ELAP) certification will be utilized.

Assessment Type	Frequency	Internal or External	Organization Performing Assessment	Person(s) Responsible for Performing Assessment (title and organizational affiliation)	Person(s) Responsible for Responding to Assessment Findings (title and organizational affiliation)	Person(s) Responsible for Identifying and Implementing CA (title and organizational affiliation)	Person(s) Responsible for Monitoring Effectiveness of CA (title and organizational affiliation)
Field Sampling Technical Systems Audit [1]	Once during first week of field effort	Internal	CAPE	Emily Molhoek or alternate QCO CAPE	Jonathan Borr PM CAPE	Jonathan Borr PM CAPE	Emily Molhoek or alternate QCO CAPE

Notes:
CA Corrective Action
[1] The field sampling Technical Systems Audit will include a field documentation audit.

SAP Worksheet #32: Assessment Findings and Corrective Action Responses Table

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of CA Response Documentation	Individual(s) Receiving CA Response (name, title, organization)	Timeframe for Response
Field Sampling Technical Systems Audit (TSA)	Memo or email	ask	Verbal notification within 24 hours and written within 1 week	CA Report	David Chock, Task Order COR, NAVFAC Hawaii; Jonathan Borr, PM, CAPE	As soon as possible, but not later than 3 working days following deficiency notification

SAP Worksheet #33: QA Management Reports Table

Type of Report	Frequency (daily, weekly monthly, quarterly, annually, etc.)	Projected Delivery Date(s)	Person(s) Responsible for Report Preparation (title and organizational affiliation)	Report Recipient(s) (title and organizational affiliation)
Field Sampling TSA	Once during first week of field effort	Verbal notification within 24 hours and written report within 1 week	Emily Molhoek/ Alan Ahsing/ Carrie Plath CAPE QCO	David Chock, NAVFAC Hawaii Task Order COR Tory Rosenbush, CAPE PM
Contractor QC Report	Daily	Throughout the duration of field activities	Emily Molhoek/ Alan Ahsing/ Carrie Plath CAPE QCO	David Chock, NAVFAC Hawaii Task Order COR
Preliminary Data Report	Ongoing, as soon as results are available	April 2015	Richard Westmoreland CAPE Project Chemist	Jonathan Borr, CAPE PM
QA Report	One time, after all results are available	April 2015	Richard Westmoreland CAPE Project Chemist	Jonathan Borr, CAPE PM
Data Evaluation Report (for confirmation samples)	One report, as soon as results are available	April 2015	CAPE	Jonathan Borr, CAPE PM

SAP Worksheets #34-36: Data Verification and Validation (Steps I and IIa/IIb) Process Table

Data Review Input	Description	Responsible for Verification (name, organization)	Step I / IIa / IIb [1]	Internal/ External
Chain-of-Custody	Form will be internally reviewed upon completion and verified against field logs, laboratory report, and QA Project Plan (QAPP) for completeness and accuracy and for purposes of monitoring deliverable due dates and sample holding time deadlines. Review will be conducted with completion of each report	Emily Molhoek or alternate CAPE QCO	Step I	Internal
Laboratory Data Package (hard copy and electronic)	TestAmerica will internally perform a 100% review of data packages for completeness and compliance with project requirements. CAPE will perform a 100% review of the summary forms for completeness and compliance with project requirements. CAPE will also perform a 100% review of final validated result summary forms against the EDD to ensure electronic data reflect hard copy data.	Richard Westmoreland, CAPE	Step I	Internal
Project and field documents	Chain-of-Custody, sample receipt forms, case narratives, communication logs, and CA forms will be reviewed to ensure that all samples were collected, transported, and analyzed for the requested parameters and the laboratory used appropriate analytical methods.	Richard Westmoreland, CAPE	Step IIa	Internal
Laboratory QC summary forms	Standard validation. In addition to all Project and Field documentation validation requirements, all QC sample results will be evaluated against the method quality criteria, and the data will be flagged with data qualifiers, according to the CLP National Functional Guidelines	Richard Westmoreland, CAPE	Step IIa/IIb	Internal
Laboratory Raw data	Full validation; In addition to all Level C requirements, review raw data, check calculations, and verify the summary forms are accurate	Richard Westmoreland, CAPE	Step IIa/IIb	External

Notes:
[1] IIa=compliance with methods, procedures, and contracts
IIb=comparison with measurement performance criteria in the SAP

SAP Worksheet #37: Usability Assessment

To support environmental decisions, data generated during the project must be scientifically valid, defensible, and of known, acceptable and documented quality. To provide this type of data, all involved parties will use relevant SOPs during all aspects of the project (e.g., sampling activities, laboratory measurements and analyses, data reporting, data validation, and necessary CAs). Environmental samples will be analyzed only by approved and DoD ELAP Certified laboratories. Appropriate SOPs are referenced throughout this SAP.

Data usability will be evaluated by the CAPE Project Team, including the Project Chemist, Project Geologist, data validator and the PM. Note that the Data Usability Assessment will be conducted on validated data. The results of the Data Usability Assessment will be presented in the appropriate reports. Data are intended to be used for the following objectives:

- Delineation of PCB concentrations in surface and subsurface soil
- Confirmation of completion of removal action
- Characterization of excavated soil for disposal purposes

37.1 Analytical Data Quality Assessment

Project Chemist will perform the data quality assessment. Key project personnel and decision makers, including the PM and Quality Assurance Officer (QAO), will evaluate the overall quality of the data set to determine whether the performance of the sampling design satisfied the criteria presented in the SAP and performed as expected. The data set and sampling performance will be further evaluated to assess whether project decisions can be made with the desired level of certainty, e.g.

- Is the extent of contamination at the site defined to concentrations below cleanup goals after excavating contaminated soil?
- Is further response appropriate or is the decision for no further action appropriate for the site?

The decision making process involves reviewing the analytical results and QA management reports in context with the specific questions outlined in Worksheet #11.

Laboratory quality control samples will be evaluated to permit an estimation of analytical certainty/uncertainty. For example the analysis of MS/MSD will be used to evaluate bias resulting from matrix interference, analysis of field duplicates will be used to evaluate sampling design, analysis of laboratory control samples will be used to evaluate analytical precision.

The data quality/usability assessment team will perform the following steps using guidance contained in EPA documents QA/G-9R *Data Quality Assessment: A Reviewer's Guide* (EPA 2006a) and QA/G-9S *Data Quality Assessment: Statistical Methods for Practitioners* (EPA 2006b):

- Individually review the project objectives and sampling design defined during systematic planning to ensure they are still applicable and that the assumptions were valid.
- Review QA reports and conduct preliminary review of the validated data set.
- Reconvene the Project Team to discuss the data quality and to determine if the data set meets project goals.

The overall measurement error associated with the data set will assessed by reviewing the data quality indicators (DQI) for precision, accuracy, representativeness, comparability, completeness and sensitivity (PARCCS). If it is determined that the project required measurement performance criteria have not been achieved for the listed DQI parameters, then it will need to be determined if the project data are usable to address the environmental questions presented in Worksheet #11. If it is determined that the data are unusable then it will need to be determined if re-sampling is necessary.

DQIs, including PARCCS parameters will be evaluated during the Data Usability Assessment and are discussed below. PARCCS parameters can be applied to both field and laboratory analytical measurements to ensure that data of known and appropriate quality are obtained to support specific decisions or regulatory actions. Discussion of the DQI goals will be used as guidance to indicate when further evaluation of data quality is needed. There are two types of data quality assessments that will be conducted for this project: qualitative and quantitative. These assessments are described below.

37.2 Qualitative

Qualitative, rather than quantitative, assessments for data quality will be performed by data verification and validation activities. Data will be verified and validated in accordance with the procedures described in Worksheets #34, #35, and #36. These procedures yield qualitative results rather than a value for a numerical error or the variability associated with a given data point because of difficulties associated with assigning error or variability values. DQIs include representativeness and comparability of data. Representativeness is a measure of how closely the measured results reflect the actual concentration of a chemical in the matrix sampled and how well the data represent a site.

Representativeness is established by selecting procedures that will produce results that accurately, precisely, and reliably depict the measured matrix and conditions. The representativeness of a result is associated with the development and implementation of proper field and laboratory protocols for sample collection, handling, and documentation. Data representativeness is attained through the proper design of the sampling program.

Representativeness will be assessed qualitatively and will be addressed for each matrix type for each analyte for which chemistry measurements are performed. In addition, field duplicates will be used to determine the mean variability within each stratum as a measure of representativeness. The calculated RPDs for field duplicates will be compared to corresponding laboratory duplicates as a qualitative means of determining field variability.

Comparability will be assessed qualitatively. If data for various measurements are not presented in comparable units, the situation will be discussed, and relevant conversions (to the extent possible) will be addressed.

37.2 Quantitative

Summaries for precision, accuracy, completeness, and sensitivity will give a more quantitative assessment of data quality for chemistry measurements. In each subsection below, both data validation and overall data quality assessment are addressed.

Precision: Precision is the measurement of agreement for a set of replicate results without comparison to an assumed or known value. Precision is a measure of reproducibility and may be expressed as the RPD for duplicate analyses.

RPDs will be calculated for available laboratory duplicates, MS/MSDs, and field duplicates. A summary of precision results presenting data that do not meet the precision criteria listed in Worksheets #12 and #28 may be qualified as estimated (“J”) during data validation activities. Data will generally not be rejected based on precision goals, unless in the professional judgment of the validator, the affected data-point is unusable.

Accuracy: Accuracy is the degree of agreement between a known or true value and a measured value. The accuracy of a result is affected by both systematic and random errors.

Accuracy will be measured by spiking a known concentration of a known analyte (true value) into site samples then measuring the recovery of the added analyte (measured value). This applies to blank spikes, such as LCSs, LCSDs, and surrogates. Data that do not meet the accuracy criteria listed in Worksheets #12 and #28 may be qualified as estimated (“J”) or rejected (“R”) during data validation activities.

Completeness: Completeness is a measure of acceptable analytical data obtained compared to the ideally expected amount of data to be obtained. For analytical completeness, it is expressed as the percentage of data points for which acceptable analytical data are generated. Rejected data points, without acceptable replacement data points, are counted against the completeness goal; data that are considered estimated concentrations or undetected are counted as acceptable data. Quantitatively, the percent completeness will be calculated for each matrix type and analytical category (or analyte, if appropriate), and results will be compared to the completeness objective of 90 percent. Completeness will be determined on an analyte-specific basis and reported as percentage completeness for each method and matrix. For field completeness, it is expressed as the number of samples planned vs. samples collected. The field completeness objective is 100 percent. If any planned samples cannot be collected, the impact to the overall project goal will be assessed.

Sensitivity: The quantitation limit (QL) is the method and matrix specific limit that the laboratory can confidently achieve and report for data for a given chemistry measurement. The QL for each sample may be elevated due to matrix interference, sample moisture content, or the presence of other analytes. The reporting limit (RL) is the approximate QL that will be reported for samples that exhibit no matrix interference, have not been diluted, or otherwise altered to address complications associated with the presence of other chemical analytes. Desired levels of detection and action levels for individual analytes are summarized in Worksheet #15.

The findings of the Data Quality Assessment and Usability will be summarized in the project QA Report.

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Figures

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REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

SITE LOCATION MAP

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 1

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NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

SITE LAYOUT MAP

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 2

DEPTH
0-6 IN

DEPTH
6-12 IN

DEPTH
12-24 IN

DEPTH
24-48 IN

TRUE NORTH
SCALE: 1"=200'

LEGEND

- SALVAGE YARD SITE BOUNDARY
- WETLAND BOUNDARY

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

100' 0 100' 200'
SCALE: 1" = 200'

REVISIONS:

No.	Date	By	Chk.	Remarks

PROJECT NAME
REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE
PCB CONCENTRATIONS VS DEPTH

CONTRACT NO:
N62742-10-D-1804, CTO 0025

JOB NO:
01804.025.003

CHECKED BY:
E.MOLHOEK

DRAWN BY:
C.RIOS

DATE:
NOVEMBER 2014

FILE NAME:
MCBH Salvage Yard RSE_REVISED.dwg

SHEET NUMBER:
FIGURE 3

LEGEND

- Historical Boring Location
- Delineation Sample Location

GRAPHIC SCALE

0 20' 40' 80'

SCALE: 1"= 40'-0"

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

DELINEATION SAMPLE LOCATIONS

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 4

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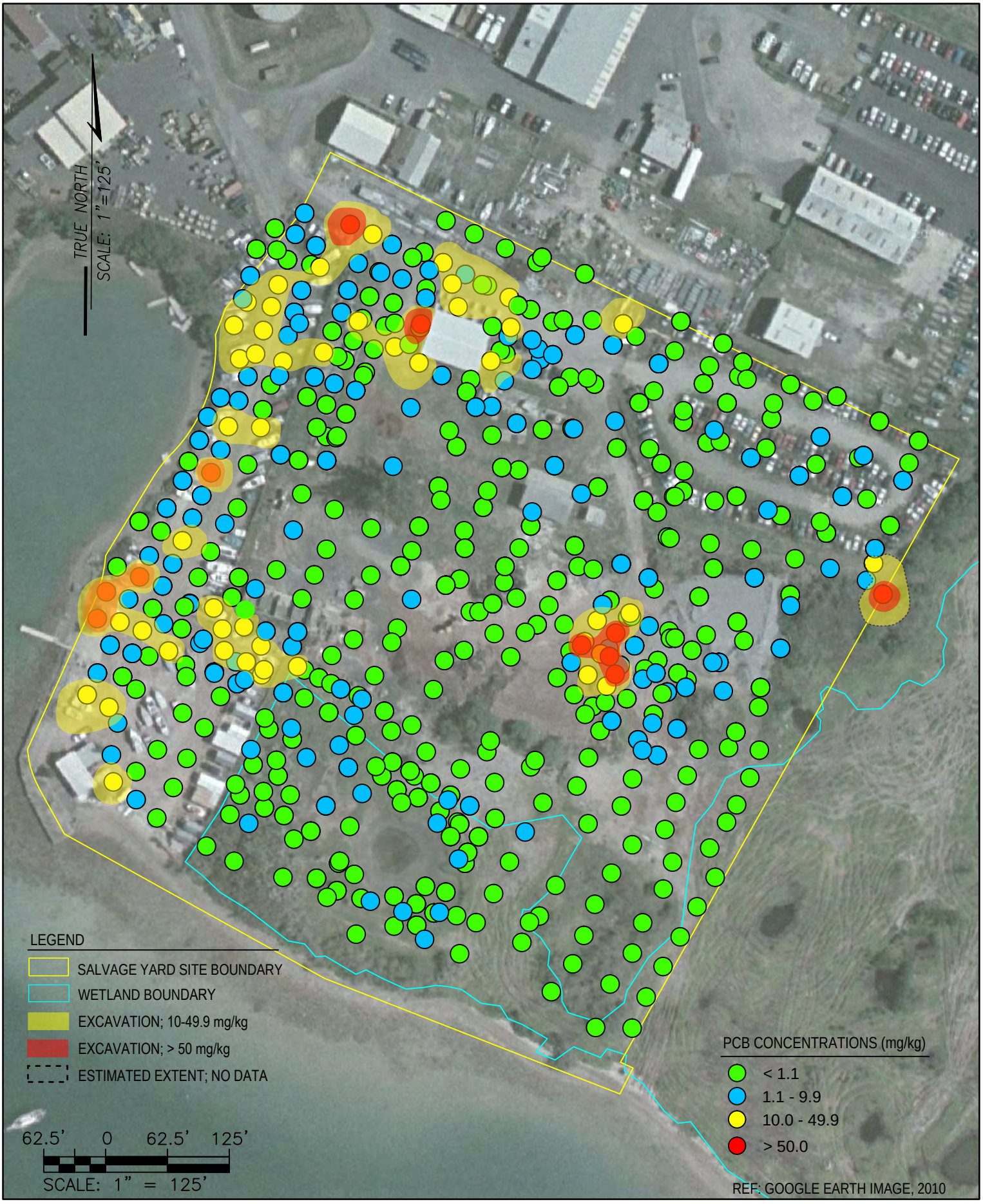

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NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

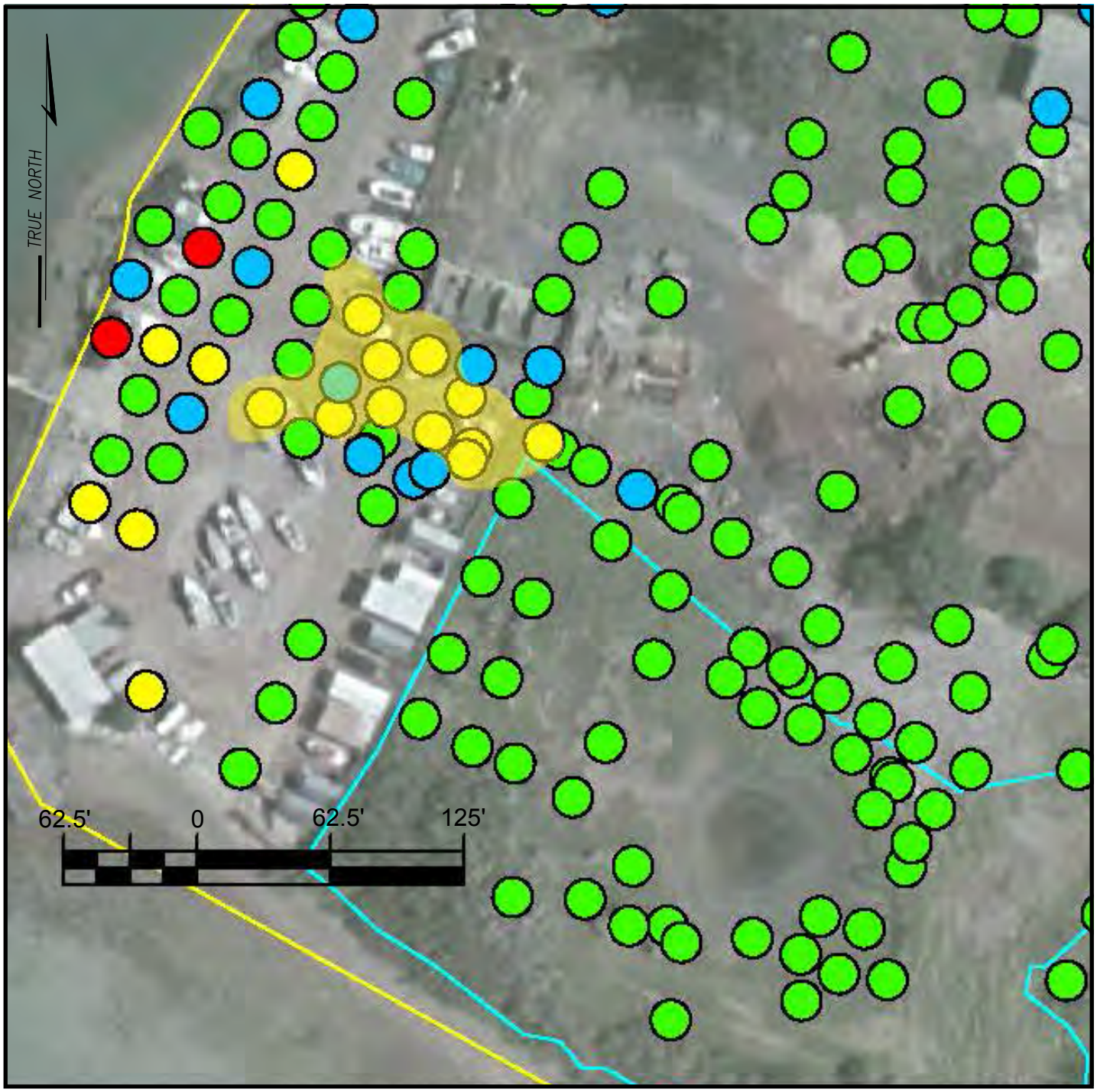
SHEET TITLE

PROPOSED APPROXIMATE
EXCAVATION AREAS

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 5



LEGEND

SITE BOUNDARY

WETLAND BOUNDARY

PCB CONCENTRATIONS (mg/kg)

- < 1.1
- 1.1 - 9.9
- 10.0 - 49.9
- > 50.0

REF: GOOGLE EARTH IMAGE, 2010

NAVFAC

REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

PROPOSED CONFIRMATION
SAMPLING EXAMPLE

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 6

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Attachment 1

Procedures from the Project Procedures Manual, U.S. Navy Environmental Restoration Program (ERP), NAVFAC Pacific, February 2007

- **Procedure I-A-6: IDW Management**
- **Procedure I-A-8: Sample Naming**
- **Procedure I-B-1: Soil Sampling**
- **Procedure I-F: Equipment Decontamination**
- **Procedure III-D: Logbooks**
- **Procedure III-E: Recordkeeping, Sample Labeling, and Chain-of-Custody Procedures**
- **Procedure III-F: Sample Handling, Storage, and Shipping Procedures**

Investigation-Derived Waste Management

1. Purpose

This standard operating procedure describes the activities and responsibilities of the United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) with regard to management of investigation-derived waste (IDW). The purpose of this procedure is to provide guidance for the minimization, handling, labeling, temporary storage, inventory, classification, and disposal of IDW generated under the ER Program. This procedure will also apply to personal protective equipment (PPE), sampling equipment, decontamination fluids, non-IDW trash, non-indigenous IDW, and hazardous waste generated during implementation of removal or remedial actions. The information presented will be used to prepare and implement work plans (WPs) for IDW-related field activities. The results from implementation of WPs will then be used to develop and implement final IDW disposal plans.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

This procedure was developed to serve as management-approved professional guidance for the management of IDW generated under the ER Program. It focuses on the requirements for minimizing, segregating, handling, labeling, storing, and inventorying IDW in the field. Certain drum inventory requirements related to the screening, sampling, classification, and disposal of IDW are also noted in this procedure.

3. Definitions

3.1 IDW

IDW consists of all materials generated during site investigations that might be contaminated with chemicals of concern. IDW might consist of many types of potentially contaminated materials, including but not limited to, PPE, disposable sampling and decontamination equipment, investigation-derived soil, sludge, and sediment, well development and purge water, and decontamination fluids.

3.2 PPE

PPE, as defined in this procedure, refers to all disposable materials used to protect personnel from contact with potentially contaminated site media, such as inner and outer gloves, Tyvek suits and overboots, and disposable respirator cartridges. Non-consumable items, such as steel-toe boots, respirators, and hard hats are not included in this procedure.

3.3 DISPOSABLE SAMPLING EQUIPMENT

Disposable sampling equipment consists of all single-use equipment that might have come in contact with potentially contaminated site media, including sample bailers, Draeger air monitoring tubes, used soil sampling trowels and spatulas, plastic drop cloths, plastic bags and bucket liners, and sample containers from field analytical test kits.

3.4 INVESTIGATION-DERIVED SOIL, SLUDGE, AND SEDIMENT

Investigation-derived soil consists of all potentially contaminated soil that is disturbed as part of site investigation activities. The most commonly encountered form of IDW soil is drill cuttings brought to the ground surface by drilling. Other forms of disturbed soil, including trenching spoils and excess soil remaining from surface sampling, should not be stored as IDW. Excavated soil should be returned to its source if site conditions permit.

Investigation-derived sludge consists of all potentially contaminated sludge materials generated or disturbed during site investigation activities. Generated sludge might consist of drilling mud used or created during intrusive activities. Other sludge might include solvents or petroleum-based materials encountered at the bottom of storage tanks and grease traps.

Investigation-derived sediment consists of all potentially contaminated sediments that are generated or disturbed during site investigation activities. Generated sediments might include solids that settle out of suspension from well development, purge, or decontamination water (see Definitions 3.5 and 3.6) while stored in 55-gallon drums or during sample filtration. Disturbed sediments might also consist of catch basin sediments or excess sediment from surface water activities.

3.5 WELL DEVELOPMENT AND PURGE WATER

Development water consists of groundwater withdrawn from newly installed monitoring wells in preparation for well purging or pump testing. Monitoring well development methods are discussed in Procedure I-C-2, *Monitoring Well Development*.

Purge water consists of groundwater that is removed from monitoring wells immediately prior to sampling. Well purging methods are discussed in Procedure I-C-3, *Monitoring Well Sampling*. Groundwater derived during aquifer testing shall be addressed on a site-specific basis. Procedures for handling groundwater generated during aquifer testing shall be included in the WP or equivalent document for the CTO.

3.6 DECONTAMINATION FLUIDS

Decontamination fluids consist of all fluids used in decontamination procedures conducted during site investigation activities. These fluids consist of wash water, rinse water, and solvents used for the decontamination of non-consumable PPE, sampling equipment, and drilling equipment. Decontamination procedures are discussed in Procedure I-F, *Equipment Decontamination*.

3.7 NON-IDW TRASH

Non-IDW trash is all waste materials, such as waste paper, drink containers, food, and packaging, generated in the support zone that have not come in contact with potentially contaminated site media.

3.8 NON-INDIGENOUS IDW

Non-indigenous IDW consists of all waste materials from offsite sources that are generated in the transition or contamination reduction zones and have not come in contact with potentially contaminated site media. Non-indigenous IDW includes materials, such as PPE from "clean" field activities (e.g., field blank generation, water sampling events) and refuse from monitoring well installation (e.g., unused sections of well casing, used bentonite buckets, sand bags, and cement bags).

Non-indigenous waste does not include material/waste that is abandoned at the ER site (including the IDW waste storage area) by other parties not associated with the ER work. Disposal of abandoned material/waste in the vicinity of IDW is the responsibility of the property owner (e.g., Navy Region Hawaii) or party responsible for abandoning the material/waste. The ER contractor shall notify the Navy Technical Representative (NTR) of the situation as soon as possible so that recovery actions can be coordinated by the Government.

3.9 RCRA HAZARDOUS WASTE

Under the Resource Conservation and Recovery Act (RCRA), a solid waste that is not excluded from regulation is defined as hazardous if it:

- Is "listed" as a hazardous waste in Chapter 40, Code of Federal Regulations (C.F.R.), Parts 261.31 through 261.33
- Exhibits any of four hazardous "characteristics"—ignitability, corrosivity, reactivity, or toxicity (as determined using the Toxicity Characteristic Leachate Procedure [TCLP]) (40 C.F.R. 261.20-24)
- Is subject to certain "mixture" or "derived-from" rules (40 C.F.R. 261.3).

Under certain circumstances, petroleum- or polychlorinated biphenyl (PCB)-contaminated wastes are not considered RCRA hazardous when they only exhibit toxicity characteristic (40 C.F.R. 261.4(b)(10) and 261.8). If IDW is determined to be RCRA hazardous waste, then RCRA storage, transport, and disposal requirements shall apply unless exempt.

3.10 RCRA LAND DISPOSAL RESTRICTIONS (LDR)

Land disposal, as defined in RCRA, is any placement of RCRA hazardous waste on the land in a waste pile, landfill, impoundment, well, land treatment area, etc. LDRs are regulatory restrictions placed on land disposal, including pre-treatment standards, engineered containment, capacity constraints, and reporting and permitting requirements.

3.11 AREA OF CONTAMINATION (AOC)

The U.S. Environmental Protection Agency (EPA) considers the RCRA AOC to be a single land-based disposal unit, usually a "landfill," and includes non-discrete land areas in which there is generally dispersed contamination. Storing IDW in a container (i.e., portable storage devices, such as drums and tanks) within the AOC and returning it to its source, whether RCRA hazardous or not, does not trigger RCRA LDRs. In addition, sampling and direct replacement of wastes within an AOC do *not* constitute land disposal.

3.12 CERCLA HAZARDOUS SUBSTANCES

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substances are listed in 40 C.F.R. Table 302.4 and include substances regulated by the RCRA Subtitle C, Clean Water Act (CWA), Clean Air Act (CAA), and Toxic Substances Control Act (TSCA). The C.F.R. is updated annually; therefore, the most recent C.F.R. should be referenced for the CERCLA hazardous waste list.

CERCLA hazardous substances are defined independent of their concentration level (i.e., any detection of a listed CERCLA constituent is considered a "CERCLA hazardous substance"). "Reportable quantities" identified for chemicals in 40 C.F.R. Table 302.4 concern only CERCLA and RCRA requirements for notification to EPA when a release has occurred; they do not dictate whether a chemical is a hazardous substance.

The definition of CERCLA hazardous substances excludes "petroleum, including crude oil or any fraction thereof;" natural gas; natural gas liquids; liquefied natural gas; and synthetic gas usable for fuel, unless specifically listed or designated under the act. Excluded fractions of crude oil contain hazardous substances, such as benzene, that are indigenous in those petroleum substances or that are normally mixed with or added to petroleum during the refining process. However, hazardous substances that are (1) added to petroleum after the refining process, (2) increase in concentration as a result of contamination of the petroleum during use, or (3) commingled with petroleum after a release to the environment, are not considered part of the petroleum exclusion provision, and therefore, are regulated under CERCLA. In addition, some waste oils are regulated under CERCLA because they are specifically listed.

The scope of CERCLA hazardous substances includes the smaller subsets of RCRA hazardous wastes, PCB Aroclors, and other constituents. Therefore, a RCRA hazardous waste is always considered a CERCLA hazardous substance for a CERCLA-driven response action; however, a CERCLA hazardous substance is not always a RCRA hazardous waste.

CERCLA only regulates releases or threats of releases of hazardous substances into the environment. If there is no evidence that (1) a release has occurred (based on site history, visual observations, background metals evaluation), (2) there is a threat of release (as from abandoned, discarded, or non-maintained chemical receptacles), or (3) the release has entered the environment (as defined below), then CERCLA does not regulate the constituent even though it is identified on the CERCLA hazardous substance list.

3.13 ENVIRONMENT

Environment means navigable waters, ocean waters, surface water, groundwater, drinking water supply, land surface or subsurface strata, and ambient air, within the U.S. or under federal jurisdiction (see Section 101(8) of CERCLA or 40 C.F.R. 300.5 for complete definition).

3.14 ONSITE AREA

The CERCLA onsite area is defined in 40 C.F.R. 300.400(e)(1) as an area that includes:

- AOC

- All suitable areas in very close proximity to the contamination that are necessary for the implementation of the response action

The delineation of the onsite area is further discussed in Volume 55 Federal Register (FR) Page 8688 and EPA guidance.

Neither CERCLA, the National Oil and Hazardous Substances Pollution Contingency Plan, nor RCRA define the terms "area of contamination" or "contamination." However, the area of contamination is interpreted as containing "varying types and concentrations of contaminants" (see 55 FR 8760) that may or may not pose a risk to human health or the environment.

The onsite area may also include several noncontiguous aerial extents of contaminations if they share a common nexus (see 55 FR 8690).

3.15 OFFSITE AREA

The offsite area consists of all areas outside the onsite area.

3.16 CERCLA OFFSITE RULE

The CERCLA offsite rule (400 C.F.R. 300.440) states that IDW containing CERCLA hazardous substances (at any concentration) must be stored, treated, or disposed of offsite only at facilities having current EPA approval to accept such CERCLA wastes. RCRA-permitted facilities (Subtitle C and D) must also have specific EPA approval to accept waste generated at a CERCLA site (even if the waste is RCRA hazardous).

With some restrictions, the offsite rule does not apply to the following:

- Wastes generated during non-CERCLA actions
- Treatability study samples
- Wastes generated during emergency response actions
- Laboratory samples

CERCLA allows IDW to be managed, stored, and disposed of onsite within or near the AOC without the need for EPA approval (i.e., CERCLA facility approval) or RCRA permits. If IDW is to be stored or disposed of on site, the onsite area (and the AOC) should be delineated on a figure in the project field book and revised, based on best professional judgment, as site data become available.

4. Responsibilities

The CTO Manager is responsible for preparing WPs and IDW disposal plans and reports in compliance with this procedure, and is responsible for documenting instances of noncompliance. The CTO Manager is responsible for ensuring that all personnel involved in sampling and/or testing shall have the appropriate education, experience, and training to perform their assigned tasks as specified in Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

QA Manager or Technical Director is responsible for ensuring overall compliance with this procedure.

The Field Manager is responsible for implementing this IDW procedure and ensuring that all project field staff follow these procedures. Field personnel are responsible for the implementation of this procedure.

5. IDW Management Procedures

The procedures for IDW management in the field are described below.

5.1 PLANNING FOR IDW MANAGEMENT

The project team should begin planning for IDW issues early in the site investigation planning stage. The proper management of IDW involves all of the following tasks:

- Waste generation and minimization
- Chemical screening and characterization of the waste
- Site characterization (determine onsite area, identify potential receptors, classify groundwater, identify background levels)
- Waste handling, storage, and associated maintenance (prepare an IDW drum inventory, maintain condition of drum and labeling, maintain safety and assess controls, comply with permit requirements [for offsite storage])
- Waste transport and disposal
- Waste tracking, documentation, record keeping, and reporting

As part of IDW planning, the CTO Manager should consult with the NTR and environmental regulatory agencies to clearly identify the primary federal or state regulatory authority that is driving the site investigation. This authority may be CERCLA, RCRA (Subtitle C), RCRA (subtitle I), TSCA, CWA, or an equivalent state program. The primary investigation authority and regulations promulgated under this authority set forth requirements for IDW management. These requirements may differ under the various response authorities. For CERCLA-driven actions, IDW storage and disposal should comply with all applicable or relevant and appropriate requirements (ARARs) and to-be-considered (TBC) criteria to the extent practicable.

Lastly, the CTO Manager should consider the disposal criteria of the anticipated disposal facility when developing the sampling and analysis plan (SAP). Some offsite facilities do not accept waste that is characterized by association with samples collected from the investigation site or they may require analytical data for chemicals that are not of potential concern at the site. Facility disposal criteria may dictate laboratory reporting limits.

5.2 IDW MINIMIZATION

FMs and their designates shall minimize the generation of onsite IDW to reduce the need for special storage or disposal requirements that might result in substantial additional costs and provide little or no reduction in site risks (EPA 1992b). Reduce the volume of IDW by applying minimization practices throughout the course of site investigation activities. These minimization strategies include

substitution of biodegradable raw materials; using low-volume IDW-generating drilling techniques; where possible, returning excess material to the source location; using disposable sampling equipment versus generating more decontamination fluids from reusable sampling equipment; using bucket and drum liners; and separating trash from IDW.

Material substitution consists of selecting materials that degrade readily or have reduced potential for chemical impacts to the site and the environment. An example of this practice is the use of biodegradable detergents (e.g., Alconox or non-phosphate detergents) for decontamination of non-consumable PPE and sampling equipment. In addition, field equipment decontamination can be conducted using isopropyl alcohol rather than hexane or other solvents (for most analytes of concern) to reduce the potential onsite chemical impacts of the decontamination solvent. Select decontamination solvents carefully so that the solvents, and their known decomposition products, are *not* potentially RCRA hazardous waste, unless absolutely necessary.

Give priority to drilling methods that minimize potential IDW generation. Select hollow-stem auger and air rotary methods, where feasible, over mud rotary methods. Mud rotary drilling produces waste drilling mud, while hollow stem and air rotary drilling methods produce relatively low volumes of soil waste. Use small-diameter borings and cores when soil is the only matrix to be sampled at the boring location; however, the installation of monitoring wells requires the use of larger-diameter borings.

If possible, return soil, sludge, or sediment removed from borings, containment areas, and shallow test trenches to the source immediately after sampling and/or geological logging of the soils (EPA 1991, 1992b). Immediate replacement of solid waste in the source location during investigation activities avoids RCRA LDRs, which permit movement of IDW within the same AOC without considering land disposal to have occurred, even if the IDW is later determined to contain RCRA hazardous material (EPA 1991). Place soil IDW from borings and trenches on polyethylene sheeting (e.g., Visqueen) during excavation and segregate it by approximate depth and any apparent contamination (i.e., visible staining). Following excavation, replace the soil IDW from above the saturated layer into the boring or trench and compact it, if possible. Efforts should be made to return the waste to the approximate depth from which it was generated. Soil and sludge IDW generated at or below the saturated layer of a boring or trench should be placed in drums and not returned to the source area. Suspected contaminated soil and sludge IDW generated above the saturated layer of a boring or trench should not be returned below the saturated layer."

Often monitoring wells are constructed outside the area of concern for soil contamination to sample for potential groundwater contamination or collect characteristic background data. At these locations, soil cuttings generated from above the saturation zone may be immediately disposed of near the wellhead in a shallow pit covered with natural topsoil from the site, and compacted. Contain soil and sludge IDW generated at or below the saturated layer in drums.

Reduce the quantity of decontamination rinse water generated by using dedicated and disposable sampling equipment, such as plastic bailers, trowels, and drum thieves that do not require decontamination. In general, decontamination fluids, and well development and purge water should not be minimized because the integrity of the associated analytical data might be affected.

Minimize the storage of visibly soiled PPE and disposable sampling equipment IDW by implementing decontamination procedures. If, based upon the best professional judgment of the FM,

the PPE and disposable sampling equipment can be rendered non-contaminated after decontamination, then double-bag the PPE and disposable sampling equipment and dispose of it off site at a (RCRA Subtitle D) municipal solid waste disposal facility at the end of each work day (EPA 1991, 1992b). Since the decontaminated waste does not contain CERCLA hazardous substances, it need not be disposed of at a CERCLA-approved disposal facility in accordance with the CERCLA offsite rule.

Bucket liners can be used in the decontamination program to reduce the volume of solid IDW generated, and reduce costs on larger projects. The plastic bucket liners can be crushed into a smaller volume than the buckets, and only a small number of plastic decontamination buckets are required for the entire project. The larger, heavy-duty, 55-gallon drum liners can be used for heavily contaminated IDW to provide secondary containment, and reduce the costs of disposal and drum recycling. Drum liners may extend the containment life of the drums in severe climates and will reduce the costs of cleaning out the drums prior to recycling.

All waste materials generated in the support zone are considered non-IDW trash. To minimize the total volume of IDW, separate all trash from IDW, seal it in garbage bags, and properly dispose of it off site as municipal waste at the end of each work day.

Keep excess cement, sand, and bentonite grout prepared for monitoring well construction to a minimum. FMs shall observe well construction to ensure that a sufficient, but not excessive, volume of grout is prepared. Some excess grout may be produced. Unused grout (that should not come in contact with potentially contaminated soil or groundwater) shall be considered non-hazardous trash, and the drilling subcontractor shall dispose of it off site. Surplus materials from monitoring well installation, such as scrap plastic sections, used bentonite buckets, and cement/sand bags that do not come in contact with potentially contaminated soil, shall be considered non-IDW trash, the drilling subcontractor shall dispose of it off site.

Following proper segregation procedures, as discussed in the next section, can minimize the quantity of contaminated IDW generated.

5.3 SEGREGATION OF IDW BY MATRIX AND LOCATION

It is necessary to properly segregate IDW in order to:

- Avoid commingling contaminated waste with clean waste, thereby creating a larger volume of waste that must be treated as contaminated
- Facilitate the sampling, screening, classification, and disposal of waste that may require different management methods

Take efforts to segregate IDW even when these activities will increase storage container and storage space requirements. These efforts will drastically reduce the sampling and documentation required for characterizing the waste and their associated costs.

In general, segregate IDW by matrix and source location and depth at the time it is generated. IDW from only one matrix shall be stored in a single drum (e.g., soil, sediment, water or PPE shall *not* be mixed in one drum). Groundwater and decontamination water should not be commingled; however, development and purge water from the same well may be stored together.

In general, IDW from separate sources should not be combined in a single drum or stockpile. Take efforts to segregate waste by increments of depth below ground surface. Most importantly, segregate soil IDW generated at or from below the saturated zone from soil generated above this zone (soil below this zone might be impacted by contaminated groundwater, whereas soil above the zone may be "clean"). Similarly, segregate soil above and below an underground storage tank (UST). Label each drum of soil to indicate the approximate depth range from which it was generated; this task may require cuttings to be segregated on plastic sheeting as they are generated or drums to be filled during the trenching or boring operation if this can be done in a safe manner.

It is possible that monitoring well development and purge water will contain suspended solids, which will settle to the bottom of the storage drum as sediment. Include significant observations on the turbidity or sediment load of the development or purge water in the logbook and report them in attachments to the quarterly drum inventory report (see Procedure III-D, *Logbooks* and Section 5.5). To avoid mixed matrices in a single drum (i.e., sediment and water), it may be necessary to decant the liquids into a separate drum after the sediments have settled out. This segregation may be accomplished during subsequent IDW sampling activities or during consolidation in a holding tank prior to disposal.

Place potentially contaminated well construction materials in a separate drum. No soil, sediment, sludge, or liquid IDW shall be placed in drums with potentially contaminated waste well construction materials. In addition, potentially contaminated well construction materials from separate monitoring wells shall not be commingled.

Store potentially contaminated PPE and disposable sampling equipment in drums separate from other IDW. Segregate PPE from generally clean field activities, such as water sampling, from visibly soiled PPE, double-bag it, and dispose of it off site as municipal waste. Disposable sampling equipment from activities, such as soil, sediment, and sludge sampling, includes plastic sheeting used as liner material in containment areas around drilling rigs and waste storage areas, disposable sampling equipment, and soiled decontamination equipment. If, according to the Field Manager's best professional judgment, the visibly soiled PPE can be decontaminated and rendered non-hazardous, then double-bag the decontaminated PPE and disposed of it off site as municipal waste (EPA 1991, 1992b). PPE and disposable sampling equipment generated on separate days in the field may be combined in a single drum, provided clean and visibly soiled IDW are segregated as discussed above.

IDW generated from the use of field analytical test kits consists of those parts of the kit that have come into contact with potentially contaminated site media, and used or excess extracting solvents and other reagents. Contain potentially contaminated solid test kit IDW in plastic bags and store it with contaminated PPE or disposable sampling equipment IDW from the same source area as soil material used for the analyses. Segregate the small volumes of waste solvents, reagents, and water samples used in field test kits, and dispose of it accordingly (based upon the characteristics of the solvents as described in this procedure). Most other test kit materials should be considered non-IDW trash, and be disposed of as municipal waste.

Store decontamination fluids in drums separate from groundwater and other IDW. If practical, decontamination fluids generated from different sources should not be stored in the same drum. If decontamination fluids generated over several days or from different sources are stored in a single drum, record information about the dates and IDW sources represented in the drum. Note this

information in the field notebook, on the drum label (see Section 5.4.3), and in the drum inventory (see Section 5.5).

The FM and designated personnel should separate the liquid and sediment portions of the equipment decontamination fluid present in the containment unit used by the drilling or excavation field crew. The contents of this unit normally consist of turbid decontamination fluid above a layer of predominantly coarse-grained sediment. When the contents of the containment unit are to be removed for storage in IDW drums, the FM shall instruct the field crew to place as much of the liquid into drums as possible and transfer the remaining solids into separate drums. Note observations of the turbidity and sediment load of the liquid IDW in the field notebook, on the drum label (see Section 5.4.3), and in attachments to the drum inventory (see Section 5.5). It is likely that decontamination fluids will contain minor amounts of suspended solids that will settle out of suspension to become sediment at the bottom of IDW storage drums. As noted above, it may be necessary to segregate the drummed water from sediment during subsequent IDW sampling or disposal activities.

Documentation for waste storage containers should include IDW source and segregation information.

5.4 DRUM FILLING, HANDLING, AND LABELING, AND INVENTORYING

Drum handling consists of those actions necessary to prepare an IDW drum for labeling. Drum labeling consists of those actions required to legibly and permanently identify the contents of an IDW drum.

5.4.1 Drum Filling

Each drum of solid IDW shall be completely filled, when possible. For liquid IDW, drums should be left with headspace of approximately 5 percent by volume to allow for expansion of the liquid and potential volatile contaminants.

5.4.2 Drum Handling

IDW shall be containerized using U.S. Department of Transportation-(DOT) approved drums. The drums shall be made of steel or plastic, have a 55-gallon capacity, be completely painted or opaque, and have removable lids (i.e., United Nations Code 1A2 or 1H2). Typically 55-gallon drums are used, however small drums may be used depending on the amount of waste generated. New steel drums are preferred over recycled drums. Recycled drums should not be used for hazardous waste, PCBs or other regulated shipments. For short-term storage of liquid IDW prior to discharge, double-walled bulk steel or plastic storage tanks may be used. For this scenario, consider the scheduling and cost-effectiveness of this type of bulk storage, treatment, and discharge system versus longer-term drum storage.

The Guam Environmental Protection Agency may require double-walled drums or other secondary containment for the storage of liquid IDW. For long-term IDW storage at other project locations, the DOT-approved drums with removable lids are recommended. Verify the integrity of the foam or rubber sealing ring located on the underside of some drum lids prior to sealing drums containing IDW liquids. If the ring is only partially attached to the drum lid, or if a portion of the ring is missing, select another drum lid with a sealing ring that is in sound condition.

To prepare IDW drums for labeling, wipe clean the outer wall surfaces and drum lids of all material that might prevent legible and permanent labeling. If potentially contaminated material adheres to the outer surface of a drum, wipe that material from the drum, and segregate the paper towel or rag used to remove the material with visibly soiled PPE and disposable sampling equipment. Label all IDW drums and place them on pallets prior to storage.

5.4.3 Drum Labeling

Proper labeling of IDW drums is essential to the success and cost-effectiveness of subsequent waste screening and disposal activities (see Attachment I-A-6-1 and Attachment I-A-6-2). Labels shall be permanent and descriptive to facilitate correlation of field analytical data with the contents of individual IDW drums. Label all IDW drums using the three distinct labeling methods described below to ensure durability of the information. These three methods are completing and affixing preprinted NAVFAC Pacific ER Program labels; marking information on drum surfaces with paint; and, affixing aluminum tags to the drum. Use of the preprinted labels, painted labeling, and aluminum tags is *mandatory*. These methods are described below.

5.4.3.1 PREPRINTED LABELS

Complete two preprinted NAVFAC Pacific ER Program drum labels as described below and presented in Attachment I-A-6-1. Seal both labels in separate heavy-duty, clear plastic bags to prevent moisture damage. Place one label on the outside of the drum with the label data facing outward. Affix the bag to the drum at the midpoint of the drum height using a sufficient quantity of adhesive tape (e.g., duct tape, packing/strapping tape) so the bag will remain on the drum as long as possible during storage. Affix the second label (sealed as mentioned above) to the underside of the drum lid, sealing it inside the drum when the lid is replaced. If appropriate, a third label may be prepared and placed in the plastic bag, behind the outside label and facing the drum. The use of two or more preprinted labels for IDW drum identification purposes should be considered as a short-term backup to the information on the aluminum tags discussed below.

Print the requested information legibly on the drum labels in black, indelible ink. Instructions for entering the required drum-specific information for each label field are presented below:

CTO. Enter the four-digit number of the CTO for the project during which the IDW was generated. Include any initial zeroes in the CTO number (e.g., CTO 0047).

Activity-Site. Enter the name of the Navy activity responsible for the project site (e.g., Naval Supply Center [NSC], Naval Facilities Engineering Command Hawaii [NAVFAC HI]) and the name of the site where the project is taking place (e.g., Orote, Landfill, Building [Bldg] 18).

Drum#: Enter the drum identification number according to the convention described below.

(x x x x - A A - D z z z);

where

- xxxx represents the four-digit CTO number
- AA represents the unique site identifier assigned by the CTO Manager for multiple site CTOs (e.g., for CTO 0047, OW denotes Old Westpac, OR denotes Orote)

D represents a *drum* identification number

zzz the sequential drum number for the site, beginning with 001

Date Collected. Enter the date the IDW was generated and placed in the drum. If IDW was generated over a number of days, enter the start and end dates for the period.

Contents. Record the source identification number on the label. Enter a "√" in the box corresponding to the type of IDW placed in the drum. For "Soil" and "Water," use the line provided to record observations on the condition of the drum contents (e.g., diesel odor, high turbidity, specific liquid IDW type). Check "Solid Waste" for PPE and indicate that PPE is present in the drum. Check "Other" for disposable sampling equipment and potentially contaminated monitoring well construction materials, and indicate the type of waste on the line provided.

Project Type. Enter a "√" in the box corresponding to the type of investigation. Choices are Remedial Investigation (RI), RCRA Facility Inspection (RFI), UST, and Other. If "Other" is specified, indicate the type of project in the "Comments" area, as described below.

Comments. Enter any additional information regarding the drum contents that will assist individuals who will characterize and dispose of the contents of the drum. "Other" project types include Site Inspection, Feasibility Study, Removal/Remedial Action, and Emergency Response activity. In addition, use this space on the label to complete any descriptions that were too large to fit in preceding label fields, such as the turbidity of decontamination water or the site activities from which the PPE was generated.

For Information Contact. Enter the project NTR activity / code, address, and phone number.

It is essential that all relevant information recorded on individual drum labels be repeated in the field notebook for later development of the drum inventory database (see Section 5.5 and Procedure III-D, *Logbooks*).

5.4.3.2 PAINTED LABELS

The second method for labeling drums is to paint label information directly on the outer surface of the drum. At a minimum, the information placed on the drum shall include the CTO number, the drum number (following the numbering convention given above), the source identification number and type, the generation date(s), and the telephone number provided at the bottom of the preprinted label appropriate for the project location. The drum surface shall be dry and free of material that could prevent legible labeling. Confine label information to the upper two-thirds of the total drum height. The top surface of the drum lid may be used as an additional labeling area, but this area should only be used *in addition* to the upper two-thirds of the sides of the drum. The printing on the drum shall be large enough to be easily legible. Yellow, white, or red paint markers (oil-based enamel paint) that are non-photodegradable are recommended to provide maximum durability and contrast with the drum surface.

5.4.3.3 ALUMINUM TAGS

The third method for labeling drums is to affix an aluminum tag to the drum with neatly printed information that shall consist of the CTO number, the drum identification number, the type of contents, the generation date(s), the source identification number and type, and the telephone number

provided at the bottom of the appropriate preprinted label. Attachment I-A-6-2 to this procedure presents an example of the aluminum tag, which shall measure approximately 1 inch by 3 inches, or larger. When a ballpoint pen is used to fill out the aluminum tag, the information is permanently recorded as indentations on the tag. A fine ballpoint pen shall be used, and block-printed lettering is required for legibility. Indentations on the tag shall be sufficiently deep to be legible after the label has been exposed to weathering for an extended period.

Complete aluminum tags after the drum has been sealed. Affix the tags to the drum using a wire, which passes through predrilled holes in the label and shall be wrapped around the bolt used to seal the drum lid. The wire is the most likely part of the aluminum tag to decay during exposure. Use of plastic insulated, copper-core electrical wire of appropriate diameter is recommended if long-term exposure to severe weathering is anticipated.

5.5 DRUM INVENTORY

Accurate preparation of an IDW drum inventory is essential to all subsequent activities associated with IDW drum tracking and disposal. Prepare an inventory for each project in which IDW is generated, stored, and disposed of. This information provided in the inventory report constitutes the results of preparing and implementing an IDW sampling, screening, characterization, and disposal program for each site.

The drum inventory information shall include 12 elements that identify drum contents and indicate their outcome. These elements are discussed in Sections 5.5.1 through 5.5.12.

5.5.1 Navy Activity (Generator)/Site Name

Inventory data shall include the Navy activity and the site name where the IDW was generated (e.g., Fleet Industrial Supply Center Pearl/Red Hill, Naval Magazine Headquarters/USTs).

5.5.2 CTO Number

Inventory data shall include the four-digit CTO number associated with each drum (e.g., 0089).

5.5.3 Drum Number

Include the drum number assigned to each drum in the inventory database. Drum numbers shall adhere to the numbering convention presented in Section 5.4.3 (e.g., 0091-LF-D006).

5.5.4 Storage Location Prior to Disposal and Condition of Drums

Include the storage location of each drum prior to disposal in the inventory database (e.g., Bldg. 394 Battery Disassembly Area, or Adjacent to West end of Bldg. 54). As part of the quarterly inventory, a site visit to the IDW storage location shall be performed to observe the condition of the drums and covers. The observations made during the quarterly site visit shall be documented on the drum inventory report as “A” (acceptable), or “U” (unacceptable). Drums and covers are considered acceptable when the integrity of the drums and covers are structurally intact, drum identification is legible, and the location of the drum storage is secure. An unacceptable classification will require recommendations to remedy the unacceptable classification.

5.5.5 Origin of Contents

Specify the source identification of the contents of each IDW drum in the inventory database (e.g., soil boring number, monitoring well number, sediment sampling location, or the multiple sources for PPE- or rinse water-generating activities).

5.5.6 IDW Type

Inventory data shall include the type of IDW in each drum (e.g., soil, PPE, disposable sampling equipment, sludge, sediment, development water, steam cleaning water, decontamination rinse water).

5.5.7 Waste Volume

Specify the amount of waste in each drum in the inventory database as a percentage of the total drum volume or an estimated percentage-filled level (e.g., 95 percent maximum for liquid IDW).

5.5.8 Recommended Analytical Methods and Test Results Compared with Applicable Regulatory Standards

The EPA analytical methods recommended to adequately characterize IDW contained in each drum will be summarized in a tabular format and attached to the quarterly IDW drum inventory report (see Attachment I-A-6-3).

5.5.9 Recommended or Actual Disposition of IDW Drum Contents

The recommended means of IDW disposal for each drum shall be summarized in a tabular format (e.g., Offsite, Encapsulated Onsite, Treatment/Sewer, Offsite Incinerator) and attached to the quarterly IDW drum inventory report (see Attachment I-A-6-3). Additional narrative discussion of the rationale for the recommended disposal option shall be attached to the quarterly IDW drum inventory report as data become available.

5.5.10 Generation Date

Inventory data shall include the date IDW was placed in each drum. If a drum contains IDW generated over more than one day, the start date for the period shall be specified in dd-mmm-yy format. This date is *not* to be confused with a RCRA hazardous waste accumulation date (40 C.F.R. 262).

5.5.11 Expected Disposal Date

Specify the date each drum is expected to be disposed of as part of the inventory in mmm-yy format. This date is for the Navy's information only and shall not be considered contractually binding.

5.5.12 Actual Disposal Date

The actual drum disposal date occurs at the time of onsite disposal, or acceptance by the offsite treatment or disposal facility. Enter this date in the drum inventory data base only when such a date is available in dd-mmm-yy format.

Information required to complete all 12 of the inventory elements for the quarterly inventory report described above and summarized in Attachment I-A-6-3, will be located on the IDW labels or provided by the CTO Manager.

The recommended analytical test methods along with actual test results compared with applicable regulatory standards will be provided to the Navy as attachments to the quarterly IDW drum inventory report when such data are available. Recommended disposal options or actual disposition of the IDW drum contents will also be provided to the Navy.

5.6 IDW CLASSIFICATION

In general, the CTO Manager should follow IDW classification guidance contained in the *Generic IDW Disposal Plans* for Hawaii and Guam (Ogden 1994, 1995) and EPA guidance (EPA 1991, 1992a). The IDW classification process consists of chemical screening and characterization of the waste.

Various federal and state laws and guidance contain requirements for IDW management (handling, storage, transport, disposal, and recordkeeping) based on the type(s) and concentrations of chemicals present in the waste. To ensure that IDW is managed in compliance with these requirements and to evaluate disposal options, the CTO Manager should

- Directly sample and analyze the IDW or associate it with historical data, observed site conditions, and/or samples collected on site at the source of the waste
- Screen the waste to identify the maximum concentrations of individual chemicals in, or associated with, the waste
- Screen waste constituents against chemical background data, if available
- Characterize the waste based on regulated groups of chemical constituents present in the waste
- Screen waste constituents against risk-based health criteria, ARARs, and TBC criteria for onsite disposal, or disposal facility criteria for offsite disposal

Each of the above steps is distinct and should be performed separately to avoid potential mistakes in the IDW classification process. The following subsections discuss these steps in greater detail.

5.6.1 IDW Sampling and Chemical Screening

IDW should be screened to identify chemicals present in the waste and their maximum concentrations. Screening may be facilitated by (1) directly sampling the waste, (2) associating the waste with analytical results from samples collected at the source of the IDW (e.g., a well boring), (3) visual observation of the waste, (4) historical activity data from the site, or (5) a combination of these methods (e.g., association with limited sampling). Composite sampling may be required if the unit volume of IDW is non-homogeneous. Data from samples collected directly from the IDW should take precedence over associated site sample data when making waste management decisions. Procedure I-D-1, *Drum Sampling* discusses methods for drum sampling.

Typically, IDW is screened for chemicals of potential concern at the site and against background data if available. If IDW is generated from outside the suspected AOC (e.g., soil cuttings from the installation of a background monitoring well), assume it is clean, and dispose of it accordingly.

The CTO Manager should consider the disposal criteria of any offsite disposal facility anticipated to be used when developing the SAP. Some offsite facilities do not accept waste that is characterized by

association with samples collected from the investigation site or they may require analytical data for chemicals that are not of potential concern at the site. Direct sampling and analysis of the waste may be required for these other constituents. Some disposal facilities prefer to collect and analyze the samples themselves. In addition, disposal facility criteria may dictate laboratory reporting limits. When possible, the CTO Manager should coordinate sampling and data requirements with the disposal subcontractor and anticipated disposal facility. Such efforts may allow IDW sampling to be conducted while the field team is mobilized for the site investigation, rather than conducting a separate IDW sampling event later.

5.6.2 IDW Characterization

Various federal and state laws and guidance contain requirements for IDW management (handling, storage, transport, disposal, and recordkeeping) based on the particular constituent or *group(s) of chemical constituents* present in the waste. Therefore, to ensure that IDW is managed in compliance with these requirements, characterize IDW based on the chemical screening results to determine whether any of the following regulated constituents are present in the waste:

- Petroleum hydrocarbons (regulated by RCRA Subtitle I when released from a UST; see 40 C.F.R. Part 280)
- Hazardous wastes (regulated by RCRA Subtitle C; see 40 C.F.R. 261-299)
- Non-hazardous, solid wastes (regulated by RCRA Subtitle D; see 40 C.F.R. 257-258)
- Hazardous substances and commingled petroleum (regulated by CERCLA; see 40 C.F.R. 300.400 and 302.4)
- PCBs (regulated by TSCA; see 40 C.F.R. 700)
- Asbestos (regulated by CAA for disposal; see 40 C.F.R. 61, Subpart M)
- Radioactive wastes (regulated by the Nuclear Regulatory Commission; see 10 C.F.R. [various parts], 40 C.F.R., Subchapter F, and other applicable laws)

EPA regulations and guidance do not require IDW to be tested to properly characterize it. Instead waste may be characterized based on historical site data, site observations, analytical data from the source of the IDW, and professional judgment (EPA 1991). Specifically, the EPA has indicated that IDW may be assumed not to be "listed" wastes under RCRA unless available information about the site suggests otherwise (53 FR 51444). Similarly, RCRA procedures for determining whether waste exhibits RCRA hazardous characteristics do not require testing if the decision can be made by "applying knowledge of the hazard characteristic in light of the materials or process used" (40 C.F.R. 262.11(c); EPA 1991). If applicable, the disposal plans and reports should state, "there is no evidence based on site data and observations that the IDW contains listed RCRA wastes or exhibits RCRA characteristics."

For soil IDW, the potential for exhibiting toxicity may be determined by comparing constituent concentrations in the waste against screening values that are 20 times the TCLP criteria as specified in Section 1.2 of EPA Method SW-846 1311 Toxicity Characteristic Leaching Procedure (EPA 1997, updates available on-line). Otherwise, samples associated with the soil can be tested using the TCLP.

5.7 IDW STORAGE

In general, the CTO Manager should follow IDW storage guidance contained in the *Generic IDW Disposal Plans* for Hawaii and Guam (Ogden 1994, 1995) and EPA guidance (EPA 1991, 1992a).

Always store IDW in a manner that is secure, protected from weather, and protective of human health and the environment. It is preferable to store IDW within the AOC(s) or on site.

If the IDW is determined to be RCRA hazardous, then RCRA storage, transport, and disposal requirements may apply, including a limited 90-day storage permit exemption period prior to required disposal. If onsite disposal is an option, store RCRA waste within the AOC so that RCRA LDRs will not apply in the future. LDRs may be triggered if the waste is stored within the onsite area, but outside of the AOC or if the waste is removed from and later returned to the AOC for disposal. The AOC concept does not affect the approach for managing IDW that did not come from the AOC, such as PPE, decontamination equipment and fluids, and groundwater. If RCRA hazardous, these wastes must be managed under RCRA and drummed and disposed of off site (EPA 1991b).

RCRA waste should not be stored within the AOC prior to disposal when professional judgment suggests the IDW might pose an immediate or permanent public endangerment (EPA 1991b).

Offsite storage of CERCLA waste must comply with the CERCLA offsite rule (40 C.F.R. 300.440).

NAVFAC Pacific requires that all CERCLA, RCRA, and other types of waste be removed from Pearl Harbor Naval Complex areas within 90 days of its generation, particularly within the shipyard area. Efforts should also be made to dispose of IDW within a 90-day period at other Navy installations, unless the IDW will be managed with remediation waste to be generated during a cleanup action in the near future. The Navy may approve extensions of the storage time limit for wastes that are non-hazardous on a project-specific basis.

5.7.1 Drum Storage

Implement drum storage procedures to minimize potential human contact with the stored IDW and prevent extreme weathering of the stored drums. Place all IDW drums upright on pallets before the drums are stored. RCRA storage requirements include the following: containers shall be in good condition and closed during storage; wastes shall be compatible with containers; storage areas shall have a containment system; and spills or leaks shall be removed as necessary.

Place all IDW drums generated during field activities at a single AOC together in a secure, fenced onsite area to prevent access to the drums by unauthorized personnel. When a secure area is not available, place drums in an area of the site with the least volume of human traffic. At a minimum, place plastic sheeting (or individual drum covers) and yellow caution tape around the stored drums. Post signage at the IDW storage area stating that drums should not be removed from the area without first contacting the Navy NTR.

Drums from projects involving multiple AOCs shall remain at the respective source areas where the IDW was generated. IDW should not be transferred off site for storage elsewhere, except under rare circumstances, such as the lack of a secure onsite storage area.

Implement proper drum storage practices to minimize damage to the drums from weathering and possible human exposure to the environment. When possible, store drums in dry, shaded areas and cover them with impervious plastic sheeting or tarpaulin material. Make every effort to protect the preprinted drum labels from direct exposure to sunlight, which causes ink on the labels to fade. In addition, store drums in areas that are not prone to flooding. Secure the impervious drum covers appropriately to prevent dislodging by the wind. It may be possible to obtain impervious plastic covers designed to fit over individual drums; nonetheless, repeat the labeling information on the outside of these opaque covers.

Drums in storage shall be placed with sufficient space between rows of drum pallets and shall not be stacked, such that authorized personnel may access all drums for inspection. Proper placement will also render subsequent IDW screening, sampling, and disposal more efficient. It is recommended that IDW drums be segregated in separate rows/areas by matrix (i.e., soil, liquid or PPE/other).

If repeated visits are made to the project site, inspect the IDW drums to clear encroaching vegetation, check the condition and integrity of each drum, check and replace aluminum tags as necessary, and replace or restore the tarpaulin covers.

5.7.2 IDW Stockpiles

Consider IDW stockpiling only when a very large quantity of IDW will be generated. Segregate stockpiled IDW, and inventory it by source location and depth to the extent practicable. Stockpiling and media mixing should not be used as methods to dilute chemical concentrations in the waste. Line stockpiles on the bottom, cover it with sturdy plastic, and locate it in areas where weather elements (e.g., wind, rainfall runoff) will not cause migration of the waste. Never dispose of liquid IDW on a stockpile; drum or store liquid waste in other appropriate containers. Follow applicable regulation and guidance when sampling stockpiled waste for characterization purposes.

5.8 IDW DISPOSAL

Various methods and requirements for onsite and offsite disposal of IDW are discussed in the *Generic IDW Disposal Plans* for Hawaii and Guam (Ogden 1994, 1995) and EPA guidance (EPA 1991, 1992b). This section explains the disposal evaluation process and highlights some of the more important requirements for onsite and offsite IDW disposal options.

IDW sampling, characterization, and disposal analysis, particularly for onsite disposal, can be unexpectedly complex and require compliance with many different laws (that act as ARARs for IDW management and disposal). Before preparing the IDW disposal plan, compare estimated costs for onsite vs. offsite disposal. Offsite disposal may be more cost effective than devising and documenting the justification for onsite disposal when the quantity of IDW is small (less than 10 drums) and/or the waste fails the initial conservative screening against conservative risk-based criteria. Also weigh cost savings against the policy preference of the EPA and State of Hawaii Department of Health (DOH) to manage and dispose of IDW on site, when possible.

5.8.1 Onsite Disposal

In general, EPA preference is to dispose of IDW on site when the disposal action:

- Does not pose an unacceptable long-term risk to human health and the environment

- Is in accordance with chemical-, location- and action-specific ARARs "to the extent practicable" (40 C.F.R. 300.415(i); 55 FR 8756)
- Does not introduce contaminants into clean soil or other site media
- Does not mobilize or significantly increase concentrations of any hazardous constituents already present in the environment
- Is consistent with the final remedy planned for the site
- Takes into account any community concerns regarding waste storage and the disposal method

Base onsite disposal options on best professional judgment and available site-specific data. For some projects, it may be prudent to store the waste temporarily until additional site data become available (e.g., sample analytical data, preliminary risk-assessment results, AOC delineation, and establishment of background values). Factors to consider include, but are not limited to the following:

- The detected or suspected contaminants, their concentrations, and total volume of IDW
- Media potentially affected (e.g., groundwater drinking source)
- Background metals data for site media
- Site access, conditions, and potential receptors
- Current and future land use
- Public perceptions (especially if drum storage and/or disposal takes place in open view)
- Time limits for IDW storage
- Potential requirements to treat waste before disposing of it on site
- Lack of unpaved areas to disposed of waste on site
- Potential wind, erosion, runoff, or flood conditions that might cause offsite migration of disposed waste
- Proximity to the ocean, surface water, or environmentally sensitive habitats
- Natural attenuation processes
- Need for additional utility survey before excavating to backfill waste
- Need for land use controls required to limit exposure pathways (e.g., backfill waste, provide permanent security around site, replant site to prevent erosion)

Protection of human health can be evaluated by comparing chemical concentrations in the waste to the more conservative of EPA residential preliminary remediation goals (PRGs), environmental action levels (EALs), and chemical-specific ARARs and TBC criteria. Ecological receptors can be protected by screening the IDW against EPA ecological soil screening levels. Onsite disposal of surface and groundwater IDW can be evaluated by initially screening against EPA tap-water PRGs, State Safe Drinking Water Standards (maximum contaminant levels and non-zero maximum contaminant level goals), and/or State Surface Water Quality Standards. These criteria are not always ARARs for the disposal method or site conditions; however, they may be useful to affirmatively

show that the disposal is protective. Alternatively, the IDW may be associated with human-health and eco-risk assessment results for the site if the onsite placement of IDW is consistent with exposure pathway assumptions made during the risk assessment (e.g., contaminated soil might not present an unacceptable health risk at depth, but could pose such a risk if disposed of at the ground surface).

In general, return IDW consisting of environmental media to or near its source, and return waste generated from depth to its original depth, if possible. Bury all contaminated soil and water IDW to be disposed of on site below grade at a depth of at least 3 feet and cover it with clean soil to reduce the potential for future exposure to human and ecological receptors.

Dispose of non-indigenous IDW and contaminated decontamination fluids off site. The cleaning detergent Alconox, often used in the decontamination process, is itself non-hazardous and biodegradable. Small quantities of clean decontamination water containing Alconox may be disposed of to clean areas on site. If onsite disposal is appropriate for RCRA IDW, this waste should be disposed of within the AOC to avoid the need to comply with LDRs.

IDW from several non-contiguous onsite areas may be consolidated and disposed of at one of the areas, provided a nexus exists between the wastes generated and response projects (see 55 FR 8690-8691).

IDW may also be temporarily disposed of back to the AOC without detailed analysis or documentation if the waste will be addressed with other site contamination during a future response action and will not present a significant short-term threat to human health and the environment.

5.8.2 Offsite Disposal

If onsite disposal is not a viable option, dispose of the IDW at an appropriate offsite treatment and/or disposal facility. Offsite transport and disposal of IDW must comply with all applicable laws and criteria specific to the chosen disposal facility. These requirements may include, but are not limited to the following:

- RCRA LDRs
- RCRA waste storage permits and time limits
- National Pollutant Discharge Elimination System and sewer disposal criteria
- CERCLA offsite rule
- TSCA treatment requirements
- DOT hazardous material transport packaging, manifesting, and security provisions
- International Maritime Organization ocean transport rules
- Certifications and training for waste transport contractors
- State notification requirements when importing certain types of waste

The CERCLA offsite rule (40 C.F.R. 300.440) requires that CERCLA waste be disposed of only at facilities specifically approved by the EPA to receive such waste for treatment, storage, or disposal. The acceptability status of a disposal facility can change quickly (e.g., if there is a release at the

facility); therefore, the CTO Manager should contact the EPA Region 9 CERCLA Offsite Rule Coordinator no more than 60 days prior to disposal of the IDW to verify the facility's approval status. The offsite rule applies to any CERCLA-driven remedial or removal action involving the offsite transfer of waste containing hazardous substances regardless of the concentrations present.

RCRA hazardous waste manifests must always be signed by authorized Navy personnel. In some cases, the Navy may authorize contractors to sign non-hazardous manifests. Navy authorization to allow contractor signature of non-hazardous manifests shall be based upon a Navy review of the contractor's RCRA and DOT training records. In addition, the Navy shall always be allowed the opportunity to review/approve non-hazardous manifests and waste profiles prior to waste disposal efforts.

Disposal of liquid IDW into the Navy sanitary sewer shall occur only if first approved by the Navy. Requests for disposal to Navy facilities should be coordinated through the NTR. Discharge to the public sewer system is discouraged and should occur only if approved by state and local government agencies.

5.9 RECORDS

The CTO Manager is responsible for completing and updating the site-specific IDW drum inventory spreadsheet and submitting it as needed. The CTO Manager is also responsible for submitting backup documentation to the Navy about the analytical methods recommended to adequately classify the IDW in each drum (see Section 5.6). In addition, actual site or drum sampling results shall be forwarded to the NTR, along with a comparison to the applicable regulatory standards, for inclusion as attachments to the quarterly IDW drum inventory. As necessary, the backup documentation to the quarterly IDW drum inventory report shall also include the recommended means for IDW disposal for each drum (see Section 5.8). After disposal, the actual means and/or location of disposal shall be indicated in tabular format with supporting narrative.

FMs and designates are responsible for documenting all IDW-related field activities in the field notebook including most elements of the IDW drum inventory spreadsheet. The correct methods for developing and maintaining a field notebook are presented in Procedure III-D, *Logbooks*.

Upon receipt of analytical data from the investigation, an IDW disposal plan shall be prepared that will include the following:

- Criteria for selecting disposal options
- Possible disposal options
- A comparison between analytical data for each drum of IDW and the comparative criteria
- The disposal option selected for each drum of IDW

Guidance related to preparing an IDW disposal plan is presented in the *Generic IDW Disposal Plans* for Hawaii and Guam (Ogden 1994, 1995). Prior to the disposal of waste, the IDW disposal plan must be approved by the NTR and, in some cases, pertinent regulatory agencies. It must also be amended following each phase of fieldwork. Following disposal of IDW, the CTO Manager should prepare a short IDW disposal report summarizing the disposal operation and appending any

associated records (e.g., final drum log, waste profiles, transport manifests, bills of lading, disposal facility certifications).

The IDW disposal report should focus on what was done after the IDW disposal plan was completed. It should discuss IDW storage, offsite transport, identify the disposal method and where/when the waste was disposed of, state that offsite disposal facilities have current CERCLA-approval (if applicable), and identify any deviations from the original disposal plan.

6. Health and Safety

The CTO Manager or designee shall prepare a site-specific health and safety plan.

7. References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

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Procedure I-C-2, *Monitoring Well Development.*

Procedure I-C-3, *Monitoring Well Sampling.*

Procedure I-D-1, *Drum Sampling.*

Procedure I-F, *Equipment Decontamination.*

Procedure III-D, *Logbooks.*

8. Attachments

Attachment I-A-6-1: IDW Drum Label

Attachment I-A-6-2: Drum Label – Aluminum Tag

Attachment I-A-6-3: Quarterly IDW Drum Inventory Updates

Attachment I-A-6-1
IDW Drum Label

IDW Drum Label

Contract #:

CTO #:

ACTIVITY SITE: _____

_____

DRUM # (_ _ _ _ - _ _ - D _ _ _ _)

DATE COLLECTED

CONTENTS: (please ✓ and explain)

☐ Soil _____

☐ Water _____

☐ Solid Waste _____

☐ Other _____

PROJECT TYPE

☐ RI ☐ RFI ☐ UST ☐ Other

COMMENTS: _____

_____

_____

_____

_____

_____

FOR INFORMATION CONTACT:

NTR Activity/ Code:

Address:

Telephone:

Attachment I-A-6-2
Drum Label - Aluminum Tag

Drum Label - Aluminum Tag

Attachment I-A-6-3
Quarterly IDW Drum Inventory Updates

Table I-A-6-1: Quarterly IDW Drum Inventory Updates

Navy Activity / Site Name (Generator Site)	CTO Number (0bbb)	Drum Number (xxxx-AA-Dzzz)	Drum Storage Location	Condition of Drum	Condition of Drum Cover	Origin of Contents (Source ID #)	IDW Type	Waste Volume (Fill level %)	Waste Generation Date (dd-Mon-yy)	Expected Disposal Date (Mon-yy)	Actual Disposal Date (dd-Mon-yy)
Inspector:											
Date of Inspection:											
NSC Pearl Harbor/ Landfill	0068	0068-LF-D001	NSC, Bldg 7	A	A	SB-1	Soil Cuttings	100	16-Dec-92	Dec-93	N/A
		0068-LF-D002	N/A	A	A	MW-1 MW-2 MW-3	Purge Water	75	20-Dec-92	Jul 93	26-Jul-93
		0068-LF-D003	N/A	A	A	MW-1 MW-2 MW-3	Decon. Water	95	20-Dec-92	Jul-93	26-Jul-93
		0068-LF-D004	NSC, Bldg.16	U	U	SB-1 SB-2 SB-3 SB-4 MW-1 MW-2 MW-3	PPE	50	16-Dec-92	Oct-93	N/A
NAVSTA Guam/ Drum Storage	0047	0047-DS-001	Hazmat Storage Area	A	A	SB-1 SB-2	Soil Cuttings	100	18-Feb-93	Sep-93	N/A

N/A Not Applicable
A Acceptable
U Unacceptable

Sample Naming

1. Purpose

This standard operating procedure describes the naming convention for samples collected and analyzed, and whose resulting data will be stored in the database for the United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) projects. Unique sample names are used to facilitate tracking by laboratory personnel and project personnel, and for purposes of storing, sorting, and querying data in the database.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

3.1 CHAIN OF CUSTODY SAMPLE NUMBER

The chain of custody (COC) sample number is a five-character identification number that is used by the laboratory and project personnel for tracking purposes. A unique COC sample number must be used for each sample collected from a particular location at a particular time. It is useful for the first two characters to be letters unique to a particular site or project, while the remaining three characters may be digits from 001 to 999 (e.g., AA001). The COC sample number is the only identifier that should be presented to the laboratory.

3.2 SAMPLE IDENTIFICATION NUMBER

The sample identification number is a unique multi-alpha, multi-numeric identifier that is used by the field team to associate sampling results to the particular sampling location, sample type, number of times the location has been sampled, and depth. To avoid potential bias in sample analysis, the sample identifier is not provided to the laboratory. The sample identification number shall be recorded in the field logbook concurrently with the COC sample number.

4. Responsibilities

The CTO Manager shall ensure that a proper sample naming convention is identified in the field sampling plan. The Field Quality Control (QC) Supervisor or other field-sampling leader shall ensure that the sample naming convention is implemented. The laboratory coordinator, CTO Manager, and/or other designated personnel shall ensure on a daily basis that unique, appropriate COC sample numbers and sample identifiers have been assigned. The Quality Assurance (QA)

Manager or QA Manager or Technical Director is responsible for ensuring overall compliance with this procedure.

Technical Director will designate one person in each office (e.g., the laboratory coordinator) to track site designations used in the COC sample number.

5. Procedures

A COC sample number and sample identifier shall be assigned as described below. It is critical that each sample name have a unique COC sample number and sample identifier; otherwise, data cannot be properly stored and tracked in the database.

5.1 COC SAMPLE NUMBER

Use the following format for the COC sample number:

abccc

where:

a = A letter indicating the office managing the CTO

b = A letter indicating the project or site, for example

- A = first site
- B = second site
- C = third site, etc.

ccc = Chronological number, for example

- 001 = first sample from the site
- 002 = second sample from the site
- 105 = 105th sample from the site
- QC samples should be included in this chronological sequence

For example, the 23rd sample from the Carpentry Shop Dip Tank site (assigned project "A" for b above) being investigated would be referred to as "DA023." This might be a soil sample, water sample, trip blank, equipment blank, field duplicate, or other sample type. Using this COC sample number, the samples will be submitted to the laboratory "blind," that is, the laboratory should not know whether each sample received is a site or field QC sample.

If a sample is lost during shipping, the replacement sample must be assigned a new COC sample number. If different containers for the same sample are shipped on different days, a new COC sample number must be assigned.

Aqueous samples for filtered metals analysis must have a unique COC sample number.

When numbering reaches the letter Z, the 26th site, it may begin with a new first letter "a", which must be coordinated with the QA Manager or Technical Director and Coordinator or designee to ensure that it has not been used by another CTO.

Alternatively, the "ab" designators can serve to identify a unique project field, such as "RH" for the Red Hill site.

5.2 SAMPLE IDENTIFICATION NUMBER

The following format is provided as a suggested guidance. Individual site objectives may necessitate variations to the suggested guidance. Coordinate with the QA Manager or Technical Director when considering deviating from this guidance.

AA-bbcc-dee-Dff.f

where:

AA = Designates the site identification

bb = Sample type and matrix (see Table I-A-8-1)

cc = Location number (e.g., 01, 02, 03)

d = Field QC sample type (see Table I-A-8-2)

ee = Chronological sample number from a particular sampling location (e.g., 01, 02, 03)

D = The letter "D" denoting depth

ff.f = Depth of sample in feet bgs (to the measured decimal place). For field blanks, trip blanks and equipment blanks, the depth field will contain the month and date of collection.

For example, the first subsurface soil sample collected from the Foundry Building (FB) borehole location four at a depth of 10 feet would be designated "FB-BS04-S01-D10.0." These characters will establish a unique sample identifier that can be used when evaluating data.

Table I-A-8-1 presents the character identifiers to be used in the sample and matrix portion of the sample identification number. In all cases, the second letter indicates the sample matrix. Note grab, composite, and undisturbed sample designations in the field logbook.

Table I-A-8-1: Sample Type and Matrix Identifiers

Identifier	Sample Type	Matrix
SS	Surface Soil	Soil
BS	Subsurface Soil	Soil
SD	Sediment	Sediment
GW	Groundwater	Water
SW	Surface Water	Water

Table I-A-8-2 describes the field QC designator types. These field QC designators clarify the type of sample collected.

Table I-A-8-2: Field QC Sample Type Identifiers

Identifier	QC Sample Type	Description
S	Normal Sample	All non-field QC samples
D	Duplicate	Collocate (adjacent liners)
R	Duplicate	Replicate
E	Equipment Rinsate	Water
F	Filtered Metals	Water
B	Field Blank	Water
T	Trip Blank	Analytical-laboratory-prepared sample
P	Blind Spike	Performance testing sample

6. Records

Sample identifiers (and COC sample numbers, if appropriate) shall be identified in advance if the exact numbers of samples to be collected are known; these numbers may be listed on a spreadsheet along with requested analyses to be used as a reference by field sampling personnel.

The COC/analytical request form must be used to track all sample names. Copies of each COC form shall be sent daily to the CTO Laboratory Coordinator and with the samples to the analytical laboratory. An example of a COC form is included as Attachment III-E-2 of Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*.

In the field, personnel shall record in the field logbook the COC sample number of each sample collected, as well as additional information, such as the sampling, date, time, and pertinent comments.

7. Health and Safety

Not applicable.

8. References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

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Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*.

9. Attachments

None.

Soil Sampling

1. Purpose

This section sets forth the standard operating procedure for soil sampling (surface samples, trench samples, and boring samples) to be used by United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) personnel.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

None.

4. Responsibilities

The CTO Manager is responsible for ensuring that these standard soil sampling procedures are followed during projects conducted under the NAVFAC Pacific ER Program, and that they are conducted or supervised by a qualified individual. A qualified individual for subsurface sampling is defined as a person with a degree in geology, hydrogeology, or geotechnical/civil engineering with at least 1 year of experience in the supervision of soil boring construction. A qualified individual for trenching, excavation (e.g., pit), or surface sampling supervision is one who has sufficient training and experience to accomplish the objectives of the sampling program. The CTO Manager shall also ensure that a qualified person, as defined in Procedure I-E-1, *Soil and Rock Classification,* conducts soil classification during all types of soil sampling. The CTO Manager is responsible for ensuring that all personnel involved in sampling and/or testing shall have the appropriate education, experience, and training to perform their assigned tasks as specified in Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

QA Manager or Technical Director is responsible for ensuring overall compliance with this procedure.

The Field Manager is responsible for ensuring that all project field staff follow these procedures.

Field sampling personnel are responsible for the implementation of this procedure.

5. Procedures

5.1 SUBSURFACE SOIL SAMPLING

The purpose of subsurface soil sampling is to acquire accurate, representative information about subsurface materials penetrated during drilling or trenching. This is accomplished by logging lithologic information, classifying lithologic materials, and collecting lithologic samples for analysis using geotechnical or chemical methods.

5.1.1 Inspection of Equipment

The collection of reliable samples of subsurface materials depends partly on the types of samples that can be collected when using various subsurface exploration techniques. These procedures are described in Section 5.2. In all cases, the equipment shall be inspected prior to commencement of drilling for signs of fluid leakage, which could introduce contaminants into the soil. If, at any time during subsurface exploration, fluid is observed leaking from the rig, operations shall cease and the leak shall be immediately repaired or contained. All soil and other materials affected by the leak will be collected, containerized, and labeled for proper disposal (see Procedure I-A-6, *IDW Management*).

5.1.2 Preparation of Site

Proper preparation of the site prior to the commencement of subsurface exploration is essential for smooth drilling operations. It is required to protect the health and safety of site personnel. First, the site shall be inspected to ensure that there are no overhead hazards that could affect subsurface exploration. Then, all subsurface sampling locations shall be assessed using geophysical methods. If possible, the area shall be excavated by hand to a depth of 2 to 3 feet before beginning drilling. If surface or shallow samples are required, it is suggested that the hand excavation be done as close to the actual subsurface exploration as possible. The drill rig must have a means to guard against employee contact with the auger (e.g., guard around the auger; barricade around the perimeter of the auger; electronic brake activated by a presence-sensing device). All members of the field crew shall know the location of the kill switch, which must be readily accessible, for the equipment.

The equipment shall be situated upwind or side-wind of the borehole. The area surrounding, and in the vicinity of, the borehole shall be covered with plastic, including the area where cuttings are placed into 55-gallon drums and the equipment decontamination area. The required exclusion zones shall be established by using plastic tape or cones to designate the various areas.

5.1.3 Equipment Decontamination

To avoid cross-contamination, all sampling equipment utilized for borehole drilling and soil sampling that may potentially come into contact with environmental samples shall be thoroughly decontaminated as described in Procedure I-F, *Equipment Decontamination*. All sampling tools shall be decontaminated between each sampling event and between each borehole or trench. At a minimum, all equipment shall be steam-cleaned or undergo the wash-and-rinse process. All wash-and-rinse water shall be collected, containerized, and labeled for proper disposal. Clean equipment (e.g., augers and samplers) shall be protected from contact with contaminated soils or other contaminated materials prior to sample collection. Equipment shall be kept on plastic or protected in another suitable fashion. After a borehole is completed, all augers and contaminated downhole equipment shall be stored on plastic sheeting.

5.1.4 Handling of Drill Cuttings

All soil cuttings from borehole drilling shall be placed into 55-gallon U.S. Department of Transportation (DOT)-approved drums or other appropriate containers, such as a roll-off bin. The containerized cuttings shall be stored in a centralized area pending sample analysis to determine their final disposition. The procedure on investigation-derived waste (IDW) (see Procedure I-A-6, *Investigation-Derived Waste Management*) details drum handling and labeling procedures.

5.2 SOIL SAMPLE COLLECTION METHODS

Table I-B-1-1 describes the characteristics of the sampling methods for the drilling techniques frequently used for soil borings and monitoring well installation, as described in Procedure I-C-1, *Monitoring Well Installation*. The split-spoon sampling method is the most commonly used soil sampling technique. However, in certain circumstances, other methods may have to be used to obtain optimal soil sampling results.

Sampling and handling procedures for samples submitted for volatile organic compound (VOC) analyses are provided in Attachment I-B-1-1.

Table I-B-1-1: Characteristics of Common Subsurface Formation-Sampling Methods

Type of Formation	Sample Collection Method	Sample Quality	Potential for Continuous Sample Collection?	Samples Suitable for Analytical Testing?	Discrete Zones Identifiable?
Unconsolidated	Bulk Sampling (Cuttings)	Poor	No	No	No
	Thin Wall	Good	Yes	Yes	Yes
	Split Spoon	Good	Yes	Yes	Yes
	Trench	Good	No	Yes	Yes
	Core Barrels	Good	Yes	Yes	Yes
Consolidated	Cuttings (direct rotary)	Poor	No	No	No
	Core Barrels	Good	Yes	Yes	Yes

The following text describes the primary soil sampling methods used for the NAVFAC Pacific ER Program.

5.2.1 Split-Spoon Samples

Split-spoon sampling is usually used in conjunction with the hollow-stem or solid-stem auger drilling method and can be used for sampling most unconsolidated and semi-consolidated sediments. It is used less frequently for air and mud rotary, and casing drive methods. It cannot normally be used to sample bedrock, such as basalt, limestone, or granite. The method can be used for highly unconsolidated sands and gravels if a stainless-steel sand catcher is placed in the lower end of the sampler.

The split-spoon sampler consists of a hardened metal barrel, 2 to 3 inches in diameter (2 to 2.5 inches inner diameter) with a threaded, removable fitting on the top end for connection to the drill

rods and a threaded, removable "shoe" on the lower end that is used to penetrate the formation. The barrel can be split along its length to allow removal of the sample.

The following steps are required to obtain a representative soil sample using a split-spoon sampler:

Advance the borehole by augering until the top of the desired sampling interval is reached. Then withdraw the drill bit from the hollow-stem augers.

Equip the sampler with interior liners that are composed of materials compatible with the suspected contaminants if samples are to be retained for laboratory analytical analysis. Generally, these liners consist of brass or stainless steel and are slightly smaller than the inner diameter of the sampler. It is recommended to use stainless-steel liners rather than brass if samples are to be analyzed for metals. Always evaluate the composition of the liners with respect to the types of contaminants that are suspected.

Attach the properly decontaminated split-spoon sampler (equipped with liners) either to the drill rods or to a cable system and lower it to the bottom of the borehole through the augers.

Drive the sampler into the formation by either a manual or automatic hammer (usually a 140-pound weight dropped through a 30-inch interval). Record the number of blows required to drive the sampler at 6-inch intervals in the boring log since blow counts provide an indication of the density/compaction of the soils being sampled. The field geologist, hydrogeologist, or geotechnical engineer shall carefully observe the internal measuring technique of the driller and keep track of sampling materials to ensure the accurate location of samples. Continuous samples can be collected with the split-spoon method by augering or drilling to the bottom of the previously sampled interval and repeating the operation. Whether continuous or intermittent, this collection method disturbs samples and cannot be used for certain geotechnical tests that require undisturbed samples.

Bring the split-spoon sampler to ground surface and remove it from the drill rods or cable system following sample acquisition. Loosen the upper and lower fittings and take the sampler to the sample handling area. At the sample handling area, remove the fittings, split the barrel of the sampler, and remove one side of the sampler. At this time, it is important to observe and record the percentage of sample recovery.

Immediately remove the liners containing the soil samples from the sampler. Generally, the lowermost liner is considered the least disturbed and shall be retained as the analytical laboratory sample. However, in certain circumstances (such as with the use of a sand catcher), other liners may be more appropriate for retention as the laboratory sample. Cover the ends of the sample liner to be retained as the analytical laboratory sample with Teflon film and sealed with plastic caps. The site geologist, hydrogeologist, or geotechnical engineer shall observe the ends of the liner destined for analytical sampling and describe the physical nature of the sample (e.g., soil or rock type, grain size, color, moisture, as indicated in Procedure I-E, *Soil and Rock Classification*.) Then label the sample according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody*, and immediately place it on ice in a cooler as described in Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*.

Collect split-spoon soil samples submitted for VOC analysis using the procedure found in Attachment I-B-1-1.

Any remaining liners collected from the sample can then be used for other purposes, such as providing a duplicate sample for field quality control or material for lithologic logging. These samples can also be used for headspace analysis as described in Section 5.4.

Conduct lithologic logging of each sample in accordance with Procedure I-E, *Soil and Rock Classification*, and enter each sample into the boring log presented in Figure I-B-1-1. In most instances, an additional liner full of material is available for this purpose. Check to ensure that all liners contain similar material. If an extra liner full of material is not available, then log by collecting the extra material present in the end of the sampler shoe. Make a comparison to the material visible at the end of the sample liner destined for laboratory analysis to ensure that the entire sample consists of similar material. If not, then describe the different material to the extent possible by relating it to similar material that was encountered previously.

If VOCs are suspected to be present, screen the sample with an organic vapor monitor (OVM) or equivalent, and collect headspace samples according to Section 5.4.

Decontaminate all sampling equipment prior to each use according to Procedure I-F, *Equipment Decontamination*.

5.2.2 Thin-Wall Samples

The thin-wall or Shelby tube sampler is usually used in conjunction with the hollow-stem and solid-stem auger drilling methods and is most useful when sampling clay- and silt-rich sediments. It can also be used with air and mud rotary, and casing drive drilling techniques. It is amenable only to lithologies that are relatively soft and, in some cases, is not capable of penetrating hard clays or compacted sands. In addition, samples of unconsolidated sands cannot normally be acquired because they cannot be retained within the sampler, although a sand catcher can be utilized, in some cases, with moderate success.

The thin-wall sampler often consists of a single thin tube that is 3 to 4 inches in outer diameter and 1 to 3 feet in length. The upper end of the sampler has a solid metal section with a fitting for drill rods. There is no fitting for the lower end of the sampler, and it is usually open to allow sample acquisition; however, when sampling in poorly consolidated materials, a sand catcher may be placed in the lower end to ensure retention of the sample.

The following steps are required to obtain a representative soil sample using a thin-wall sampler:

Advance the borehole by augering or drilling until the top of the desired sampling interval is reached. Then withdraw the drill bit from the hollow-stem augers.

Place the sampler on the end of the drill rods and lower it to the bottom of the borehole.

Instead of driving the sampler, use the hydraulic apparatus associated with the kelly bar on the drilling rig to press the sampler into the undisturbed formation. The thin-wall sampler may lack sufficient structural strength to penetrate the materials, in which case another sampling technique may be required. The samples obtained using this method cannot be used for certain geotechnical tests where undisturbed samples are required.

Thin-wall samples submitted for VOC analysis must be collected using the procedure found in Attachment I-B-1-1.

Following sample acquisition, bring the thin-wall sampler to the ground surface, remove it from the drill rods, and take it to the sample handling area.

Immediately cover the ends of the sample with Teflon film and sealed with plastic caps if the sample is to be retained as a laboratory sample. Then label the sample according to Procedure III-E, *Record Keeping Sample Labeling, and Chain of Custody Procedures* and immediately place it on ice in a cooler. Extrude the sample from the sampler and inspect it if the sample is to be used only for lithologic logging.

Conduct lithologic logging of each sample in accordance with Procedure I-E*, Soil and Rock Classification* and enter each sample into the boring log presented in Figure I-B-1-1. If the sample is contained in a sleeve, observe the ends of the sample in the sleeve to assess lithologic and stratigraphic characteristics.

If VOCs are suspected to be present, screen the sample with an OVM or equivalent, and collect headspace samples according to Section 5.4.

Decontaminate all sampling equipment prior to each use according to Procedure I-F, *Equipment Decontamination.*

5.2.3 Cores

A core barrel is often used to obtain core samples from harder lithologic materials, such as basalt, granite, and limestone, in instances where undisturbed samples are required for geotechnical testing, and in cases where completely continuous sampling is required. Complete recovery of samples during coring is often difficult when sampling unconsolidated and semi-consolidated lithologies, such as clays, silts, and sands.

The American Society for Testing and Materials (ASTM) has standardized rock coring methods (D-2113) (ASTM 2006). Several standardized core sizes for bits, shells, and casings have been established (e.g., RX, NX, SW.) Table I-B-1-2 summarizes the various size standards for core barrels and bits.

Field Log of Boring

BORING NUMBER	SHEET ____ OF _____

PROJECT NAME	PROJECT NUMBER	ELEVATION AND DATUM			LOCATION	
DRILLING COMPANY	DRILLER	DATE AND TIME STARTED			DATE AND TIME COMPLETED	
DRILLING EQUIPMENT	DRILLING METHOD	COMPLETION DEPTH			TOTAL NO. OF SAMPLES	
SIZE AND TYPE OF BIT	HOLE DIAMETER	NO. OF SAMPLES	BULK	SS	DRIVE	PITCHER
DRILLING FLUID	DRILLING ANGLE	WATER LEVEL	FIRST		AFTER _____ HOURS	
SAMPLE HAMMER TYPE DRIVING WT. DROP		HYDROGEOLOGIST/DATE			CHECKED BY/DATE	

LITHOLOGY	DEPTH (FEET)	SAMPLES	RECOVERY	BLOW COUNT	DESCRIPTION	USCS SYMBOL	ESTIMATED PERCENT OF GR	SA	FI	COMMENTS

Figure I-B-1-1: Field Log of Boring

Table I-B-1-2: Standard Core Barrel Sizes (in inches)

Description	RX or RW	EX or EW	AX or AW	BX or BW	NX or NW	HX or HW	PX or PW	SX or SW	UX or UW	ZX or ZW
Bit Set Normal I.D.	0.750	0.845	1.185	1.655	2.155	3.000	—	—	—	—
Bit Set Normal and Thin-wall O.D.	1.160	1.470	1.875	2.345	2.965	3.890	—	—	—	—
Bit Set Thin-wall. I.D	0.735	0.905	1.281	1.750	2.313	3.187	—	—	—	—
Shell Set Normal and Thin-wall O.D.	1.175	1.485	1.890	2.360	2.980	3.907	—	—	—	—
Casing Bit Set I.D.	1.000	1.405	1.780	2.215	2.840	3.777	4.632	5.632	6.755	7.755
Casing Bit Set and Shoe O.D.	1.485	1.875	2.345	2.965	3.615	4.625	5.650	6.780	7.800	8.810

I.D. Inner Diameter
O.D. Outer Diameter

The selection of the most practical core barrel for the anticipated bedrock conditions is important. The selection of the correct drill bit is also essential to good recovery and drilling production. Although the final responsibility of bit selection usually rests with the drilling contractor, there is a tendency in the trade to use "whatever happens to be at hand." The selection of the diamond size, bit crown contour, and number of water ports depends upon the characteristics of the rock mass. The use of an incorrect bit can be detrimental to the overall core recovery. Generally, fewer and larger diamonds are used to core soft formations, and more numerous, smaller diamonds, which are mounted on the more commonly used semi-round bit crowns, are used in hard formations. Special impregnated diamond core bits have been developed recently for use in severely weathered and fractured formations where bit abrasion can be very high.

Core barrels are manufactured in three basic types: single tube, double tube, and triple tube. These basic units all operate on the same principle of pumping drilling fluid through the drill rods and core barrel. This is done to cool the diamond bit during drilling and to carry the borehole cuttings to the surface. A variety of coring bits, core retainers, and liners are used in various combinations to maximize the recovery and penetration rate of the selected core barrel.

The simplest type of rotary core barrel is the single tube, which consists of a case hardened, hollow steel tube with a diamond drilling bit attached at the bottom. The diamond bit cuts an annular groove, or kerf, in the formation to allow passage of the drilling fluid and cuttings up the outside of the core barrel. The single tube core barrel cannot be employed in formations that are subject to erosion, slaking, or excessive swelling, as the drilling fluid passes over the recovered sample during drilling.

The most popular and widely used rotary core barrel is the double tube, which is basically a single tube barrel with a separate and additional inner liner that is available in either a rigid or swivel type of construction. In the rigid types, the inner liner is fixed to the outer core barrel so that it rotates with the outer tube. In contrast, the swivel type of inner liner is supported on a ball-bearing carrier, which allows the inner tube to remain stationary, or nearly so, during rotation of the outer barrel. The sample, or core, is cut by rotation of the diamond bit. The bit is in constant contact with the drilling fluid as it flushes out the borehole cuttings. The addition of bottom discharge bits and fluid control

valves to the core barrel system minimizes the amount of drilling fluid and its contact with the sample, which further decreases sample disturbance.

The third and most recent advancement in rotary core barrel design is the triple tube core barrel, which adds another separate, non-rotating liner to the double tube core barrel. This liner, which retains the sample, consists of a clear plastic solid tube or a split, thin metal liner. Each type of liner has its distinct advantages and disadvantages; however, they are both capable of obtaining increased sample recovery in poor quality rock or semi-cemented soils, with the additional advantage of minimizing sample handling and disturbance during removal from the core barrel.

The rotary core barrels that are available range from 1 to 10 inches in diameter, and the majority may be used with water, drilling mud, or air for recovering soil samples. Of the three basic types of core barrels, the double tube core barrel is most frequently used in rock core sampling for geotechnical engineering applications. The triple tube core barrel is used in zones of highly variable hardness and consistency. The single tube is rarely used because of its sample recovery and disturbance problems.

Coring to obtain analytical samples requires only filtered air as the drilling fluid. The core barrel operates by rotating the outer barrel to allow the bit to penetrate the formation. The sample is retained in the inner liner, which in most samplers does not rotate with the outer barrel. As the outer barrel is advanced, the sample rises in the inner liner. In general, a secondary liner consisting of plastic or metal is present within the inner liner to ensure the integrity of acquired samples.

Obtain soil or rock core samples with a core barrel or a 5-foot split-spoon core barrel using the following procedure:

Drill the core barrel to the appropriate sampling depth. It is important to use only clean, filtered air (i.e., particulate- and petroleum-free) as drilling fluid while coring to obtain samples for laboratory analysis. If necessary, distilled water may be added through the delivery system of the coring device by the driller, provided that the drilling returns cannot be brought to the surface by air alone.

Retrieve the core barrel from the hole. Use care to ensure that the contents of the core barrel do not fall out of the bottom during withdrawal and handling.

Open the core barrel by removing both the top and bottom fittings. Then remove the sample within the inner liner from the core barrel and take it to the sample handling area.

Conduct lithologic logging of each sample in accordance with Procedure I-E, *Soil and Rock Classification*, and enter each sample into the boring log presented in Figure I-B-1-1.

If VOCs are suspected to be present, screen the sample with an OVM or equivalent, and collect headspace samples according to Section 5.4.

Collect core samples submitted for VOC analysis using the procedure found in Attachment I-B-1-1.

If rock core samples are to be recovered for analytical laboratory or geotechnical analyses, the core barrel will either be lined with a sample container (e.g. stainless steel or acrylic liner), or the samples will be transferred to an appropriate sample container (e.g. stainless steel / acrylic liner, glass jar). Samples collected or placed in stainless steel or acrylic liners shall have the ends of the liners covered with Teflon film and sealed with plastic end caps. The sample containers shall be labeled in accordance with Procedure III-E, *Record Keeping, Sample Labeling, and Chain of Custody*

Procedures, and Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*, and immediately placed on ice in a cooler.

Place the samples in core boxes if samples are to be catalogued and stored. Affix the CTO number; site name; borehole number; start depth; end depth; date; and name of the geologist, hydrogeologist, or geotechnical engineer to the core box. Store the samples in a clean, dry area on site during the duration of field sampling; samples shall not be brought back to the office or equipment storage area. Document proper disposal at the completion of field sampling.

Decontaminate all sampling equipment prior to each use according to Procedure I-F, *Equipment Decontamination*.

5.2.4 Bulk Samples

The term "bulk sample" represents a sample collected from borehole cuttings either from the hollow-stem auger flights or the discharge of any of the rotary or cable tool drilling techniques. This type of sample is useful for describing soils or consolidated materials, where no undisturbed samples representative of a specific depth are being collected. It should be noted that this type of sample is generally considered to be the least acceptable of the types of samples previously described in this section and shall be used only when detailed lithologic data are not needed.

Handling and lithologic logging of bulk samples should be performed in a manner consistent with that used for split-spoon samples. An estimate of the depth (or range of depths) from which the sample was obtained, and date and time of collection should be recorded on the boring log. Samples are usually collected every 5 feet, preferably at several different times during a 5-foot drilling run so that lithologic variations occurring over the drilling interval can be noted. Rock fragments commonly range in size from 1/16 to 1/2 inch, with many fragments larger than 1/4 inch. Larger fragments can often be obtained with reverse circulation rotary drilling. Rotary-tool samples usually contain some caved materials from above and, when drilling with mud or water rotary, the cuttings may contain soil and rock recirculated by the mud/water pump; therefore, care must be exercised when interpreting lithologic logs completed using data from this type of sample.

Because the collection of samples at the surface lags behind the actual drilling of a given lithologic bed at depth, the samples usually represent a depth less than that of the current depth of the drill bit. The amount of lag may be significant in deeper boreholes, but can be eliminated by collecting samples after circulating for a period of time sufficient to permit the most recently drilled materials to reach the surface.

5.2.5 Borehole Abandonment

Following completion of soil sampling, the borehole shall be properly abandoned unless a monitoring well is to be installed. Abandonment shall occur immediately following acquisition of the final sample in the boring and shall consist of the placement of a bentonite-cement grout from the bottom of the boring to within 2 feet of ground surface. The grout mixture shall consist of a mix of 7 to 9 gallons of water per 94-pound bag of Portland Type I or II cement with 3 to 5 percent by weight of powdered bentonite. Other commercial products such as Volclay are also acceptable with approval of the CTO Manager and QA Manager or Technical Director. The bentonite-cement grout shall be placed in one continuous pour from the bottom of the boring to within at least 0.5 foot to 2 feet of ground surface through a tremie pipe or hollow-stem augers. Additional grout may need to be placed if significant settlement occurs. The remaining portion of the boring can be filled with topsoil.

5.2.6 Trenching and Pit Sampling

Trenching is used in situations where the depth of investigation generally does not exceed 10 to 15 feet and is most suitable for assessing surface and near-surface contamination and geologic characteristics. In addition, trenching allows detailed observation of shallow subsurface features and exposes a wider area of the subsurface than is exposed in borings. Pit sampling is typically conducted in conjunction with a removal or remedial action.

A backhoe is usually used to excavate shallow trenches to a depth of no greater than 15 feet. Front-end loaders or bulldozers are used when it is not possible to use a backhoe; for example, when materials lack cohesion or are too stiff, or the terrain is too steep for a backhoe. Larger excavations (i.e., pits) may require additional equipment as described in the CTO work plan (WP) or equivalent document.

Typically, trenches have widths of one to two backhoe buckets and range in length from 5 to 20 feet, although larger trenches can be dug depending on the objectives of the study. Pits will vary in size depending upon the scope of the removal/remedial action. Soils removed from the trench/pit shall be carefully placed on plastic sheeting or other appropriate materials in the order of removal from the trench or excavation. The shallow excavated materials can be placed on one side of the trench/excavation and deeper materials on the other side to allow better segregation of shallow and deep materials.

Soil sampling locations within each trench or pit shall be chosen on the basis of visual inspection and any VOC screening results. Samples shall be collected from either the sidewalls or the bottom of the trenches/excavations. Soil sampling should be conducted outside the trench/excavation, and personnel generally should not enter a trench or pit if there is any other means (e.g., backhoe buckets, hand augers, shovels, or equivalent) to perform the work. If entry is unavoidable, then a competent person shall first determine acceptable entry conditions including sloping, shoring, and air monitoring requirements, personal protective equipment (PPE), and inspections. In addition, the site-specific health and safety plan must be amended to include applicable requirements of 29 Code of Federal Regulations (CFR) 1910.146.

Equipment used for trench/pit sampling may include hand augers, core samplers (slide hammer), liners inserted manually into the soil, or hand trowels. In addition, samples may be obtained directly from the trench or from the backhoe bucket. All samples shall be properly sealed and labeled according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*, and immediately placed on ice in a cooler as indicated in Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*. Sample locations and descriptions shall be described and recorded on the field trench/pit log.

Trench or pit samples submitted for VOC analysis must be collected using the procedure found in Attachment I-B-1-1.

The exposed materials shall be observed for lithologic and contaminant characteristics following completion of the excavation activities. Detailed mapping of the exposed walls of the trench shall be conducted, although in no instance shall personnel enter a trench without first determining acceptable entry conditions including sloping, shoring, and air monitoring requirements, PPE, and inspections as defined in 29 CFR 1910.146. A useful mapping technique for extremely long trenches or large pits is to examine the vertical profile of the excavation at horizontal intervals of 5 to 10 feet,

in a manner similar to the method typically used for preparation of a geologic cross-section using soil borings. Field observations shall be noted in the field logbook and described in detail on a trench/pit log. An example of a field trench/pit log is presented in Figure I-B-1-2. The lithologic description shall include all soil classification information listed in Procedure I-E, *Soil and Rock Classification*. A cross-section of the trench or pit should also be included on the field trench/pit log. Photographs of the trench/pit are also an excellent way to document important subsurface features.

During backfilling of the excavation, the materials excavated from the greatest depth should be placed back into the excavation first. Lithologic materials should be replaced in 2- to 4-foot lifts and recompacted by tamping with the backhoe bucket. For certain land uses or site restoration, more appropriate compaction methods may be required. These methods shall be described in the CTO WP and design documents. The backfilled trench/pit shall be capped with the original surface soil. If materials are encountered that cannot be placed back in the excavation, they should be placed either in DOT-approved open-top drums or placed on and covered with visqueen or equivalent material and treated as IDW in accordance with Procedure I-A-6, *IDW Management.*

5.3 SURFACE SAMPLING

All surface soil samples shall be accurately located on field maps in accordance with Procedure I-I, *Land Surveying.* Detailed soil classification descriptions shall be completed in accordance with Procedure I-E, *Soil and Rock Classification* and recorded on the surface and shallow soil sample log (Figure I-B-1-3).

In general, surface soil samples are not to be analyzed for VOCs unless there is sufficient evidence to suggest the presence of such compounds.

Methods commonly used for collection of surface soil samples are described below.

5.3.1 Hand Trowel

A stainless-steel or disposable hand trowel may be used for sampling surface soil in instances where samples are not to be analyzed for volatile organics. The hand trowel is initially used to remove the uppermost 2 inches of soil and is then used to acquire a representative sample of deeper materials to a depth of 6 inches. Generally, only samples within the upper 6 inches of soil should be sampled using these methods. The depth of the sample shall be recorded in the surface and shallow soil sample log (Figure I-B-1-3). The soil classification shall include all the information outlined in Procedure I-E, *Soil and Rock Classification*.

Soil samples collected using a hand trowel are usually placed into pre-cleaned, wide-mouth glass jars. The jar is then sealed with a tight-fitting cap, labeled according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*, and placed on ice in a cooler in accordance with Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*. All sampling equipment must be decontaminated prior to each use according to the methods presented in Procedure I-F, *Equipment Decontamination*.

5.3.2 Hand Auger

A soil recovery hand auger consisting of a metal rod, handle, detachable stainless-steel core barrel, and inner sleeves can be used to obtain both surface soil and trench samples. Multiple extensions can

be connected to the sampler to facilitate the collection of samples at depths up to 15 feet below the existing ground surface.

Pre-cleaned sample liners are loaded into the core barrel prior to sampling. In general, these liners are used not only to collect samples, but also to serve as the sample container. Alternatively, in instances where VOCs are not to be analyzed or where not enough samples can be collected to completely fill a liner, samples can be transferred to wide-mouth glass jars. In either case, the sample shall be labeled according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures* and immediately placed on ice in a cooler as indicated in Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*. To minimize possible cross-contamination, the soil recovery hand auger and sample liners shall be decontaminated prior to each use according to the procedures described in Procedure I-F, *Equipment Decontamination*.

5.3.3 Slide Hammer Sampling

In instances where the soil type precludes the collection of soil samples using the soil recovery hand auger, a manually operated slide hammer can be used to collect relatively undisturbed soil samples from excavations and surface soils. The slide hammer consists of a 6- to 12-inch core barrel that is connected to the slide hammer portion of the device using detachable extensions.

The core sampler is typically loaded with two to four sample liners, depending on the liner length, which are not only used to acquire the samples, but also serve as the sample container. Immediately following acquisition, samples shall be labeled according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures* and immediately placed on ice in a cooler as indicated in Procedure III-F, *Sample Handling, Storage, and Shipping Procedures*.

All of the sampling equipment that comes into contact with the sample medium shall be decontaminated in accordance with Procedure I-F, *Equipment Decontamination*. Split-barrel slide hammer core samplers, which have recently become available, are much easier to decontaminate than the older, single-piece core barrel, and should be used in place of the older core barrels where possible.

5.3.4 Hand Sampling Using Sample Liners

Surface soil samples can sometimes be collected by hand using just the sample liners. This method can be used in cases where the surface soils are soft or where it is advantageous to minimize the disturbance of the sample (such as when sampling for volatiles). Obtaining surface soil samples with this method consists merely of pushing or driving the sample tube into the ground by hand.

FIELD LOG OF TRENCH/PIT

Project Name							
Trench Number		Project Number	Elevation and Datum			Location	
Equipment Supplier		Operator	Date and Time Started			Date and Time Completed	
Equipment Type		Trench Orientation	Total Depth			Total Number of Samples	
Bucket Width	Trench Length	Trench Width	No. Of Samples	Bulk	Ss	Drive	Hand Auger
Geologist or Hydrogeologist/Date			Check by/Date				

SOIL DESCRIPTION

LITHOLOGY	DEPTH (FEET)	DESCRIPTION	USCS SYMBOL	Est. % of G	S	F	COMMENTS
							Description taken _____ feet
							from _____ end of trench.

Figure I-B-1-2: Field Log of Trench/Pit

SURFACE AND SHALLOW SOIL SAMPLE LOG

Project Number	Project Name	Date	Time

Sample Identification Number and Time	Checked by

Sampled by	Recorded by

Method of Collection

Surface Description

Notes

Soil Sample Data

Location

Coordinates	Elevation

LITHOLOGY	DEPTH (FEET)	DESCRIPTION	USCS SYMBOL	Est. % of G	S	F	COMMENTS

Figure I-B-1-3: Surface and Shallow Soil Sample Log

The sample liner (with the collected sample inside) is then removed from the ground and capped with Teflon film and plastic end caps. The sample is labeled according to Procedure III-E, *Record Keeping, Sampling Labeling, and Chain-Of-Custody Procedures* and immediately placed on ice in a cooler. All liners shall be decontaminated prior to use in accordance with Procedure I-F, *Equipment Decontamination*. Since the only pieces of equipment used are the sample liners, this method helps to minimize the required amount of equipment decontamination.

5.4 VOLATILE ORGANICS SCREENING AND HEADSPACE ANALYSIS

Volatile organics screening and headspace analysis is performed to preliminarily assess if the sample contains VOCs. Volatile organics screening and headspace analysis of samples shall be performed using a Foxboro Model 128 portable organic vapor analyzer (OVA), a HNU model PI 101 portable photoionization detector (PID), or other similar instrument.

Volatile organics screening and headspace analysis is intended as a field screen for the presence of VOCs. The method measures the presence or absence of VOCs in the headspace (air) above a soil sample. Various factors affect the level of VOCs volatilizing from soils, such as concentration in the soil, temperature of the soil and air, organic carbon content of the soil, equilibration time, moisture content of the soil, and the chemical and physical characteristics of the VOCs. Therefore, headspace readings can only be regarded as qualitative assessments of volatiles, and caution should be exercised if using this technique to select samples for analytical testing. OVA and PID readings can vary because the two instruments have different sensitivities to the various VOCs and are usually calibrated relative to different gas standards (i.e., methane for the OVA and isobutylene for the PID).

In order to screen samples for VOCs, the instrument probe shall be inserted into the top of the sample liner immediately after the sampler is opened. The instrument response (normally in parts per million) is then recorded in the field notebook and/or the field log.

For headspace analysis, a portion of the sample is transferred into a Ziploc bag or pre-cleaned glass jar, which is then sealed and agitated. The VOCs are allowed to volatilize into the headspace and equilibrate for 15 to 30 minutes. Next, the instrument probe is then inserted into the container to sample the headspace, and the instrument response is recorded in the field notebook and/or the field log.

6. Records

Soil classification information collected during soil sampling should be documented in borehole, trench, and surface soil log forms. All log entries shall be made in indelible ink. Information concerning sampling activities shall be recorded on sample log forms or in the field logbook. The CTO Manager or designee shall review all field logs on at least a monthly basis. Procedures for these activities are contained in this manual. Copies of this information should be sent to the CTO Manager and to the project files.

7. Health and Safety

Standard health and safety practices shall be observed according to the site-specific health and safety plan (HSP). Ambient air and soil vapor monitoring during excavation activities shall provide data

related to relative volatile contaminant concentrations and any required PPE that might be necessary. In addition, an air monitoring program and suggested PPE is listed in the site-specific HSP.

Suggested minimum PPE used during soil sampling activities in conjunction with field excavations shall include inner disposable vinyl gloves, outer chemical protective nitrile gloves, Tyvek coveralls, steel-toed boots and overboots, safety glasses, hearing protection (around heavy equipment in operation), and an American National Standards Institute-Standard hard hat. Half-face respirators and cartridges may be necessary depending on the contaminant concentrations and shall always be available on site. At no time during soil sampling activities are personnel to reach for debris near machinery that is in operation.

In addition to the aforementioned precautions and depending upon the type of contaminant expected, the following safe work practices will be employed:

Particulate or Metal Compounds:

Avoid skin contact and/or incidental ingestion of soil.

Use protective clothing, steel-toed boots, gloves, safety glasses, and hearing protection as warranted.

VOCs:

Avoid breathing constituents venting from soil borings, trenches, pits, or holes by approaching upwind, and/or by use of respiratory protection.

Pre-survey the area for trenches, pits, or holes using a flame ionization detector/PID prior to sampling.

Conduct sampling activities in Level C protection if monitoring results indicate organic vapors that exceed action levels as specified in the site-specific HSP. At a minimum, skin protection will be required by use of gloves and Tyvek or other media that is protective against the media being encountered.

Flammable or Explosive Conditions:

Monitor explosive gases as continuously as possible using an explosimeter and oxygen meter.

Place all ignition sources upwind or crosswind of the borehole.

Cease operations and evaluate conditions if explosive gases exceed the designated action levels as specified in the site-specific HSP.

Physical Hazards Associated With Soil Sampling:

Use the large muscles of the legs, not the back, when retrieving soil samplers to avoid possible back strain.

Stay clear of all moving equipment and avoid wearing loose fitting clothing.

Be wary of open trenches, pits, or holes to avoid slip/trip/fall hazards.

Drink electrolyte replacement fluids (1-2 cups/hour is recommended) to avoid heat stress and wear fitted insulating clothing to avoid cold stress in extreme temperature conditions.

Be aware of restricted mobility due to PPE.

Rotate sampling among field personnel to avoid hand, wrist, arm, shoulder, and back trauma due to overuse of slide hammers or hand augers.

8. References

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Procedure I-A-6, *IDW Management.*

Procedure I-C-1, *Monitoring Well Installation.*

Procedure I-E-1, *Soil and Rock Classification*.

Procedure I-F, *Equipment Decontamination.*

Procedure I-I, *Land Surveying.*

Procedure III-E, *Record Keeping, Sample Labeling, and Chain of Custody Procedures.*

Procedure III-F, *Sample Handling, Storage, and Shipping Procedures.*

9. Attachment

Attachment I-B-1-1: Sampling and Handling Procedure: Analysis of Soil for Volatile Organic Compounds

Attachment I-B-1-1
Sampling and Handling Procedure:
Analysis of Soil for Volatile Organic Compounds

1. Laboratory Requirements

The laboratory must be capable of performing (1) United States (U.S.) Environmental Protection Agency (EPA) Solid Waste (SW)-846 Method 5035A and (2) Method 8260B, 8021B, or 8015B (purgable hydrocarbons), depending on the project objectives. The laboratory must have method performance data to verify this capability.

The laboratory must obtain, or prepare, 40-milliliter (mL) volatile organic analyte (VOA) vials sealed with a Teflon or silicon septa cap. The VOA vials must contain a single-use magnetic stir bar and 5 milliliters (mL) of American Society for Testing and Materials Type II water. The VOA vials must have a sample label and be weighed prior to shipment to the field for use. The laboratory is responsible for recording the weight of each vial before and after sampling. Alternately, EnCore-type samplers may be employed.

The laboratory must provide a minimum of three prepared VOA vials, or EnCore-type samplers, for each soil sample analyzed for volatile organic compounds (VOCs).

2. Supplies

Disposable coring devices (hereafter referred to as coring devices): either vendor-calibrated sample coring devices, or EnCore-type samplers. One coring device sampler per sampling location, plus additional coring devices (5 percent) in case of breakage.

VOA vials: three laboratory-prepared vials with 5 mL of ASTM Type II water, single-use magnetic stir bar, and sample label per sampling location, plus additional prepared vials (5 percent) in case of breakage, or three EnCore-type samplers.

Reagent/trip blanks: laboratory-prepared in identical fashion to sample vials.

Temperature blanks: laboratory-prepared.

2-ounce glass jars with Teflon-lined lid: for dilution purposes and percent moisture determination.

Nitrile gloves.

3. Field Sampling

The following directions apply to all sampling techniques for soil coring devices: For reasons stated in the section titled *Use of the EnCore Sampler (or Equivalent) for Sample Transport and Storage* on page 28 of this attachment and explained in detail in Sections 8.2.1.8 and A7.2 of EPA Method 5035A, EnCore-type samplers are recommended for sample collection, not sample collection and transport.

Always wear clean gloves while handling VOA vials to help prevent soil and other debris from adding to the weight of the vial. Always don a new pair of gloves for each sampling location.

Whenever possible, collect the soil samples for VOC analysis in place. If this is not possible, practical, or safe, collect the sample from a stainless-steel sample liner, or if absolutely necessary, from a backhoe bucket.

Collect VOA samples as quickly as possible to avoid unnecessary VOC losses. EPA Region 9 recommends total exposure of the soil sample to ambient conditions should not exceed 10 seconds.

Once the soil has been transferred to the VOA vial, screw the cap back on and mark the sample ID on the label with a ballpoint pen. Do not use a pen that has high solvent concentrations in the ink.

Place the VOA vial inside a cooler containing either wet ice in sealed bags or gel ice.

Collect three VOA vial samples at each sampling location. The same syringe may be used to prepare all three vials. Duplicate samples require collecting three additional VOA vial samples. For dilution and percent moisture purposes, soil must also be collected in 2-ounce or greater glass jars with Teflon-lined lids at each sampling location. If other analyses are being conducted for the sampling location, then the percent moisture may be obtained from other sample containers, and one 2-ounce glass jar will be used for dilution purposes. The 2-ounce jar will be completely filled with zero headspace. If other analyses are not being conducted at the sampling location, then an additional sample must be collected in another 2-ounce glass jar for percent moisture.

Collect one equipment blank per laboratory or vendor shipment of syringes, as described in Procedure III-B, *Field QC Samples*, unless the syringes are certified clean (e.g., certificate of analysis or equivalent documentation) by the vendor.

Place samples in bubble wrap or other protective covering. Place custody seals on the covering. Custody seals or tape must not be placed directly on the sample vials, as this will interfere with the analytical instrumentation, final weight of the sample, and ultimate sample VOC concentration.

The following additional directions for VOC soil sample collection are taken from EPA SW-846 Method 5035A Appendix A8.0.

Collection of Samples for Analysis

After a fresh surface of the solid material is exposed to the atmosphere, the subsample collection process should be completed in the least amount of time in order to minimize the loss of VOCs due to volatilization. Removing a subsample from a material should be done with the least amount of disruption (disaggregation) as possible. Additionally, rough trimming of the sampling location's surface layers should be considered if the material may have already lost VOCs (been exposed for more than a couple of minutes) or if it might be contaminated by other waste, different soil strata, or vegetation. Removal of surface layers can be accomplished by scraping the surface using a clean spatula, scoop, knife, or shovel (ASTM 2005, Hewitt et al. 1999).

3.1 SUBSAMPLING OF COHESIVE GRANULAR BUT UNCEMENTED MATERIALS USING DEVICES DESIGNED TO OBTAIN A SAMPLE APPROPRIATE ANALYSIS

Collect subsamples of the appropriate size for analysis using a metal or rigid plastic coring tool. For example, coring tools for the purpose of transferring a subsample can be made from disposable plastic syringes by cutting off the tapered front end and removing the rubber cap from the plunger or can be purchased as either plastic or stainless-steel coring devices. These smaller coring devices help to maintain the sample structure during collection and transfer to the VOA vials, as do their larger counterparts used to retrieve subsurface materials. When inserting a clean coring tool into a fresh surface for sample collection, air should not be trapped behind the sample. If air is trapped, it could either pass through the sampled material causing VOCs to be lost or push the sample prematurely from the coring tool.

The commercially available EasyDraw Syringe, Powerstop Handle, and Terra Core sampler coring devices are designed to prevent headspace air above the sample contents. For greater ease in pushing into the solid matrix, sharpen the front edge of these tools. The optimum diameter of the coring tool depends on the following:

Size of the opening on the collection vial or bottle (tool should fit inside mouth)

Dimensions of the original sample, particle size of the solid materials (e.g., gravel-size particles would require larger samplers)

Volume of sample required for analysis

For example, when a 5-gram (g) subsample of soil is specified, only a single 3-cubic-centimeter (cm^3) volume of soil has to be collected (assuming the soil has density of 1.7 g/cm^3). Larger subsample masses or more subsample increments are preferred as the heterogeneity of the material increases. After an undisturbed sample has been obtained by pushing the barrel of the coring tool into a freshly exposed surface and then removing the filled corer, quickly wipe the exterior of the barrel with a clean disposable towel.

The next step varies depending on whether the coring device is used for sample storage and transfer or solely for transfer. If the coring tool is used as a storage container, cap the open end after ensuring that the sealing surfaces are cleaned. If the device is to be solely used for collection and not for storage, immediately extrude the sample into a VOA vial or bottle by gently pushing the plunger while tilting the VOA vial at an angle (to avoid splashing any deionized water). The volume of material collected should not cause excessive stress on the coring tool during intrusion into the material, or be so large that the sample easily falls apart during extrusion. Obtain and transfer samples rapidly (< 10 seconds) to reduce volatilization losses. If the vial or bottle contains ASTM reagent Type II water, hold it at an angle when extruding the sample into the container to minimize splashing. Just before capping, visually inspect the lip and threads of the sample vessel, and remove any foreign debris with a clean towel, allowing an airtight seal to form.

3.2 DEVICES THAT CAN BE USED FOR SUBSAMPLING A CEMENTED MATERIAL

The material requiring sampling may be so hard that even metal coring tools cannot penetrate it. Subsamples of such materials can be collected by fragmenting a larger portion of the material using a clean chisel to generate aggregate(s) of a size that can be placed into a VOA vial or bottle. When transferring the aggregate(s), precautions must be taken to prevent compromising the sealing surfaces and threads of the container. Losses of VOCs by using this procedure are dependent on the location of the contaminant relative to the surface of the material being sampled. Therefore, take caution in the interpretation of the data obtained from materials that fit this description. As a last resort, when this task cannot be performed on site, a large sample can be collected in a vapor-tight container and transported to the laboratory for subsampling. Collect, fragment, and add the sample to a container as quickly as possible.

3.3 DEVICES THAT CAN BE USED FOR SUBSAMPLING A NON-COHESIVE GRANULAR MATERIAL

As a last resort, gravel, or a mixture of gravel and fines that cannot be easily obtained or transferred using coring tools, can be quickly sampled using a stainless-steel spatula or scoop. If the collection

vial or bottle contains ASTM reagent Type II water, transfer samples with minimal splashing and without the spatula or scoop contacting the liquid contents. For some solids, a wide-bottom funnel or similar channeling device may be necessary to facilitate transfer to the container and prevent compromising the sealing surfaces of the container. Take caution when interpreting the data obtained from materials that fit this description. Loss of VOCs is likely due to the nature of the sampling method and the non-cohesive nature of the material, which exposes more surface area to the atmosphere than other types of samples. During the sampling process, non-cohesive materials also allow coarser materials to separate from fines, which can skew the concentration data if the different particle sizes, which have different surface areas, are not properly represented in the sample.

3.4 USE OF THE ENCORE SAMPLER (OR EQUIVALENT) FOR SAMPLE TRANSPORT AND STORAGE

The EnCore sampler is a sampling device that can be used as both a simultaneous coring tool for cohesive soils and a transport device to a support laboratory (field or off site). The EnCore sampler is intended to be a combined sampler-storage device for soils until a receiving laboratory can initiate either immediate VOC analysis, or preserve extruded soil aliquots for later VOC analysis. It is meant to be disposed of after use. The commercially available device is constructed of an inert composite polymer. It uses a coring/storage chamber to collect either a 5-gram or 25-gram sample of cohesive soils. It has a press-on cap with hermetically a vapor-tight seal and locking arm mechanism. It also has a vapor-tight plunger for the non-disruptive extrusion of the sample into an appropriate container for VOC analysis of soil.

An individual disposable EnCore sampler (or equivalent) is needed for each soil aliquot collected for vapor partitioning or ASTM reagent Type II water sample preparation. Upon soil sample collection, store the EnCore sampler is at 4 ± 2 degrees centigrade (°C) until laboratory receipt within 48 hours. Upon laboratory receipt, soil aliquots are extruded to appropriate tared and prepared VOA vials.

Validation data have been provided to support use of the EnCore sampler for VOC concentrations in soil between 5 and 10 parts per million, for two sandy soils, with a 2-day holding time at 4 ± 2°C. Preliminary data (Soroni et al. 2001) demonstrate an effective 2-day (48-hour) holding time at 4 ±2°C for three sandy soil types with VOC concentrations at 100 parts per billion (ppb) (benzene and toluene at 300 ppb), as well as an effective 1- or 2-week holding time at < -7°C (freezing temperature). Recent published work (EPA 2001) neither definitively supports nor shows the EnCore device to be ineffective for sample storage at these preservation temperatures. Soils stored in the EnCore device for 2 calendar days at 4 ± 2°C are subject to loss of benzene, toluene, ethylbenzene, and xylene (BTEX) compounds by biodegradation if the soil is an aerated, biologically active soil (e.g., garden soil) (Soroni et al. 1999), but this BTEX loss is eliminated for up to 48 hours under freezing conditions (Hewitt 1999). Further details on the EnCore sampler can be found in ASTM D4547-98 (ASTM 2003) or other publications.

Since Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) action levels for VOCs in soil are typically associated with EPA Region 9 preliminary remediation goals for residential exposure scenarios, it is recommended that if EnCore samplers are used, they be frozen on site prior to shipment to the laboratory or extruded into a 40-mL VOA vial before shipment.

4. Sample Shipping and Holding Times

Samples may be shipped either at 4 ± 2°C or frozen at –7°C. The primary difference between the two shipping temperatures is the allowable holding time of the sample between sample collection and sample analysis. Samples shipped at 4 ± 2°C must either be received and analyzed by the laboratory within 48 hours of sample collection or be received by the laboratory within 48 hours, frozen upon receipt, and analyzed within 14 days of sample collection. Samples shipped at –7°C and received/maintained by the laboratory in a frozen state must be analyzed within 14 days of sample collection.

If soil samples are to be field frozen, it is recommended to use shipping containers designed for transport of frozen goods (e.g., DHL Thermoboxes). These containers are capable of maintaining temperatures down to –20°C for 3 days. If such containers cannot be obtained, place the frozen samples in a cooler containing fresh, frozen gel packs or an ice and rock salt mixture, and ship the cooler using an overnight carrier. Dry ice may be used as a refrigerant for sample shipment, but must be coordinated with the overnight carrier in advance. The sample vials and caps must never be placed in direct contact with the dry ice since cracking may occur.

Soil or sediment samples contained in 2-ounce glass jars for dilution or percent moisture purposes may be shipped in standard coolers using conventional shipping protocols described in Procedure III-F, *Sample Handling, Storage, and Shipping*, if the sample appears to have a moisture content that might cause the sample to expand and the glass jar to break due to freezing. If soil samples contained in 2-ounce glass jars are shipped in this manner, then trip blanks must accompany them during shipment.

Reagent/trip blanks that contain the same volume of ASTM Type II water and sample label used in the sample VOA vials must be included in each shipment. The reagent/trip blanks will be packaged, shipped, and analyzed in the same manner as field samples. Reagent/trip blanks will be analyzed to evaluate cross-contamination during shipment and to identify potential reagent contamination issues.

5. Laboratory Receipt

Upon receipt by the analytical laboratory, the sample temperature must be measured and recorded. The laboratory should note whether the samples are frozen. The samples must be logged in and assigned an analysis date to ensure that samples are analyzed within the 14-day holding time.

Once the samples have been logged in, they are placed in a freezer at 0°C or colder until they are analyzed. Samples arriving in a non-frozen state (greater than 0°C) are to be frozen upon receipt or analyzed within 48 hours of sample collection. If the duration of sample shipment exceeds 48 hours, the non-frozen samples should be analyzed on the day of laboratory receipt.

The laboratory will prepare the samples for analysis as dictated by laboratory standard operating procedures and SW-846 Method 5035A, and analyzed by Method 8260B, 8021B, or 8015B (purgeable hydrocarbons), depending on the project objectives.

6. References

American Society for Testing and Materials (ASTM). 2003. *Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds*. D4547-03. West Conshohocken, PA.

———. 2005. *Standard Guide for Sampling Waste and Soils for Volatile Organic Compounds*. D4547-98. West Conshohocken, PA.

Environmental Protection Agency, United States (EPA). *Multi-Laboratory Study on the Effects of Temperature and Sample Container on Volatile Organic Compounds from Time of Sampling to Time of Analysis -Final Report.* Office of Emergency and Remedial Response. 24 April.

———. 2002. *Method 5035A Closed System Purge and Trap and Extraction for Volatile Organics in Soil and Waste Samples*, Draft Revision 1. Office of Solid Waste. July.

Hewitt, Alan. D. 1999. Frozen Storage of Soil Samples for VOC Analysis. *Environmental Testing & Analysis*, 8 (5), pp. 18–25, 46.

Hewitt, Alan. D. and K. F. Myers. 1999. *Sampling and On-Site Analytical Methods for Volatiles in Soil and Groundwater—Field Guidance Manual*; Special Report 99-16. Hanover, NH: U.S. Army Cold Regions Research and Engineering Laboratory. November.

Soroni, S. S. and J. F. Schaborn. 1999. *Performance of the Disposable EnCore Sampler for Storing Soil for Volatile Organic Analysis*. Proceedings of the 15th Annual Waste Testing and QA Symposium, EPA. Washington. pp. 129-134.

Soroni, S. S., J. F. Schaborn and J. F. Rovani. 2001. *Validation of a New Soil VOC Sampler: Performance of the En Core Sampler for Storage of Low VOC Concentrations and EPA Method 1311 Volatile Organic Analytes*. Topical Report WRI-01-R005; Laramie, WY: Western Research Institute.

Procedure III-B, *Field QC Samples.*

Procedure III-F, *Sample Handling, Storage, and Shipping.*

Equipment Decontamination

1. Purpose

This standard operating procedure describes methods of equipment decontamination for use during site activities by United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) personnel.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

None.

4. Responsibilities

The CTO Manager is responsible for identifying instances of non-compliance with this procedure and ensuring that decontamination activities comply with this procedure. The CTO Manager is responsible for ensuring that all personnel involved in equipment decontamination shall have the appropriate education, experience, and training to perform their assigned tasks as specified in Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

QA Manager or Technical Director is responsible for ensuring overall compliance with this procedure.

The Field Manager is responsible for ensuring that all field equipment is decontaminated according to this procedure.

Field personnel are responsible for the implementation of this procedure.

5. Procedures

Decontamination of equipment used in soil/sediment sampling, groundwater monitoring, well drilling and well development, as well as equipment used to sample groundwater, surface water, sediment, waste, wipe, asbestos, and unsaturated zone is necessary to prevent cross-contamination and to maintain the highest integrity possible in collected samples. Planning a decontamination program requires consideration of the following factors:

- The location where the decontamination procedures will be conducted
- The types of equipment requiring decontamination
- The frequency of equipment decontamination
- The cleaning technique and types of cleaning solutions appropriate to the contaminants of concern
- The method for containing the residual contaminants and wash water from the decontamination process
- The use of a quality control measure to determine the effectiveness of the decontamination procedure

The following subsection describes standards for decontamination, including the frequency of decontamination, cleaning solutions and techniques, containment of residual contaminants and cleaning solutions, and effectiveness.

5.1 DECONTAMINATION AREA

Select an appropriate location for the decontamination area at a site based on the ability to control access to the area, the ability to control residual material removed from equipment, the need to store clean equipment, and the ability to restrict access to the area being investigated. Locate the decontamination area an adequate distance away and upwind from potential contaminant sources to avoid contamination of clean equipment.

5.2 TYPES OF EQUIPMENT

Drilling equipment that must be decontaminated includes drill bits, auger sections, drill-string tools, drill rods, split barrel samplers, tremie pipes, clamps, hand tools, and steel cable. Decontamination of monitoring well development and groundwater sampling equipment includes submersible pumps, bailers, interface probes, water level meters, bladder pumps, airlift pumps, peristaltic pumps, and lysimeters. Other sampling equipment that requires decontamination includes, but is not limited to, hand trowels, hand augers, slide hammer samplers, shovels, stainless-steel spoons and bowls, soil sample liners and caps, wipe sampling templates, composite liquid waste samplers, and dippers. Equipment with a porous surface, such as rope, cloth hoses, and wooden blocks, cannot be thoroughly decontaminated and shall be properly disposed of after one use.

5.3 FREQUENCY OF EQUIPMENT DECONTAMINATION

Decontaminate down-hole drilling equipment and equipment used in monitoring well development and purging prior to initial use and between each borehole or well. Down-hole drilling equipment, however, may require more frequent cleaning to prevent cross-contamination between vertical zones within a single borehole. When drilling through a shallow contaminated zone and installing a surface casing to seal off the contaminated zone, decontaminate the drilling tools prior to drilling deeper. Initiate groundwater sampling by sampling groundwater from the monitoring well where the least contamination is suspected. Decontaminate groundwater, surface water, and soil sampling devices prior to initial use and between collection of each sample to prevent the possible introduction of contaminants into successive samples.

5.4 CLEANING SOLUTIONS AND TECHNIQUES

Decontamination can be accomplished using a variety of techniques and fluids. The preferred method of decontaminating major equipment, such as drill bits, augers, drill string, and pump drop-pipe, is steam cleaning. To steam clean, use a portable, high-pressure steam cleaner equipped with a pressure hose and fittings. For this method, thoroughly steam wash equipment, and rinse it with potable tap water to remove particulates and contaminants.

A rinse decontamination procedure is acceptable for equipment, such as bailers, water level meters, new and re-used soil sample liners, and hand tools. The decontamination procedure shall consist of the following: (1) wash with a non-phosphate detergent (alconox, liquinox, or other suitable detergent) and potable water solution; (2) rinse in a bath with potable water; (3) spray with laboratory-grade isopropyl alcohol; (4) rinse in a bath with deionized or distilled water; and (5) spray with deionized or distilled water. If possible, disassemble equipment prior to cleaning. Add a second wash at the beginning of the process if equipment is very soiled.

Decontaminating submersible pumps requires additional effort because internal surfaces become contaminated during usage. Decontaminate these pumps by washing and rinsing the outside surfaces using the procedure described for small equipment or by steam cleaning. Decontaminate the internal surfaces by recirculating fluids through the pump while it is operating. This recirculation may be done using a relatively long (typically 4 feet) large-diameter pipe (4-inch or greater) equipped with a bottom cap. Fill the pipe with the decontamination fluids, place the pump within the capped pipe, and operate the pump while recirculating the fluids back into the pipe. The decontamination sequence shall include: (1) detergent and potable water; (2) potable water rinse; (3) potable water rinse; and (4) deionized water rinse. Change the decontamination fluids after each decontamination cycle.

Solvents other than isopropyl alcohol may be used, depending upon the contaminants involved. For example, if polychlorinated biphenyls or chlorinated pesticides are contaminants of concern, hexane may be used as the decontamination solvent. However, if samples are also to be analyzed for volatile organics, hexane shall not be used. In addition, some decontamination solvents have health effects that must be considered. Decontamination water shall consist of distilled or deionized water. Steam-distilled water shall not be used in the decontamination process as this type of water usually contains elevated concentrations of metals. Decontamination solvents to be used during field activities will be specified in CTO work plan (WP).

Rinse equipment used for measuring field parameters, such as pH (indicates the hydrogen ion concentration – acidity or basicity), temperature, specific conductivity, and turbidity with deionized or distilled water after each measurement. Also wash new, unused soil sample liners and caps with a fresh detergent solution and rinse them with potable water followed by distilled or deionized water to remove any dirt or cutting oils that might be on them prior to use.

5.5 CONTAINMENT OF RESIDUAL CONTAMINANTS AND CLEANING SOLUTIONS

A decontamination program for equipment exposed to potentially hazardous materials requires a provision for catchment and disposal of the contaminated material, cleaning solution, and wash water.

When contaminated material and cleaning fluids must be contained from heavy equipment, such as drill rigs and support vehicles, the area must be properly floored, preferably with a concrete pad that slopes toward a sump pit. If a concrete pad is impractical, planking can be used to construct solid flooring that is then covered by a nonporous surface and sloped toward a collection sump. If the decontamination area lacks a collection sump, use plastic sheeting and blocks or other objects to create a bermed area for collection of equipment decontamination water. Situate items, such as auger flights, which can be placed on metal stands or other similar equipment, on this equipment during decontamination to prevent contact with fluids generated by previous equipment decontamination. Store clean equipment in a separate location to prevent recontamination. Collect decontamination fluids contained within the bermed area and store them in secured containers as described below.

Use wash buckets or tubs to catch fluids from the decontamination of lighter-weight drilling equipment and hand-held sampling devices. Collect the decontamination fluids and store them on site in secured containers, such as U.S. Department of Transportation-approved drums, until their disposition is determined by laboratory analytical results. Label containers in accordance with Procedure I-A-6, *IDW Management*.

5.6 EFFECTIVENESS OF DECONTAMINATION PROCEDURES

A decontamination program must incorporate quality control measures to determine the effectiveness of cleaning methods. Quality control measures typically include collection of equipment rinsate samples or wipe testing. Equipment rinsates consist of analyte-free water that has been poured over or through the sample collection equipment after its final decontamination rinse. Wipe testing is performed by wiping a cloth over the surface of the equipment after cleaning. Procedure III-B, *Field QC Samples (Water, Soil)* provides further descriptions of these samples and their required frequency of collection. These quality control measures provide "after-the fact" information that may be useful in determining whether or not cleaning methods were effective in removing the contaminants of concern.

6. Records

Describe the decontamination process in the field logbook.

7. Health and Safety

It is the responsibility of the Site Safety Office (SSO) to set up the site zones (i.e., exclusion, transition, and clean) and decontamination areas. Generally the decontamination area is located within the transition zone, upwind of intrusive activities, and serves as the washing area for both personnel and equipment to minimize the spread of contamination into the clean zone. For equipment, a series of buckets are set up on a visqueen-lined bermed area. Separate spray bottles containing laboratory-grade isopropyl alcohol (or alternative cleaning solvent as described in the CTO WP) and distilled water are used for final rinsing of equipment. Depending on the nature of the hazards and the site location, decontamination of heavy equipment, such as augers, pump drop pipe, and vehicles, may be accomplished using a variety of techniques.

Personnel responsible for equipment decontamination must adhere to the site-specific health and safety plan (HSP) and must wear the personal protective equipment (PPE) specified in the site-specific HSP. Generally this includes, at a minimum, Tyvek coveralls, steel-toed boots with boot

covers or steel-toed rubber boots, safety glasses, American National Standards Institute-standard hard hats, and hearing protection (if heavy equipment is in operation). Air monitoring by the SSO may result in an upgrade to the use of respirators and cartridges in the decontamination area; therefore, this equipment must be available on site. If safe alternatives are not achievable, discontinue site activities immediately.

In addition to the aforementioned precautions, employ the following safe work practices:

Chemical Hazards Associated With Equipment Decontamination

1. Avoid skin contact with and/or incidental ingestion of decontamination solutions and water.
2. Utilize PPE as specified in the site-specific HSP to maximize splash protection.
3. Refer to material safety data sheets, safety personnel, and/or consult sampling personnel regarding appropriate safety measures (i.e., handling, PPE including skin and respiratory).
4. Take the necessary precautions when handling detergents and reagents.

Physical Hazards Associated With Equipment Decontamination

1. To avoid possible back strain, it is recommended to raise the decontamination area 1 to 2 feet above ground level.
2. To avoid heat stress, over exertion, and exhaustion, it is recommended to rotate equipment decontamination among all site personnel.
3. Take necessary precautions when handling field sampling equipment.

8. References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

Department of the Navy (DON). 2002. *Navy Environmental and Natural Resources Program Manual*. OPNAV Instruction 5090.1B Change 3. October.

Procedure I-A-6, *IDW Management.*

Procedure III-B, *Field QC Samples (Water, Soil).*

9. Attachments

None.

Logbooks

1. Purpose

This standard operating procedure describes the activities and responsibilities pertaining to the identification, use, and control of logbooks and associated field data records for use by United States Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) personnel.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan Appendix A. Section 1.4 *Field Documentation SOPs* (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

3.1 LOGBOOK

A logbook is a bound field notebook with consecutively numbered, water-repellent pages that is clearly identified with the name of the relevant activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries.

3.2 DATA FORM

A data form is a predetermined format utilized for recording field data that may become, by reference, a part of the logbook (e.g., soil boring logs, trenching logs, surface soil sampling logs, groundwater sample logs, and well construction logs are data forms).

4. Responsibilities

The CTO Manager or delegate is responsible for determining which team members shall record information in field logbooks and for obtaining and maintaining control of the required logbooks. The CTO Manager shall review the field logbook on at least a monthly basis. The CTO Manager or designee is responsible for reviewing logbook entries to determine compliance with this procedure and to ensure that the entries meet the project requirements.

A knowledgeable individual such as the Field Manager, CTO Manager, or QC Supervisor shall perform a technical review of each logbook at a frequency commensurate with the level of activity (weekly is suggested, or, at a minimum, monthly). Document these reviews by the dated signature of the reviewer on the last page or page immediately following the material reviewed.

The Field Manager is responsible for ensuring that all project field staff follow these procedures and that the logbook is completed properly and daily. The Field Manager is also responsible for submitting copies to the CTO Manager, who is responsible for filing them and submitting a copy to the Navy (if required by the CTO Statement of Work).

The logbook user is responsible for recording pertinent data into the logbook to satisfy project requirements and for attesting to the accuracy of the entries by dated signature. The logbook user is also responsible for safeguarding the logbook while having custody of it.

Field personnel are responsible for the implementation of this procedure.

All NAVFAC Pacific ER Program field personnel are responsible for complying with Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

5. Procedure

The field logbook serves as the primary record of field activities. Make entries chronologically and in sufficient detail to allow the writer or a knowledgeable reviewer to reconstruct the applicable events. Store the logbook in a clean location and use it only when outer gloves used for personal protective equipment (PPE) have been removed.

Individual data forms may be generated to provide systematic data collection documentation. Entries on these forms shall meet the same requirements as entries in the logbook and shall be referenced in the applicable logbook entry. Individual data forms shall reference the applicable logbook and page number. At a minimum, include names of all samples collected in the logbook even if they are recorded elsewhere.

Enter field descriptions and observations into the logbook, as described in Attachment III-D-1, using indelible black ink.

Typical information to be entered includes the following:

- Dates (month/day/year) and times (military) of all onsite activities and entries made in logbooks/forms
- Site name, and description
- Site location by longitude and latitude, if known
- Weather conditions, including temperature and relative humidity
- Fieldwork documentation, including site entry and exit times
- Descriptions of, and rationale for, approved deviations from the work plan (WP) or field sampling plan
- Field instrumentation readings
- Names, job functions, and organizational affiliations of personnel on-site
- Photograph references
- Site sketches and diagrams made on-site

- Identification and description of sample morphology, collection locations and sample numbers as described in Procedure I-A-8, *Sample Naming*
- Sample collection information, including dates (month/day/year) and times (military) of sample collections, sample collection methods and devices, station location numbers, sample collection depths/heights, sample preservation information, sample pH (if applicable), analysis requested (analytical groups), etc., as well as chain-of-custody (COC) information such as sample identification numbers cross-referenced to COC sample numbers
- Sample naming convention
- Field quality control (QC) sample information
- Site observations, field descriptions, equipment used, and field activities accomplished to reconstruct field operations
- Meeting information
- Important times and dates of telephone conversations, correspondence, or deliverables
- Field calculations
- PPE level
- Calibration records
- Contractor and subcontractor information (address, names of personnel, job functions, organizational affiliations, contract number, contract name, and work assignment number)
- Equipment decontamination procedures and effectiveness
- Laboratories receiving samples and shipping information, such as carrier, shipment time, number of sample containers shipped, and analyses requested,
- User signatures

The logbook shall reference data maintained in other logs, forms, etc. Correct entry errors by drawing a single line through the incorrect entry, then initialing and dating this change. Enter an explanation for the correction if the correction is more than for a mistake.

At least at the end of each day, the person making the entry shall sign or initial each entry or group of entries.

Enter logbook page numbers on each page to facilitate identification of photocopies.

If a person's initials are used for identification, or if uncommon acronyms are used, identify these on a page at the beginning of the logbook.

At least weekly and preferably daily, the preparer shall photocopy and retain the pages completed during that session for backup. This will prevent loss of a large amount of information if the logbook is lost.

6. Records

Retain the field logbook as a permanent project record. If a particular CTO requires submittal of photocopies of logbooks, perform this as required.

7. Health and Safety

In order to keep the logbook clean, store it in a clean location and use it only when outer gloves used for PPE have been removed.

8. References

Department of Defense, United States (DoD). 2005. *Uniform Federal Policy for Quality Assurance Project Plans, Part 1: UFP-QAPP Manual*. Final Version 1. DoD: DTIC ADA 427785, EPA-505-B-04-900A. In conjunction with the U. S. Environmental Protection Agency and the Department of Energy. Washington: Intergovernmental Data Quality Task Force. March. On-line updates available at: http://www.epa.gov/fedfac/pdf/ufp_qapp_v1_0305.pdf.

Department of the Navy (DON). 2002. *Navy Environmental and Natural Resources Program Manual*. OPNAV Instruction 5090.1B Change 3. October.

Procedure I-A-8, *Sample Naming.*

9. Attachments

Attachment III-D-1: Description of Logbook Entries

Attachment III-D-1
Description of Logbook Entries

Logbook entries shall be consistent with Section A.1.4 *Field Documentation SOPs* of the UFP-QAPP Manual (DoD 2005) and contain the following information, as applicable, for each activity recorded. Some of these details may be entered on data forms, as described previously.

Name of Activity	For example, Asbestos Bulk Sampling, Charcoal Canister Sampling, Aquifer Testing.
Task Team Members and Equipment	Name all members on the field team involved in the specified activity. List equipment used by serial number or other unique identification, including calibration information.
Activity Location	Indicate location of sampling area as indicated in the field sampling plan.
Weather	Indicate general weather and precipitation conditions.
Level of PPE	Record the level of PPE (e.g., Level D).
Methods	Indicate method or procedure number employed for the activity.
Sample Numbers	Indicate the unique numbers associated with the physical samples. Identify QC samples.
Sample Type and Volume	Indicate the medium, container type, preservative, and the volume for each sample.
Time and Date	Record the time and date when the activity was performed (e.g., 0830/08/OCT/89). Use the 24-hour clock for recording the time and two digits for recording the day of the month and the year.
Analyses	Indicate the appropriate code for analyses to be performed on each sample, as specified in the WP.
Field Measurements	Indicate measurements and field instrument readings taken during the activity.
Chain of Custody and Distribution	Indicate chain-of-custody for each sample collected and indicate to whom the samples are transferred and the destination.
References	If appropriate, indicate references to other logs or forms, drawings, or photographs employed in the activity.

Narrative (including time and location)	Create a factual, chronological record of the team's activities throughout the day including the time and location of each activity. Include descriptions of general problems encountered and their resolution. Provide the names and affiliations of non-field team personnel who visit the site, request changes in activity, impact the work schedule, request information, or observe team activities. Record any visual or other observations relevant to the activity, the contamination source, or the sample itself. It should be emphasized that logbook entries are for recording data and chronologies of events. The logbook author must include observations and descriptive notations, taking care to be objective and recording no opinions or subjective comments unless appropriate.
Recorded by	Include the signature of the individual responsible for the entries contained in the logbook and referenced forms.
Checked by	Include the signature of the individual who performs the review of the completed entries.

Record Keeping, Sample Labeling, and Chain-Of-Custody Procedures

1. Purpose

The purpose of this standard operating procedure is to establish standard protocols for all United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) field personnel for use in maintaining field and sampling activity records, writing sample logs, labeling samples, ensuring that proper sample custody procedures are utilized, and completing chain-of-custody/analytical request forms.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

3.1 LOGBOOK

A logbook is a bound field notebook with consecutively numbered, water-repellent pages that is clearly identified with the name of the relevant activity, the person responsible for maintenance of the logbook, and the beginning and ending dates of the entries.

3.2 CHAIN-OF-CUSTODY

Chain-of-custody (COC) is documentation of the process of custody control. Custody control includes possession of a sample from the time of its collection in the field to its receipt by the analytical laboratory, and through analysis and storage prior to disposal.

4. Responsibilities

The CTO Manager is responsible for determining which team members shall record information in the field logbook and for checking sample logbooks and COC forms to ensure compliance with these procedures. The CTO Manager shall review COC forms on a monthly basis at a minimum.

The CTO Manager and QA Manager or Technical Director are responsible for evaluating project compliance with the Project Procedures Manual.

QA Manager or Technical Director is responsible for ensuring overall compliance with this procedure.

The Laboratory Project Manager or Sample Control Department Manager is responsible for reporting any sample documentation or COC problems to the CTO Manager or CTO Laboratory Coordinator within 24 hours of sample receipt.

The Field Manager is responsible for ensuring that all field personnel follow these procedures. The CTO Laboratory Coordinator is responsible for verifying that the COC/analytical request forms have been completed properly and match the sampling and analytical plan. The CTO Manager or CTO Laboratory Coordinator is responsible for notifying the laboratory, data managers, and data validators in writing if analytical request changes are required as a corrective action. These small changes are different from change orders, which involve changes to the scope of the subcontract with the laboratory and must be made in accordance with a respective contract (e.g., Comprehensive Long-Term Environmental Action Navy, remedial action contract)

NAVFAC Pacific ER Program field personnel are responsible for following these procedures while conducting sampling activities. Field personnel are responsible for recording pertinent data into the logbook to satisfy project requirements and for attesting to the accuracy of the entries by dated signature. All NAVFAC Pacific ER Program field personnel are responsible for complying with Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

5. Procedures

This procedure provides standards for documenting field activities, labeling the samples, documenting sample custody, and completing COC/analytical request forms. The standards presented in this section shall be followed to ensure that samples collected are maintained for their intended purpose and that the conditions encountered during field activities are documented.

5.1 RECORD KEEPING

The field logbook serves as the primary record of field activities. Make entries chronologically and in sufficient detail to allow the writer or a knowledgeable reviewer to reconstruct each day's events. Field logs such as soil boring logs and ground-water sampling logs will also be used. These procedures are described in Procedure III-D, *Logbooks*.

5.2 SAMPLE LABELING

Affix a sample label with adhesive backing to each individual sample container. Place clear tape over each label (preferably prior to sampling) to prevent the labels from tearing off, falling off, being smeared, and to prevent loss of information on the label. Record the following information with a waterproof marker on each label:

- Project name or number (optional)
- COC sample number
- Date and time of collection

- Sampler's initials
- Matrix (optional)
- Sample preservatives (if applicable)
- Analysis to be performed on sample (This shall be identified by the method number or name identified in the subcontract with the laboratory)

These labels may be obtained from the analytical laboratory or printed from a computer file onto adhesive labels.

5.3 CUSTODY PROCEDURES

For samples intended for chemical analysis, sample custody procedures shall be followed through collection, transfer, analysis, and disposal to ensure that the integrity of the samples is maintained. Maintain custody of samples in accordance with the U.S. Environmental Protection Agency (EPA) COC guidelines prescribed in EPA *NEIC Policies and Procedures*, National Enforcement Investigations Center, Denver, Colorado, revised May 1986; EPA *RCRA Ground Water Monitoring Technical Enforcement Guidance Document* (TEGD), *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (EPA OSWER Directive 9355 3-01), Appendix 2 of the *Technical Guidance Manual for Solid Waste Water Quality Assessment Test (SWAT) Proposals and Reports*, and *Test Methods for Evaluating Solid Waste* (EPA SW-846). A description of sample custody procedures is provided below.

5.3.1 Sample Collection Custody Procedures

According to the EPA guidelines, a sample is considered to be in custody if one of the following conditions is met:

- It is in one’s actual physical possession or view
- It is in one’s physical possession and has not been tampered with (i.e., it is under lock or official seal)
- It is retained in a secured area with restricted access
- It is placed in a container and secured with an official seal such that the sample cannot be reached without breaking the seal

Place custody seals on sample containers immediately after sample collection and on shipping coolers if the cooler is to be removed from the sampler's custody. Place custody seals in such a manner that they must be broken to open the containers or coolers. Label the custody seals with the following information:

- Sampler's name or initials
- Date and time that the sample/cooler was sealed

These seals are designed to enable detection of sample tampering. An example of a custody seal is shown in Attachment III-E-1.

Field personnel shall also log individual samples onto COC forms (carbon copy or computer generated) when a sample is collected. These forms may also serve as the request for analyses. Procedures for completing these forms are discussed in Section 5.4, indicating sample identification number, matrix, date and time of collection, number of containers, analytical methods to be performed on the sample, and preservatives added (if any). The samplers will also sign the COC form signifying that they were the personnel who collected the samples. The COC form shall accompany the samples from the field to the laboratory. When a cooler is ready for shipment to the analytical laboratory, the person delivering the samples for transport will sign and indicate the date and time on the accompanying COC form. One copy of the COC form will be retained by the sampler and the remaining copies of the COC form shall be placed inside a self-sealing bag and taped to the inside of the cooler. Each cooler must be associated with a unique COC form. Whenever a transfer of custody takes place, both parties shall sign and date the accompanying carbon copy COC forms, and the individual relinquishing the samples shall retain a copy of each form. One exception is when the samples are shipped; the delivery service personnel will not sign or receive a copy because they do not open the coolers. The laboratory shall attach copies of the completed COC forms to the reports containing the results of the analytical tests. An example COC form is provided in Attachment III-E-2.

5.3.2 Laboratory Custody Procedures

The following custody procedures are to be followed by an independent laboratory receiving samples for chemical analysis; the procedures in their Naval Facilities Engineering Service Center-evaluated Laboratory Quality Assurance Plan must follow these same procedures. A designated sample custodian shall take custody of all samples upon their arrival at the analytical laboratory. The custodian shall inspect all sample labels and COC forms to ensure that the information is consistent, and that each is properly completed. The custodian will also measure the temperature of the temperature blank in the coolers upon arrival using either a National Institute for Standards and Technology calibrated thermometer or an infra-red temperature gun. The custodian shall note the condition of the samples including:

- If the samples show signs of damage or tampering
- If the containers are broken or leaking
- If headspace is present in sample vials
- Proper preservation of samples (made by pH measurement, except volatile organic compounds (VOCs) and purgeable total petroleum hydrocarbons (TPH) and temperature). The pH of VOC and purgeable TPH samples will be checked by the laboratory analyst after the sample aliquot has been removed from the vial for analysis.
- If any sample holding times have been exceeded

All of the above information shall be documented on a sample receipt sheet by the custodian.

Discrepancies or improper preservation shall be noted by the laboratory as an out-of-control event and shall be documented on an out-of-control form with corrective action taken. The out-of-control form shall be signed and dated by the sample control custodian and any other persons responsible for corrective action. An example of an out-of-control form is included as Attachment III-E-4.

The custodian shall then assign a unique laboratory number to each sample and distribute the samples to secured storage areas maintained at 4 degrees Celsius (soil samples for VOC analysis are to be stored in a frozen state until analysis). The unique laboratory number for each sample, the COC sample number, the client name, date and time received, analysis due date, and storage shall also be manually logged onto a sample receipt record and later entered into the laboratory's computerized data management system. The custodian shall sign the shipping bill and maintain a copy.

Laboratory personnel shall be responsible for the care and custody of samples from the time of their receipt at the laboratory through their exhaustion or disposal. Samples should be logged in and out on internal laboratory COC forms each time they are removed from storage for extraction or analysis.

5.4 COMPLETING COC/ANALYTICAL REQUEST FORMS

COC form/analytical request form completion procedures are crucial in properly transferring the custody and responsibility of samples from field personnel to the laboratory. This form is important for accurately and concisely requesting analyses for each sample; it is essentially a release order from the analysis subcontract.

Attachment III-E-2 is an example of a generic COC/analytical request form that may be used by field personnel. Multiple copies may be tailored to each project so that much of the information described below need not be handwritten each time. Attachment III-E-3 is an example of a completed site-specific COC/analytical request form, with box numbers identified and discussed in text below.

Box 1 **Project Manager:** This name shall be the name that will appear on the report. Do not write the name of the Project Coordinator or point of contact for the project instead of the CTO manager.

Project Name: Write the project name as it is to appear on the report.

Project Number: Write the project number as it is to appear on the report. It shall include the project number and task number. Also include the laboratory subcontract number.

Box 2 **Bill to:** List the name and address of the person/company to bill only if it is not in the subcontract with the laboratory.

Box 3 **Sample Disposal Instructions:** These instructions will be stated in the Master Service Agreement or each CTO statement of work with each laboratory.

Shipment Method: State the method of shipment (e.g., hand carry; air courier via FED EX, AIR BORNE or DHL).

Comment: This area shall be used by the field team to communicate observations, potential hazards, or limitations that may have occurred in the field or additional information regarding analysis (e.g., a specific metals list, samples expected to contain high analyte concentrations).

Box 4 **Cooler Number:** This will be written on the inside or outside of the cooler and shall be included on the COC. Some laboratories attach this number to the trip blank identification, which helps track volatile organic analysis samples. If a number is not on the cooler, field personnel shall assign a number, write it on the cooler, and write it on the COC.

QC Level: Enter the reporting/QC requirements (e.g., Full Data Package, Summary Data Package).

Turn around time (TAT): TAT will be determined by a sample delivery group (SDG), which may be formed over a 14-day period, not to exceed 20 samples. Once the SDG has been completed, standard TAT is 21 calendar days from receipt of the last sample in the SDG. Entering NORMAL or STANDARD in this field will be acceptable. If quicker TAT is required, it shall be in the subcontract with the laboratory and reiterated on each COC to remind the laboratory.

Box 5 **Type of containers:** Write the type of container used (e.g., 1 liter glass amber, for a given parameter in that column).

Preservatives: Field personnel must indicate on the COC the correct preservative used for the analysis requested. Indicate the pH of the sample (if tested) in case there are buffering conditions found in the sample matrix.

Box 6 **COC sample number:** This is typically a five-character alpha-numeric identifier used by the contractor to identify samples. The use of this identifier is important since the labs are restricted to the number of characters they are able to use. See Procedure I-A-8, *Sample Naming*.

Description (sample identification): This name will be determined by the location and description of the sample, as described in Procedure I-A-8, *Sample Naming*. This sample identification should not be submitted to the laboratory, but should be left blank. If a computer COC version is used, the sample identification can be input, but printed with this block black. A cross-referenced list of COC Sample Number and sample identification must be maintained separately.

Date Collected: Record the collection date in order to track the holding time of the sample. Note: For trip blanks, record the date it was placed in company with samples.

Time Collected: When collecting samples, record the time the sample is first collected. Use of the 24-hour military clock will avoid a.m. or p.m. designations (e.g., 1815 instead of 6:15 p.m.). Record local time; the laboratory is responsible for calculating holding times to local time.

Lab Identification: This is for laboratory use only.

Box 7 **Matrix and QC:** Identify the matrix (e.g., water, soil, air, tissue, fresh water sediment, marine sediment, or product). If a sample is expected to contain high

analyte concentrations (e.g., a tank bottom sludge or distinct product layer), notify the laboratory in the comment section. Mark an "X" for the sample(s) that have extra volume for laboratory QC matrix spike/matrix spike duplicate (MS/MSD) purposes. The sample provided for MS/MSD purposes is usually a field duplicate.

Box 8 **Analytical Parameters:** Enter the parameter by descriptor and the method number desired (e.g. BTEX 8260B, PAHs 8270C, etc). Whenever practicable, list the parameters as they appear in the laboratory subcontract to maintain consistency and avoid confusion.

If the COC does not have a specific box for number of sample containers, use the boxes below the analytical parameter, to indicate the number of containers collected for each parameter.

Box 9 **Sampler's Signature:** The person who collected samples must sign here.

Relinquished By: The person who turned over the custody of the samples to a second party other than an express mail carrier, such as FEDEX, DHL or Air Borne Express, must sign here.

Received By: Typically, a representative of the receiving laboratory signs here. Or, a field crew member who delivered the samples in person from the field to the laboratory might sign here. A courier, such as Federal Express or DHL, does not sign here because they do not open the coolers. It must also be used by the prime contracting laboratory when samples are to be sent to a subcontractor.

Relinquished By: In the case of subcontracting, the primary laboratory will sign the Relinquished By space and fill out an additional COC to accompany the samples being subcontracted.

Received By (Laboratory): This space is for the final destination (e.g., at a subcontracted laboratory).

Box 10 **Lab Number and Questions:** This box is to be filled in by the laboratory only.

Box 11 **Control Number:** This number is the "COC" followed by the first contractor identification number in that cooler, or contained on that COC. This control number must be unique (i.e., never used twice). Record the date the COC is completed. It should be the same date the samples are collected.

Box 12 **Total No. of Containers/row:** Sum the number of containers in that row.

Box 13 **Total No. of Containers/column:** Sum the number of containers in that column. Because COC forms contain different formats depending on who produced the form, not all of the information listed in items 1 to 13 may be recorded; however, as much of this information as possible shall be included.

COC forms tailored to each CTO can be drafted and printed onto multi-ply forms. This eliminates the need to rewrite the analytical methods column headers each time. It also eliminates the need to write the project manager, name, and number; QC Level; TAT; and the same general comments each time.

Complete one COC form per cooler. Whenever possible, place all volatile organic analyte vials into one cooler in order to reduce the number of trip blanks. Complete all sections and be sure to sign and date the COC form. One copy of the COC form must remain with the field personnel.

6. Records

The COC/analytical request form shall be faxed approximately daily to the CTO Laboratory Coordinator for verification of accuracy. Following the completion of sampling activities, the sample logbook and COC forms will be transmitted to the CTO Manager for storage in project files. The data validators shall receive a copy also. The original COC/analytical request form shall be submitted by the laboratory along with the data delivered. Any changes to the analytical requests that are required shall be made in writing to the laboratory. A copy of this written change shall be sent to the data validators and placed in the project files. The reason for the change shall be included in the project files so that recurring problems can be easily identified.

7. Health and Safety

Not applicable.

8. References

Department of the Navy (DON). 2002. *Navy Environmental and Natural Resources Program Manual*. OPNAV Instruction 5090.1B Change 3. October.

Environmental Protection Agency, United States (EPA). 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA.* Interim Final. EPA/540/G-89/004. Office of Emergency and Remedial Response. October.

———. 1992. *RCRA Groundwater Monitoring Draft Technical Guidance*. EPA/530/R-93/001. Office of Solid Waste. November.

———. 1997. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, SW-846.* 3rd ed., Final Update IIIA. Office of Solid Waste.

Water Resources Control Board, State of California. 1988. *Technical Guidance Manual for Solid Waste Water Quality Assessment Test (SWAT) Proposals and Reports*. August.

Procedure I-A-8, *Sample Naming.*

Procedure III-D, *Logbooks.*

9. Attachments

Attachment III-E-1, Chain-of-Custody Seal

Attachment III-E-2, Generic Chain-of-Custody/Analytical Request Form

Attachment III-E-3, Sample Completed Chain-of-Custody

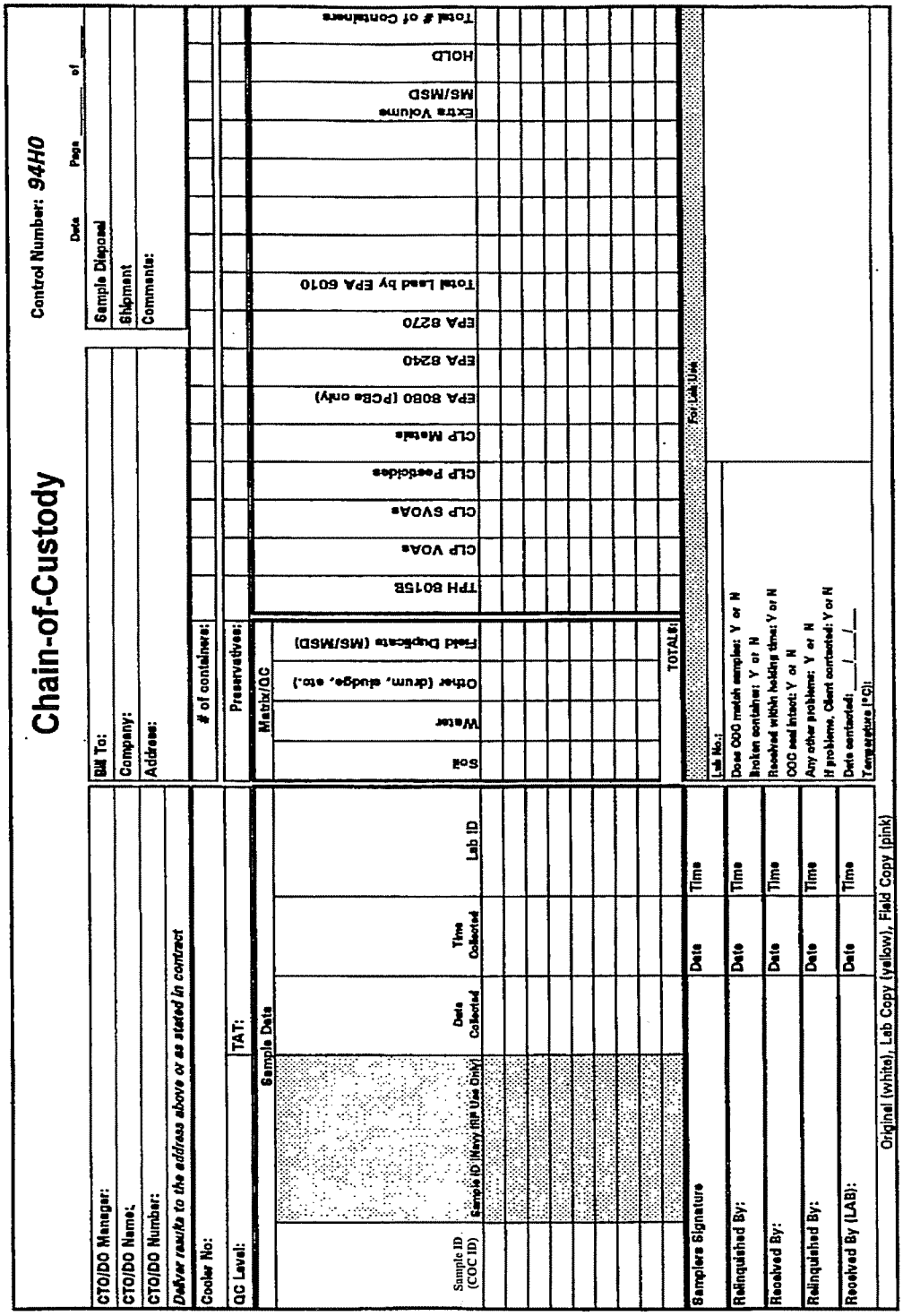
Attachment III-E-4, Sample Out-of-Control Form

Attachment III-E-1
Chain-of-Custody Seal

CHAIN-OF-CUSTODY SEAL

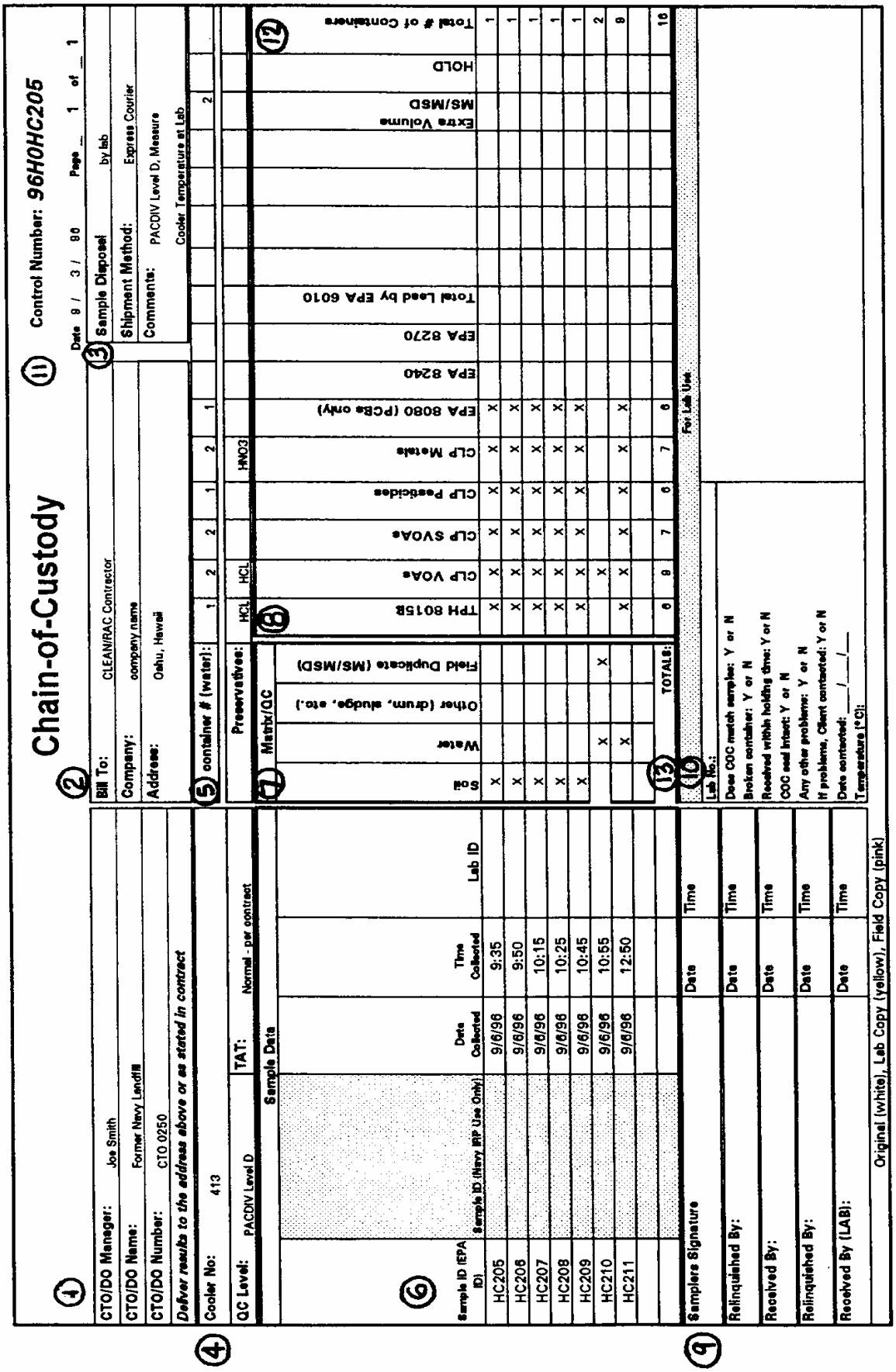
[LABORATORY]	SAMPLE NO.	DATE	SEAL BROKEN BY
	SIGNATURE		DATE
	PRINT NAME AND TITLE *(Inspector, Analyst or Technician*		

Attachment III-E-2
Generic Chain-of-Custody/Analytical Request Form



Generic Chain-of-Custody/Analytical Request Form

Attachment III-E-3
Sample Completed Chain-of-Custody


Chain-of-Custody
Control Number: 96H0HC205
CTO/DO Manager: Joe Smith
CTO/DO Name: Former Navy Landfill
CTO/DO Number: CTO 0250
Deliver results to the address above or as stated in contract
Cooler No: 413
QC Level: PACOIV Level D
TAT: Normal - per contract
Bill To: CLEAN/RAC Contractor
Company: company name
Address: Oahu, Hawaii
Sample Disposal by lab
Shipment Method: Express Courier
Comments: PACOIV Level D, Measure
Cooler Temperature at Lab
container # (water):
Preservatives:
Matrix/QC
Sample Data
Sample ID (EPA ID)
Sample ID (Navy IRP Use Only)
Date Collected
Time Collected
Lab ID
Soil
Water
Other (drum, sludge, etc.)
Field Duplicate (MS/MSD)
TPH 8015B
CLP VOAs
CLP SVOAs
CLP Pesticides
CLP Metals
EPA 8080 (PCBs only)
EPA 8240
EPA 8270
Total Lead by EPA 6010
Extra Volume MS/MSD
HOLD
Total # of Containers
HC205 9/6/96 9:35
HC206 9/6/96 9:50
HC207 9/6/96 10:15
HC208 9/6/96 10:25
HC209 9/6/96 10:45
HC210 9/6/96 10:55
HC211 9/6/96 12:50
TOTALS:
For Lab Use
Lab No.:
Does COC match samples: Y or N
Broken container: Y or N
Received within holding time: Y or N
COC seal intact: Y or N
Any other problems: Y or N
If problems, Client contacted: Y or N
Date contacted: ___/___/___
Temperature °C:
Samplers Signature
Relinquished By:
Received By:
Relinquished By:
Received By (LAB):
Date
Time
Original (white), Lab Copy (yellow), Field Copy (pink)

Attachment III-E-4
Sample Out-of-Control Form

OUT OF CONTROL FORM	Status	Date	Initial
	Noted OOC		
	Submit for CA*		
	Resubmit for CA*		
	Completed		

Date Recognized:	By:
Dated Occurred:	Matrix
Parameter (Test Code):	Method:
Analyst:	Supervisor:

Samples Affected (List by Accession AND Sample No.)

1. Type of Event (Check all that apply)		2. Corrective Action (CA)* (Check all that apply)	
	Calibration Corr. Coefficient <0.995		Repeat calibration
	%RSD>20%		Made new standards
	Blank >MDL		Reran analysis
	Does not meet criteria:		Sample(s) redigested and rerun
	Spike		Sample(s) reextracted and rerun
	Duplicate		Recalculated
	LCS		Cleaned system
	Calibration Verification		Ran standard additions
	Standard Additions		Notified
	MS/MSD		Other (please explain)
	BS/BSD		
	Surrogate Recovery		
	Calculations Error		
	Holding Times Missed		

☐ Other (Please explain	Comments:

3. Results of Corrective Action
☐ Return to Control (indicated with)
☐ Corrective Actions Not Successful - DATA IS TO BE FLAGGED with _____.

Analyst:	Date:
Supervisor:	Date:
QA Department:	Date:

Sample Handling, Storage, and Shipping

1. Purpose

This standard operating procedure sets forth the methods for use by for use by United States (U.S.) Navy Environmental Restoration (ER) Program, Naval Facilities Engineering Command, Pacific (NAVFAC Pacific) personnel engaged in handling, storing, and transporting samples.

2. Scope

This procedure applies to all Navy ER projects performed in the NAVFAC Pacific Area of Responsibility.

This procedure shall serve as management-approved professional guidance for the ER Program and is consistent with protocol in the Uniform Federal Policy-Quality Assurance Project Plan (DoD 2005). As professional guidance for specific activities, this procedure is not intended to obviate the need for professional judgment during unforeseen circumstances. Deviations from this procedure while planning or executing planned activities must be approved by both the Contract Task Order (CTO) Manager and the Quality Assurance (QA) Manager or Technical Director, and documented.

3. Definitions

None.

4. Responsibilities

The CTO Manager and the Laboratory Project Manager are responsible for identifying instances of non-compliance with this procedure and ensuring that future sample transport activities are in compliance with this procedure.

The Field Manager is responsible for ensuring that all samples are shipped according to this procedure.

Field personnel are responsible for the implementation of this procedure.

The QA Manager or Technical Director is responsible for ensuring that sample handling, storage, and transport activities conducted during all CTOs are in compliance with this procedure.

All field personnel are responsible for complying with Chief of Naval Operations Instruction 5090.1b Section 25-5.8 Specific Training Requirements (DON 2002).

5. Procedures

5.1 HANDLING AND STORAGE

Immediately following collection, label all samples according to Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*. The lids of the containers shall not be sealed with duct tape, but may be covered with custody seals or placed directly into self-sealing bags. Place

the sample containers in an insulated cooler with frozen gel packs (e.g., "blue ice") or ice in double, sealed self-sealing bags. Samples should occupy the lower portion of the cooler, while the ice should occupy the upper portion. Place Styrofoam pads on the bottom and top (and sides, if necessary) of the inside of the cooler. Place an absorbent material (e.g., proper absorbent cloth material) on the bottom of the cooler to contain liquids in case of spillage. Fill all empty space between sample containers with Styrofoam "peanuts" or other appropriate material. Prior to shipping, wrap glass sample containers on the sides, tops, and bottoms with bubble wrap or other appropriate padding and/or surround them in Styrofoam to prevent breakage during transport. Pack all glass containers for water samples in an upright position, never stacked or on their sides. Prior to shipment, replace the ice or cold packs in the coolers so that samples will be maintained as close to 4 degrees Celsius (°C) as possible from the time of collection through transport to the analytical laboratory. Ship samples within 24 hours or on a schedule allowing the laboratory to meet holding times for analyses. The procedures for maintaining sample temperatures at 4°C pertain to all field samples.

5.2 SHIPPING

Follow all appropriate U.S. Department of Transportation regulations (e.g., 49 Code of Federal Regulations [C.F.R.], Parts 171-179) for shipment of air, soil, water, and other samples. Elements of these procedures are summarized below.

In Hawaii, soil sample shipments are typically brought to the courier at the airport where the courier contacts a U.S. Department of Agriculture (USDA) representative to make an inspection. Alternatively, the contractor may enter into an agreement with the USDA to ship soil samples. In this way, the USDA does not need to inspect each soil sample shipment. The USDA does not need to inspect water sample shipments. Place custody seals on each container (see Section 5.1, Handling and Storage) to ensure proper chain-of-custody control in the event coolers are opened for inspection.

In Guam, the courier picks up shipments at each site provided that arrangements have been made regarding pickup time and location. Alternatively, shipments can be delivered directly to the courier at the airport. USDA inspections occur outside of Guam.

5.2.1 Hazardous Materials Shipment

Field personnel must state whether any sample is suspected to be a hazardous material. A sample should be assumed to be hazardous unless enough evidence exists to indicate it is non-hazardous. If not suspected to be hazardous, shipments may be made as described in the Section 5.2.2 for non-hazardous materials. If hazardous, follow the procedures summarized below.

Any substance or material that is capable of posing an unreasonable risk to life, health, or property when transported is classified as hazardous. Perform hazardous materials identification by checking the list of dangerous goods for that particular mode of transportation. If not on that list, materials can be classified by checking the Hazardous Materials Table (49 C.F.R. 172.102 including Appendix A) or by determining if the material meets the definition of any hazard class or division (49 C.F.R. Part 173), as listed in Attachment III-F-2.

All persons shipping hazardous materials must be properly trained in the appropriate regulations, as required by HM-126F, Training for Safe Transportation of Hazardous Materials (49 C.F.R. HM-126F Subpart H). The training covers loading, unloading, handling, storing, and transporting of

hazardous materials, as well as emergency preparedness in the case of accidents. Carriers, such as commercial couriers, must also be trained. Modes of shipment include air, highway, rail, and water.

When shipping hazardous materials, including bulk chemicals or samples suspected of being hazardous, the proper shipping papers (49 C.F.R. 172 Subpart C), package marking (49 C.F.R. 172 Subpart D), labeling (49 C.F.R. 172 Subpart E), placarding (49 C.F.R. 172 Subpart F, generally for carriers), and packaging must be used. Attachment III-F-1 shows an example of proper package markings. Refer to a copy of 49 C.F.R. each time hazardous materials/potentially hazardous samples are shipped.

According to Section 2.7 of the International Air Transport Association Dangerous Goods Regulations publication, very small quantities of certain dangerous goods may be transported without certain marking and documentation requirements as described in 49 C.F.R. Part 172. However, other labeling and packing requirements must still be followed. Attachment III-F-2 shows the volume or weight for different classes of substances. A "Dangerous Goods in Excepted Quantities" label must be completed and attached to the associated shipping cooler (Attachment III-F-3). Certain dangerous goods are not allowed on certain airlines in any quantity.

As stated in item 4 of Attachment III-F-4, the Hazardous Materials Regulations do not apply to hydrochloric acid (HCl), nitric acid (HNO_3), sulfuric acid (H_2SO_4), and sodium hydroxide (NaOH) added to water samples if their pH or percentage by weight criteria is met. These samples may be shipped as non-hazardous materials as discussed below.

5.2.2 Non-hazardous Materials Shipment

If the samples are suspected to be non-hazardous based on previous site sample results, field screening results, or visual observations, if applicable, then samples may be shipped as non-hazardous.

When a cooler is ready for shipment to the laboratory, place two copies of the chain-of-custody form inside a self-sealing bag and tape it to the inside of the insulated cooler. Then, seal the cooler with waterproof tape and label it with "Fragile," "This-End-Up" (or directional arrows pointing up), or other appropriate notices. Place chain-of-custody seals on the coolers as discussed in Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures.*

5.2.3 Shipments from Outside the Continental United States

Shipment of sample coolers to the U.S. from locations outside the continental U.S. is controlled by the USDA and is subject to their inspection and regulation. A "USDA Soil Import Permit" is required to prove that the receiving analytical laboratory is certified by the USDA to receive and properly dispose of soil. In addition, all sample coolers must be inspected by a USDA representative, affixed with a label indicating that the coolers contain environmental samples, and accompanied by shipping forms stamped by the USDA inspector prior to shipment. In addition, the U.S. Customs Service must clear samples shipped from U.S. territorial possessions or foreign countries upon entry into the U.S. As long as the commercial invoice is properly completed (see below), shipments typically pass through U.S. Customs Service without the need to open coolers for inspection.

Completion and use of proper paperwork will, in most cases, minimize or eliminate the need for the USDA and U.S. Customs Service to inspect the contents. Attachment III-F-5 shows an example of

how paperwork may be placed on the outside of coolers for non-hazardous materials. For hazardous materials, refer to Section 5.2.1.

In summary, tape the paperwork listed below to the outside of the coolers to assist sample shipments. If a shipment is made up of multiple pieces (e.g., more than one cooler), the paperwork need only be attached to one cooler, provided that the courier agrees. All other coolers in the shipment need only to be taped and have address and chain-of-custody seals affixed.

1. **Courier Shipping Form & Commercial Invoice**. See Attachment III-F-6, and Attachment III-F-7 for examples of the information to be included on the commercial invoice for soil and water. Place the courier shipping form and commercial invoice inside a clear, plastic, adhesive-backed pouch that adheres to the package (typically supplied by the courier) and place it on the cooler lid as shown in Attachment III-F-5.
2. **Soil Import Permit (soil only)**. See Attachment III-F-8 and Attachment III-F-9 for examples of the soil import permit and soil samples restricted entry labels. The laboratory shall supply these documents prior to mobilization. The USDA in Hawaii often does stop shipments of soil without these documents. Staple together the 2 inch × 2 inch USDA label (described below), and soil import permit, and place them inside a clear plastic pouch. The courier typically supplies the clear, plastic, adhesive-backed pouches that adhere to the package.

   Placing one restricted entry label as shown in Attachment III-F-5 (covered with clear packing tape) and one stapled to the actual permit is suggested.

   The USDA does not control water samples, so the requirements for soil listed above do not apply.

3. **Chain-of-Custody Seals**. The laboratory should supply the seals. CTO personnel must sign and date these. At least two seals should be placed in such a manner that they stick to both the cooler lid and body. Placing the seals over the tape (as shown in Attachment III-F-5), then covering it with clear packing tape is suggested. This prevents the seal from coming loose and enables detection of tampering.
4. **Address Label**. Affix a label stating the destination (laboratory address) to each cooler.
5. **Special Requirements for Hazardous Materials**. See Section 5.2.1.

Upon receipt of sample coolers at the laboratory, the sample custodian shall inspect the sample containers as discussed in Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures*. The samples shall then be either immediately extracted and/or analyzed, or stored in a refrigerated storage area until they are removed for extraction and/or analysis. Whenever the samples are not being extracted or analyzed, they shall be returned to refrigerated storage.

6. Records

Maintain records as required by implementing these procedures.

7. Health and Safety

- Avoid lifting heavy coolers with back muscles; instead, use leg muscles or dollies.
- Wear proper gloves, such as blue nitrile and latex, as defined in the site-specific project health and safety plan, when handling sample containers to avoid contacting any materials that may have spilled out of the sample containers.

8. References

Department of the Navy (DON). 2002. *Navy Environmental and Natural Resources Program Manual*. OPNAV Instruction 5090.1B Change 3. October.

Procedure III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures.*

9. Attachments

Attachment III-F-1: Example Hazardous Materials Package Marking

Attachment III-F-2: Packing Groups

Attachment III-F-3: Label for Dangerous Goods in Excepted Quantities

Attachment III-F-4: SW-846 Preservative Exception

Attachment III-F-5: Non-Hazardous Material Cooler Marking Figure For Shipment From Outside The Continental United States

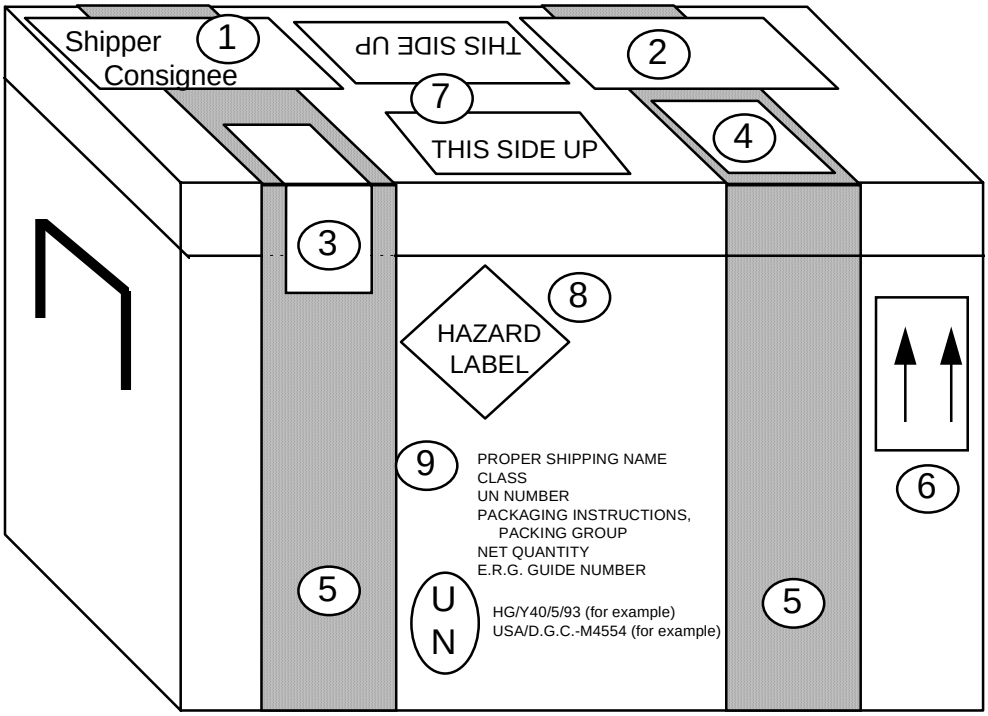
Attachment III-F-6: Commercial Invoice – Soil

Attachment III-F-7: Commercial Invoice – Water

Attachment III-F-8: Soil Import Permit

Attachment III-F-9: Soil Samples Restricted Entry Labels

Attachment III-F-1
Example Hazardous Material Package Marking



1. **AIR BILL/COMMERCIAL INVOICE**
2. **USDA PERMIT (Letter to Laboratory from USDA)**
3. **CUSTODY SEAL**
4. **USDA 2" X 2" SOIL IMPORT PERMIT**
5. **WATERPROOF STRAPPING TAPE**
6. **DIRECTION ARROWS STICKER - TWO REQUIRED**
7. **THIS SIDE UP STICKERS**
8. **HAZARD LABEL**
9. **HAZARDOUS MATERIAL INFORMATION**
10. **PACKAGE SPECIFICATIONS**

Attachment III-F-2
Packing Groups

PACKING GROUP OF THE SUBSTANCE	**PACKING GROUP 1**		**PACKING GROUP II**		**PACKING GROUP III**	
CLASS or DIVISION of PRIMARY or SUBSIDIARY RISK	Packagings		Packagings		Packagings	
	Inner	Outer	Inner	Outer	Inner	Outer
1: Explosives	---------- Forbidden (Note A) ----------					
2.1: Flammable Gas	---------- Forbidden (Note B) ----------					
2.2: Non-Flammable, non-toxic gas	---------- See Notes A and B ----------					
2.3: Toxic gas	---------- Forbidden (Note A) ----------					
3. Flammable liquid	30 mL	300 mL	30 mL	500 mL	30 mL	1 L
4.1 Self-reactive substances	Forbidden		Forbidden		Forbidden	
4.1: Other flammable solids	Forbidden		30 g	500 g	30 g	1 kg
4.2: Pyrophoric substances	Forbidden		Not Applicable		Not Applicable	
4.2 Spontaneously combustible substances	Not Applicable		30 g	500 g	30 g	1 kg
4.3: Water reactive substances	Forbidden		30 g or 30 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
5.1: Oxidizers	Forbidden		30 g or 30 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
5.2: Organic peroxides (Note C)	See Note A		30 g or 30 mL	500 g or 250 mL	Not Applicable	
6.1: Poisons - Inhalation toxicity	Forbidden		1 g or 1 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
6.1: Poisons - oral toxicity	1 g or 1 mL	300 g or 300 mL	1 g or 1 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
6.1: Poisons - dermal toxicity	1 g or 1 mL	300 g or 300 mL	1 g or 1 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
6.2: Infectious substances	---------- Forbidden (Note A) ----------					
7: Radioactive material (Note D)	---------- Forbidden (Note A) ----------					
8: Corrosive materials	Forbidden		30 g or 30 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L
9: Magnetized materials	---------- Forbidden (Note A) ----------					
9: Other miscellaneous materials (Note E)	Forbidden		30 g or 30 mL	500 g or 500 mL	30 g or 30 mL	1 kg or 1 L

Note A: *Packing groups are not used for this class or division.*
Note B: *For inner packagings, the quantity contained in receptacle with a water capacity of 30 mL. For outer packagings, the sum of the water capacities of all the inner packagings contained must not exceed 1 L.*
Note C: *Applies only to Organic Peroxides when contained in a chemical kit, first aid kit or polyester resin kit.*
Note D: *See 6.1.4.1, 6.1.4.2 and 6.2.1.1 through 6.2.1.7, radioactive material in excepted packages.*
Note E: *For substances in Class 9 for which no packing group is indicated in the List of Dangerous Goods, Packing Group II quantities must be used.*

Attachment III-F-3
Label for Dangerous Goods in Excepted Quantities

DANGEROUS GOODS IN EXCEPTED QUANTITIES

This package contains dangerous goods in excepted small quantities and is in all respects in compliance with the applicable international and national government regulations and the IATA Dangerous Goods Regulations.

_____
Signature of Shipper

_____ _____
Title Date

_____

_____
Name and address of Shipper

This package contains substance(s) in Class(es) (check applicable box(es))

Class:	2	3	4	5	6	8	9
	o	o	o	o	o	o	o

and the applicable UN Numbers are:

Attachment III-F-4
SW-846 Preservative Exception

Measurement	Vol. Req. (mL)	Container[2]	Preservative [3,4]	Holding Time[5]
MBAS	250	P,G	Cool, 4ºC	48 Hours
NTA	50	P,G	Cool, 4ºC	24 Hours

1. More specific instructions for preservation and sampling are found with each procedure as detailed in this manual. A general discussion on sampling water and industrial wastewater may be found in ASTM, Part 31, p. 72-82 (1976) Method D-3370.

2. Plastic (P) or Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred.

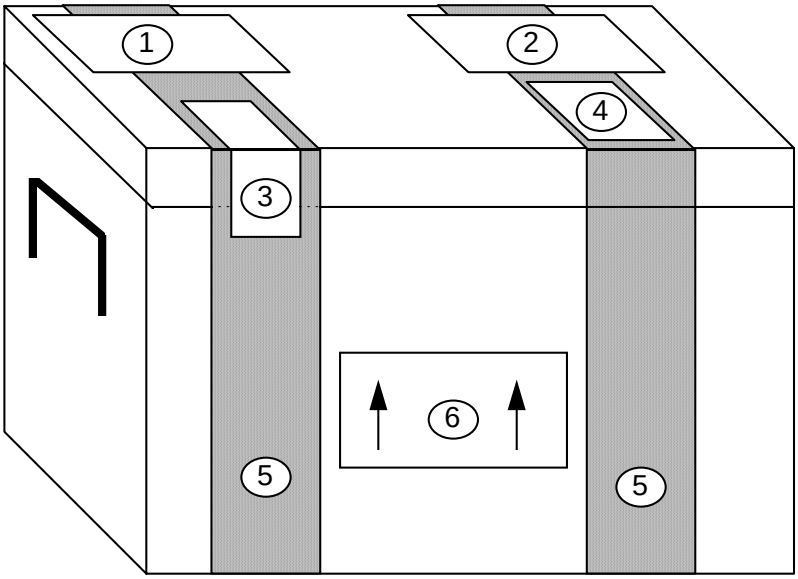
3. Sample preservation should be performed immediately upon sample collection. For composite samples each aliquot should be preserved at the time of collection. When use of an automated sampler makes it impossible to preserve each aliquot, then samples may be preserved by maintaining at 4ºC until compositing and sample splitting is completed.

4. When any sample is to be shipped by common carrier or sent through the United States Mail, it must comply with the Department of Transportation Hazardous Materials Regulations (49 C.F.R. Part 172). The person offering such material for transportation is responsible for ensuring such compliance. for the preservation requirements of Table 1, the Office of Hazardous Materials, Materials Transportation Bureau, Department of Transportation has determined that the Hazardous Materials regulations do not apply to the following materials: Hydrochloric acid (HCl) in water solutions at concentration of 0.04% by weight or less (pH about 1.96 or greater); Nitric acid (HNO_3) in water solutions at concentrations of 0.15% by weight or less (pH about 1.62 or greater); Sulfuric acid (H_2SO_4) in water solutions at concentrations of 0.35% by weight or less (pH about 1.15 or grater); Sodium hydroxide (NaOH) in water solutions at concentrations of 0.080% by weight or less (pH about 12.30 or less).

5. Samples should be analyzed as soon as possible after collection. The times listed are the maximum times that samples may be held before analysis and still considered valid. Samples may be held for longer periods only if the permittee, or monitoring laboratory, has data on file to show that the specific types of sample under study are stable for the longer time, and has received a variance from the Regional Administrator. Some samples may not be stable for the maximum time period given in the table. A permittee, or monitoring laboratory, is obligated to hold the sample for a shorter time if knowledge exists to show this is necessary to maintain sample stability.

6. Should only be used in the presence of residual chlorine.

Attachment III-F-5
Non-Hazardous Material Cooler Marking Figure For Shipment From Outside The Continental United States



1. **AIR BILL/COMMERCIAL INVOICE**
2. **USDA PERMIT (Letter to Laboratory from USDA)**
3. **CUSTODY SEAL**
4. **USDA 2" X 2" SOIL IMPORT PERMIT**
5. **WATERPROOF STRAPPING TAPE**
6. **DIRECTION ARROWS STICKER - TWO REQUIRED**

Attachment III-F-6
Commercial Invoice – Soil

DATE OF EXPORTATION 1/1/94	EXPORT REFERENCES (i.e., order no., invoice no., etc.) <CTO #>
SHIPPER/EXPORTER (complete name and address) Joe Smith Ogden c/o <hotel name> <hotel address>	CONSIGNEE Sample Receipt <Lab Name> <Lab Address>
COUNTRY OF EXPORT Guam, USA	IMPORTER - IF OTHER THAN CONSIGNEE
COUNTRY OF ORIGIN OF GOODS Guam, USA	
COUNTRY OF ULTIMATE DESTINATION USA	

INTERNATIONAL AIR WAYBILL NO. ____

(NOTE: All shipments must be accompanied by a Federal Express International Air Waybill)

MARKS/NOS	NO. OF PKGS	TYPE OF PACKAGING	FULL DESCRIPTION OF GOODS	QTY	UNIT OF MEASURE	WEIGHT	UNIT VALUE	TOTAL VALUE
	3	coolers	Soil samples for laboratory analysis only				$1.00	$3.00
	TOTAL NO. OF PKGS.					TOTAL WEIGHT		TOTAL INVOICE VALUE
	3							$3.00
								Check one ☐ F.O.B. ☐ C&F ☐ C.I.F.

THESE COMMODITIES ARE LICENSED FOR THE ULTIMATE DESTINATION SHOWN.

DIVERSION CONTRARY TO UNITED STATES LAW IS PROHIBITED.

I DECLARE ALL THE INFORMATION CONTAINED IN THIS INVOICE TO BE TRUE AND CORRECT

SIGNATURE OF SHIPPER/EXPORTER (Type name and title and sign)

Joe Smith, Ogden — Joe Smith — 1/1/94

Name/Title — Signature — Date

Attachment III-F-7
Commercial Invoice – Water

DATE OF EXPORTATION	EXPORT REFERENCES (i.e., order no., invoice no., etc.)
1/1/94	<COC #>
SHIPPER/EXPORTER (complete name and address) Joe Smith Ogden c/o <hotel name> <hotel address>	CONSIGNEE Sample Receipt <Lab Name> <Lab Address>
COUNTRY OF EXPORT Guam, USA	IMPORTER - IF OTHER THAN CONSIGNEE
COUNTRY OF ORIGIN OF GOODS Guam, USA	
COUNTRY OF ULTIMATE DESTINATION USA	

INTERNATIONAL AIR WAYBILL NO. [ ]

(NOTE: All shipments must be accompanied by a Federal Express International Air Waybill)

MARKS/NOS	NO. OF PKGS	TYPE OF PACKAGING	FULL DESCRIPTION OF GOODS	QTY	UNIT OF MEASURE	WEIGHT	UNIT VALUE	TOTAL VALUE
	3	coolers	Water samples for laboratory analysis only				$1.00	$3.00
	TOTAL NO. OF PKGS.					TOTAL WEIGHT		TOTAL INVOICE VALUE
	3							$3.00

Check one
☐ F.O.B.
☐ C&F
☐ C.I.F.

THESE COMMODITIES ARE LICENSED FOR THE ULTIMATE DESTINATION SHOWN.

DIVERSION CONTRARY TO UNITED STATES LAW IS PROHIBITED.

I DECLARE ALL THE INFORMATION CONTAINED IN THIS INVOICE TO BE TRUE AND CORRECT

SIGNATURE OF SHIPPER/EXPORTER (Type name and title and sign)

Joe Smith, Ogden	Joe Smith	1/1/94
Name/Title	Signature	Date

Attachment III-F-8
Soil Import Permit

UNITED STATES DEPARTMENT OF AGRICULTURE

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

Soil Permit

Permit Number: S-52299

Issued To:

Columbia Analytical Services
(Lee Wolf)
1317 S. 13th Avenue
Kelso, Washington 98626

TELEPHONE: (360) 577-7222

Under the authority of the Federal Plant Pest Act of May 23, 1957, permission is hereby granted to the facility/individual named above subject to the following conditions:

1. Valid for shipments of soil not heat treated at the port of entry, only if a compliance agreement (PPQ Form 519) has been completed and signed. Compliance Agreements and Soil permits are non-transferable. If you hold a Soil Permit and you leave your present employer or company, you must notify your local USDA office promptly.
2. To be shipped in sturdy, leakproof, containers.
3. To be released without treatment at the port of entry.
4. To be used only for analysis and only in the facility of the permittee at Columbia Analytical Services, located in Kelso, Washington.
5. No use of soil for growing purposes is authorized, including the isolation or culture of organisms imported in soil.
6. All unconsumed soil, containers, and effluent is to be autoclaved, incinerated, or heat treated by the permittee at the conclusion of the project as approved and prescribed by Plant Protection and Quarantine.
7. This permit authorizes shipments from all foreign sources, including Guam, Hawaii, Puerto Rico, and the U.S. Virgin Islands through any U.S. port of entry.

JUNE 30, 2006
Expiration Date

Deborah M. Knott
Approving Official DEBORAH M. KNOTT

WARNING: Any alteration, forgery, or unauthorized use of this Federal form is subject to civil penalties of up to $250,000 (7 U.S.C. s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C. s 1001).

PPQ FORM 525B (8/94)

Pt 1 - PERMITTEE

Attachment III-F-9
Soil Samples Restricted Entry Label

U.S. DEPARTMENT OF AGRICULTURE

ANIMAL AND PLANT HEALTH INSPECTION SERVICE

PLANT PROTECTION AND QUARANTINE

HYATTSVILLE, MARYLAND 20782

SOIL SAMPLES

RESTRICTED ENTRY

The material contained in this package is imported under authority of the Federal Plant Pest Act of May 23, 1957.

For release without treatment if addressee is currently listed as approved by Plant Protection and Quarantine.

PPQ FORM 550 *Edition of 12/77 may be used*

(JAN 83)

Attachment 2

Laboratory DoD ELAP Certificate of Accreditation

LABORATORY ACCREDITATION BUREAU®

Certificate of Accreditation

ISO/IEC 17025:2005 Certificate Number L2242

Accutest Laboratories Northern California

2105 Lundy Avenue
San Jose CA 95131

has met the requirements set forth in L-A-B's policies and procedures, all requirements of ISO/IEC 17025:2005 "General Requirements for the competence of Testing and Calibration Laboratories" and the U.S. Department of Defense Environmental Laboratory Accreditation Program (DoD ELAP).*

The accredited lab has demonstrated technical competence to a defined "Scope of Accreditation" and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated 8 January 2009).

Accreditation valid through: May 2, 2016

R. Douglas Leonard, Jr., President, COO
Laboratory Accreditation Bureau
Presented the 1st of May 2013

*See the laboratory's Scope of Accreditation for details of accredited parameters
**Laboratory Accreditation Bureau is found to be in compliance with ISO/IEC 17011:2004 and recognized by ILAC (International Laboratory Accreditation Cooperation) and NACLA (National Cooperation for Laboratory Accreditation).

Scope of Accreditation
For
Accutest Laboratories Northern California

2105 Lundy Avenue
San Jose, CA 95131
Surjit Saini
408-588-0200

In recognition of a successful assessment to ISO/IEC 17025:2005 and the requirements of the DoD Environmental Laboratory Accreditation Program (DoD ELAP) as detailed in the DoD Quality Systems Manual for Environmental Laboratories (DoD QSM v4.2) based on the National Environmental Laboratory Accreditation Conference Chapter 5 Quality Systems Standard (NELAC Voted Revision June 5, 2003), accreditation is granted to Accutest Laboratories Northern California to perform the following tests:

Accreditation granted through: **May 2, 2016**

Testing – Environmental

Potable Water		
Technology	**Method**	**Analyte**
GC/ECD	EPA 504.1	EDB and DBCP
ICPMS	EPA 200.8	Aluminum
ICPMS	EPA 200.8	Antimony
ICPMS	EPA 200.8	Arsenic
ICPMS	EPA 200.8	Barium
ICPMS	EPA 200.8	Beryllium
ICPMS	EPA 200.8	Boron
ICPMS	EPA 200.8	Cadmium
ICPMS	EPA 200.8	Calcium
ICPMS	EPA 200.8	Chromium
ICPMS	EPA 200.8	Cobalt
ICPMS	EPA 200.8	Copper
ICPMS	EPA 200.8	Iron
ICPMS	EPA 200.8	Lead
ICPMS	EPA 200.8	Manganese
ICPMS	EPA 200.8	Magnesium
ICPMS	EPA 200.8	Molybdenum
ICPMS	EPA 200.8	Nickel

Potable Water		
Technology	**Method**	**Analyte**
ICPMS	EPA 200.8	Potassium
ICPMS	EPA 200.8	Selenium
ICPMS	EPA 200.8	Silver
ICPMS	EPA 200.8	Sodium
ICPMS	EPA 200.8	Strontium
ICPMS	EPA 200.8	Tin
ICPMS	EPA 200.8	Titanium
ICPMS	EPA 200.8	Thallium
ICPMS	EPA 200.8	Zinc
ICPMS	EPA 200.8	Uranium
ICPMS	EPA 200.8	Vanadium

Non-Potable Water		
Technology	**Method**	**Analyte**
IC	EPA 314.0	Perchlorate
ICP	EPA 6010B	Aluminum
ICP	EPA 6010B	Calcium
ICP	EPA 6010B	Iron
ICP	EPA 6010B	Magnesium
ICP	EPA 6010B	Manganese
ICP	EPA 6010B	Potassium
GC/ECD/ECD	EPA 608	4,4'-DDD
GC/ECD/ECD	EPA 608	4,4'-DDE
GC/ECD/ECD	EPA 608	4,4'-DDT
GC/ECD/ECD	EPA 608	a-BHC
GC/ECD/ECD	EPA 608	Aldrin
GC/ECD/ECD	EPA 608	b-BHC
GC/ECD/ECD	EPA 608	Chlordane (tech.)
GC/ECD/ECD	EPA 608	d-BHC
GC/ECD/ECD	EPA 608	Dieldrin
GC/ECD/ECD	EPA 608	Endosulfan I
GC/ECD/ECD	EPA 608	Endosulfan II
GC/ECD/ECD	EPA 608	Endosulfan Sulfate
GC/ECD/ECD	EPA 608	Endrin

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/ECD/ECD	EPA 608	Endrin Aldehyde
GC/ECD/ECD	EPA 608	Endrin Ketone
GC/ECD/ECD	EPA 608	g-BHC (Lindane)
GC/ECD/ECD	EPA 608	Heptachlor
GC/ECD/ECD	EPA 608	Heptachlor Epoxide
GC/ECD/ECD	EPA 608	Methoxychlor
GC/ECD/ECD	EPA 608	Toxaphene
GC/ECD/ECD	EPA 608	PCB-1016
GC/ECD/ECD	EPA 608	PCB-1221
GC/ECD/ECD	EPA 608	PCB-1232
GC/ECD/ECD	EPA 608	PCB-1242
GC/ECD/ECD	EPA 608	PCB-1248
GC/ECD/ECD	EPA 608	PCB-1254
GC/ECD/ECD	EPA 608	PCB-1260
GC/ECD/ECD	EPA 608	PCB-1262
GC/ECD/ECD	EPA 608	PCB-1268
GC/ECD/ECD	EPA 608	Alpha-Chlordane
GC/ECD/ECD	EPA 608	Gamma-Chlordane
GC/MS	EPA 624	1,1,1,2-Tetrachloroethane
GC/MS	EPA 624	1,1,1-Trichloroethane
GC/MS	EPA 624	1,1,2,2-Tetrachloroethane
GC/MS	EPA 624	1,1,2-Trichloro-1,2,2-Trifluoroethane
GC/MS	EPA 624	1,1,2-Trichloroethane
GC/MS	EPA 624	1,1-Dichloroethane
GC/MS	EPA 624	1,1-Dichloroethene
GC/MS	EPA 624	1,1-Dichloropropene
GC/MS	EPA 624	1,2,3-Trichlorobenzene
GC/MS	EPA 624	1,2,3-Trichloropropane
GC/MS	EPA 624	1,2,4-Trichlorobenzene
GC/MS	EPA 624	1,2,4-Trimethylbenzene
GC/MS	EPA 624	1,2-Dibromoethane
GC/MS	EPA 624	1,2-Dichlorobenzene
GC/MS	EPA 624	1,2-Dichloroethane
GC/MS	EPA 624	1,2-Dichloropropane
GC/MS	EPA 624	1,3,5-Trimethylbenzene
GC/MS	EPA 624	1,3-Dichlorobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 624	1,3-Dichloropropane
GC/MS	EPA 624	1,4-Dichlorobenzene
GC/MS	EPA 624	1,4-Dioxane
GC/MS	EPA 624	2,2-Dichloropropane
GC/MS	EPA 624	2-Chloroethyl Vinyl Ether
GC/MS	EPA 624	2-Chlorotoluene
GC/MS	EPA 624	2-Hexanone (MBK)
GC/MS	EPA 624	4-Chlorotoluene
GC/MS	EPA 624	4-Methyl-2-pentanone (MIBK)
GC/MS	EPA 624	Acetone
GC/MS	EPA 624	Acetonitrile
GC/MS	EPA 624	Acrolein
GC/MS	EPA 624	Acrylonitrile
GC/MS	EPA 624	Allyl Chloride
GC/MS	EPA 624	Benzene
GC/MS	EPA 624	Benzyl Chloride
GC/MS	EPA 624	Bromobenzene
GC/MS	EPA 624	Bromochloromethane
GC/MS	EPA 624	Bromodichloromethane
GC/MS	EPA 624	Bromoform
GC/MS	EPA 624	Bromomethane
GC/MS	EPA 624	Carbon Disulfide
GC/MS	EPA 624	Carbon Tetrachloride
GC/MS	EPA 624	Chlorobenzene
GC/MS	EPA 624	Chloroethane
GC/MS	EPA 624	Chloroform
GC/MS	EPA 624	Chloromethane
GC/MS	EPA 624	Chloroprene
GC/MS	EPA 624	cis-1,2-Dichloroethene
GC/MS	EPA 624	cis-1,3-Dichloropropene
GC/MS	EPA 624	cis-1,4-Dichloro-2-butene
GC/MS	EPA 624	Dibromochloromethane
GC/MS	EPA 624	Dibromomethane
GC/MS	EPA 624	Dichlorodifluoromethane
GC/MS	EPA 624	Ethyl Methacrylate
GC/MS	EPA 624	Ethyl tert-butyl Ether (ETBE)

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 624	Ethylbenzene
GC/MS	EPA 624	Hexachlorobutadiene
GC/MS	EPA 624	Iodomethane
GC/MS	EPA 624	Isobutyl Alcohol
GC/MS	EPA 624	Isopropylbenzene
GC/MS	EPA 624	Methacrylonitrile
GC/MS	EPA 624	Methyl Ethyl Ketone
GC/MS	EPA 624	Methyl Methacrylate
GC/MS	EPA 624	Methyl tert-butyl Ether (MTBE)
GC/MS	EPA 624	Methylene Chloride
GC/MS	EPA 624	Naphthalene
GC/MS	EPA 624	n-Butylbenzene
GC/MS	EPA 624	N-propylbenzene
GC/MS	EPA 624	Pentachloroethane
GC/MS	EPA 624	Propionitrile
GC/MS	EPA 624	sec-Butylbenzene
GC/MS	EPA 624	Styrene
GC/MS	EPA 624	tert-Amyl Methyl Ether (TAME)
GC/MS	EPA 624	tert-Butyl Alcohol (TBA)
GC/MS	EPA 624	tert-Butylbenzene
GC/MS	EPA 624	Tetrachloroethene
GC/MS	EPA 624	Toluene
GC/MS	EPA 624	trans-1,2-Dichloroethene
GC/MS	EPA 624	trans-1,3-Dichloropropene
GC/MS	EPA 624	trans-1,4-Dichloro-2-butene
GC/MS	EPA 624	Trichloroethene
GC/MS	EPA 624	Trichlorofluoromethane
GC/MS	EPA 624	Vinyl Acetate
GC/MS	EPA 624	Vinyl Chloride
GC/MS	EPA 624	Xylenes, Total
GC/MS	EPA 625	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 625	1,2,4-Trichlorobenzene
GC/MS	EPA 625	1,2-Dichlorobenzene
GC/MS	EPA 625	1,2-Dinitrobenzene
GC/MS	EPA 625	1,3,5-Trinitrobenzene
GC/MS	EPA 625	1,3-Dichlorobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 625	1,3-Dinitrobenzene
GC/MS	EPA 625	1,4-Dichlorobenzene
GC/MS	EPA 625	1,4-Dinitrobenzene
GC/MS	EPA 625	1,4-Naphthoquinone
GC/MS	EPA 625	1,4-Phenylenediamine
GC/MS	EPA 625	1-Naphthylamine
GC/MS	EPA 625	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 625	2,4,5-Trichlorophenol
GC/MS	EPA 625	2,4,6-Trichlorophenol
GC/MS	EPA 625	2,4-Dichlorophenol
GC/MS	EPA 625	2,4-Dimethylphenol
GC/MS	EPA 625	2,4-Dinitrophenol
GC/MS	EPA 625	2,4-Dinitrotoluene
GC/MS	EPA 625	2,6-Dichlorophenol
GC/MS	EPA 625	2,6-Dinitrotoluene
GC/MS	EPA 625	2-Acetylaminofluorene
GC/MS	EPA 625	2-Chloronaphthalene
GC/MS	EPA 625	2-Chlorophenol
GC/MS	EPA 625	2-Methyl-4,6-dinitrophenol
GC/MS	EPA 625	2-Methylnaphthalene
GC/MS	EPA 625	2-Naphthylamine
GC/MS	EPA 625	2-Nitroaniline
GC/MS	EPA 625	2-Nitrophenol
GC/MS	EPA 625	2-Picoline
GC/MS	EPA 625	3,3'-Dichlorobenzidine
GC/MS	EPA 625	3,3'-Dimethoxybenzidine
GC/MS	EPA 625	3,3'-Dimethylbenzidine
GC/MS	EPA 625	3-Methylcholanthrene
GC/MS	EPA 625	3-Nitroaniline
GC/MS	EPA 625	4-Aminobiphenyl
GC/MS	EPA 625	4-Bromophenyl Phenyl Ether
GC/MS	EPA 625	4-Chloro-3-methylphenol
GC/MS	EPA 625	4-Chloroaniline
GC/MS	EPA 625	4-Chlorophenyl Phenyl Ether
GC/MS	EPA 625	4-Methylphenol
GC/MS	EPA 625	4-Nitroaniline

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 625	4-Nitrophenol
GC/MS	EPA 625	7,12-Dimethylbenz(a)anthracene
GC/MS	EPA 625	a,a-Dimethylphenethylamine
GC/MS	EPA 625	Acenaphthene
GC/MS	EPA 625	Acenaphthylene
GC/MS	EPA 625	Acetophenone
GC/MS	EPA 625	Aniline
GC/MS	EPA 625	Anthracene
GC/MS	EPA 625	Aramite
GC/MS	EPA 625	Benzidine
GC/MS	EPA 625	Benzo(a)anthracene
GC/MS	EPA 625	Benzo(a)pyrene
GC/MS	EPA 625	Benzo(b)fluoranthene
GC/MS	EPA 625	Benzo(g,h,i)perylene
GC/MS	EPA 625	Benzo(k)fluoranthene
GC/MS	EPA 625	Benzoic Acid
GC/MS	EPA 625	Benzyl Alcohol
GC/MS	EPA 625	Bis(2-chloroethoxy)methane
GC/MS	EPA 625	Bis(2-chloroethyl) Ether
GC/MS	EPA 625	Bis(2-chloroisopropyl) Ether
GC/MS	EPA 625	Butyl benzyl phthalate
GC/MS	EPA 625	Carbazole
GC/MS	EPA 625	Chrysene
GC/MS	EPA 625	Di(2-ethylhexyl) Phthalate
GC/MS	EPA 625	Dibenzo(a,h)anthracene
GC/MS	EPA 625	Dibenzofuran
GC/MS	EPA 625	Diethyl Phthalate
GC/MS	EPA 625	Dimethyl Phthalate
GC/MS	EPA 625	Di-n-butyl phthalate
GC/MS	EPA 625	Di-n-octyl phthalate
GC/MS	EPA 625	Diphenylamine
GC/MS	EPA 625	Ethyl Methanesulfonate
GC/MS	EPA 625	Fluoranthene
GC/MS	EPA 625	Fluorene
GC/MS	EPA 625	Hexachlorobenzene
GC/MS	EPA 625	Hexachlorobutadiene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 625	Hexachlorocyclopentadiene
GC/MS	EPA 625	Hexachloroethane
GC/MS	EPA 625	Hexachlorophene
GC/MS	EPA 625	Hexachloropropene
GC/MS	EPA 625	Indeno(1,2,3-c,d)pyrene
GC/MS	EPA 625	Isophorone
GC/MS	EPA 625	Isosafrole
GC/MS	EPA 625	m-Cresol
GC/MS	EPA 625	Naphthalene
GC/MS	EPA 625	Nitrobenzene
GC/MS	EPA 625	N-nitrosodiethylamine
GC/MS	EPA 625	N-nitrosodimethylamine
GC/MS	EPA 625	N-nitrosodi-n-butylamine
GC/MS	EPA 625	N-nitrosodi-n-propylamine
GC/MS	EPA 625	N-nitrosodiphenylamine
GC/MS	EPA 625	N-nitrosomethylethylamine
GC/MS	EPA 625	N-nitrosomorpholine
GC/MS	EPA 625	N-nitrosopiperidine
GC/MS	EPA 625	N-nitrosopyrrolidine
GC/MS	EPA 625	o-Cresol
GC/MS	EPA 625	o-Toluidine
GC/MS	EPA 625	p-Dimethylaminoazobenzene
GC/MS	EPA 625	Pentachlorobenzene
GC/MS	EPA 625	Pentachloronitrobenzene
GC/MS	EPA 625	Pentachlorophenol
GC/MS	EPA 625	Phenacetin
GC/MS	EPA 625	Phenanthrene
GC/MS	EPA 625	Phenol
GC/MS	EPA 625	Pronamide
GC/MS	EPA 625	Pyrene
GC/MS	EPA 625	Pyridine
GC/MS	EPA 625	Safrole
GC/FID	EPA 8015B	Ethanol
GC/FID	EPA 8015B	Methanol
GC/ECD/ECD	EPA 8081A	Alpha-Chlordane
GC/ECD/ECD	EPA 8081A	Gamma-Chlordane

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/ECD/ECD	EPA 8082	PCB 1262
GC/ECD/ECD	EPA 8082	PCB 1268
IC	EPA 9056	Chloride
IC	EPA 9056	Nitrate
IC	EPA 9056	Nitrite
IC	EPA 9056	Sulfate
GC/MS	LUFT GC/MS	Total Petroleum Hydrocarbons-Gasoline
GC/FID	NWTPH-Dx	Diesel-range Total Petroleum Hydrocarbons
GC/FID	NWTPH-Gx	Gasoline-range Organics
GC/FID	AK101	Gasoline-range Organics
GC/MS	AK101-MS	Gasoline-range Organics
IC	EPA 7199	Chromium VI
IC	SM 3500-Cr-D	Chromium VI
Colorimetric	SM 4500-CN E	Cyanide, Total
Colorimetric	SM 4500-CN G	Cyanide, amenable
CVAA	EPA 245.1	Mercury
CVAA	EPA 7470A	Mercury
CVAA	EPA 7471A	Mercury
GC/ECD/ECD	EPA 8081A	4,4'-DDD
GC/ECD/ECD	EPA 8081A	4,4'-DDE
GC/ECD/ECD	EPA 8081A	4,4'-DDT
GC/ECD/ECD	EPA 8081A	a-BHC
GC/ECD/ECD	EPA 8081A	Aldrin
GC/ECD/ECD	EPA 8081A	b-BHC
GC/ECD/ECD	EPA 8081A	Chlordane (tech.)
GC/ECD/ECD	EPA 8081A	d-BHC
GC/ECD/ECD	EPA 8081A	Dieldrin
GC/ECD/ECD	EPA 8081A	Endosulfan I
GC/ECD/ECD	EPA 8081A	Endosulfan II
GC/ECD/ECD	EPA 8081A	Endosulfan Sulfate
GC/ECD/ECD	EPA 8081A	Endrin
GC/ECD/ECD	EPA 8081A	Endrin Aldehyde
GC/ECD/ECD	EPA 8081A	Endrin Ketone
GC/ECD/ECD	EPA 8081A	g-BHC (Lindane)
GC/ECD/ECD	EPA 8081A	Heptachlor
GC/ECD/ECD	EPA 8081A	Heptachlor Epoxide

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/ECD/ECD	EPA 8081A	Methoxychlor
GC/ECD/ECD	EPA 8081A	Toxaphene
GC/ECD/ECD	EPA 8082	PCB-1016
GC/ECD/ECD	EPA 8082	PCB-1221
GC/ECD/ECD	EPA 8082	PCB-1232
GC/ECD/ECD	EPA 8082	PCB-1242
GC/ECD/ECD	EPA 8082	PCB-1248
GC/ECD/ECD	EPA 8082	PCB-1254
GC/ECD/ECD	EPA 8082	PCB-1260
GC/ECD	EPA 8011	EDB and DBCP
GC/FID	EPA 8015B	Diesel-range Total Petroleum Hydrocarbons
GC/FID	EPA 8015B	Gasoline-range Organics
GC/FID	EPA 8015D	Diesel Range Organics
GC/FID	AK-102	Diesel Range Organics
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,1-Trichloroethane
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloro-1,2,2-Trifluoroethane
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethene
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromoethane
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane
GC/MS	EPA 8260B	1,2-Dibromo-3-chloropropane (DBCP)
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Chloroethyl Vinyl Ether
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone (MBK)
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone (MIBK)
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Acetonitrile
GC/MS	EPA 8260B	Acrolein
GC/MS	EPA 8260B	Acrylonitrile
GC/MS	EPA 8260B	Allyl Chloride
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Benzyl Chloride
GC/MS	EPA 8260B	Bromobenzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon Disulfide
GC/MS	EPA 8260B	Carbon Tetrachloride
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	Chloroprene
GC/MS	EPA 8260B	cis-1,2-Dichloroethene
GC/MS	EPA 8260B	cis-1,3-Dichloropropene
GC/MS	EPA 8260B	cis-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane
GC/MS	EPA 8260B	Ethyl Methacrylate
GC/MS	EPA 8260B	Ethyl tert-butyl Ether (ETBE)
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Hexachlorobutadiene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B	Iodomethane
GC/MS	EPA 8260B	Isobutyl Alcohol
GC/MS	EPA 8260B	Isopropylbenzene
GC/MS	EPA 8260B	Methyl Acetate
GC/MS	EPA 8260B	Methacrylonitrile
GC/MS	EPA 8260B	Methylcyclohexane
GC/MS	EPA 8260B	Methyl Ethyl Ketone
GC/MS	EPA 8260B	Methyl Methacrylate
GC/MS	EPA 8260B	Methyl tert-butyl Ether (MTBE)
GC/MS	EPA 8260B	Methylene Chloride
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	N-propylbenzene
GC/MS	EPA 8260B	p-Isopropyltoluene
GC/MS	EPA 8260B	Pentachloroethane
GC/MS	EPA 8260B	Propionitrile
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	tert-Amyl Methyl Ether (TAME)
GC/MS	EPA 8260B	tert-Butyl Alcohol (TBA)
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene
GC/MS	EPA 8260B	Tetrahydrofuran
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	trans-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Trichloroethene
GC/MS	EPA 8260B	Trichlorofluoromethane
GC/MS	EPA 8260B	Vinyl Acetate
GC/MS	EPA 8260B	Vinyl Chloride
GC/MS	EPA 8260B	Xylenes, Total
GC/MS	EPA 8270C	1,1'Biphenyl
GC/MS	EPA 8270C	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C	1,2-Dichlorobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	1,2-Dinitrobenzene
GC/MS	EPA 8270C	1,3,5-Trinitrobenzene
GC/MS	EPA 8270C	1,3-Dichlorobenzene
GC/MS	EPA 8270C	1,3-Dinitrobenzene
GC/MS	EPA 8270C	1,4-Dichlorobenzene
GC/MS	EPA 8270C	1,4-Dinitrobenzene
GC/MS	EPA 8270C	1,4 Dioxane SIM
GC/MS	EPA 8270C	1,4-Naphthoquinone
GC/MS	EPA 8270C	1,4-Phenylenediamine
GC/MS	EPA 8270C	1-Naphthylamine
GC/MS	EPA 8270C	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C	2,4,5-Trichlorophenol
GC/MS	EPA 8270C	2,4,6-Trichlorophenol
GC/MS	EPA 8270C	2,4-Dichlorophenol
GC/MS	EPA 8270C	2,4-Dimethylphenol
GC/MS	EPA 8270C	2,4-Dinitrophenol
GC/MS	EPA 8270C	2,4-Dinitrotoluene
GC/MS	EPA 8270C	2,6-Dichlorophenol
GC/MS	EPA 8270C	2,6-Dinitrotoluene
GC/MS	EPA 8270C	2-Acetylaminofluorene
GC/MS	EPA 8270C	2-Chloronaphthalene
GC/MS	EPA 8270C	2-Chlorophenol
GC/MS	EPA 8270C	2-Methyl-4,6-dinitrophenol
GC/MS	EPA 8270C	2-Methylnaphthalene
GC/MS	EPA 8270C	2-Naphthylamine
GC/MS	EPA 8270C	2-Nitroaniline
GC/MS	EPA 8270C	2-Nitrophenol
GC/MS	EPA 8270C	2-Picoline
GC/MS	EPA 8270C	3,3'-Dichlorobenzidine
GC/MS	EPA 8270C	3,3'-Dimethoxybenzidine
GC/MS	EPA 8270C	3,3'-Dimethylbenzidine
GC/MS	EPA 8270C	3-Methylcholanthrene
GC/MS	EPA 8270C	3-Methylphenol
GC/MS	EPA 8270C	3-Nitroaniline
GC/MS	EPA 8270C	4-Aminobiphenyl
GC/MS	EPA 8270C	4-Bromophenyl Phenyl Ether

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	4-Chloro-3-methylphenol
GC/MS	EPA 8270C	4-Chloroaniline
GC/MS	EPA 8270C	4-Chlorophenyl Phenyl Ether
GC/MS	EPA 8270C	4-Methylphenol
GC/MS	EPA 8270C	4-Nitroaniline
GC/MS	EPA 8270C	4-Nitrophenol
GC/MS	EPA 8270C	7,12-Dimethylbenz(a)anthracene
GC/MS	EPA 8270C	a,a-Dimethylphenethylamine
GC/MS	EPA 8270C	Acenaphthene
GC/MS	EPA 8270C	Acenaphthylene
GC/MS	EPA 8270C	Acetophenone
GC/MS	EPA 8270C	Alpha-Terpineol
GC/MS	EPA 8270C	Aniline
GC/MS	EPA 8270C	Anthracene
GC/MS	EPA 8270C	Aramite
GC/MS	EPA 8270C	Atrazine
GC/MS	EPA 8270C	Benzidine
GC/MS	EPA 8270C	Benzaldehyde
GC/MS	EPA 8270C	Benzo(a)anthracene
GC/MS	EPA 8270C	Benzo(a)pyrene
GC/MS	EPA 8270C	Benzo(b)fluoranthene
GC/MS	EPA 8270C	Benzo(g,h,i)perylene
GC/MS	EPA 8270C	Benzo(k)fluoranthene
GC/MS	EPA 8270C	Benzoic Acid
GC/MS	EPA 8270C	Benzyl Alcohol
GC/MS	EPA 8270C	Bis(2-chloroethoxy)methane
GC/MS	EPA 8270C	Bis(2-chloroethyl) Ether
GC/MS	EPA 8270C	Bis(2-chloroisopropyl) Ether
GC/MS	EPA 8270C	Butyl benzyl phthalate
GC/MS	EPA 8270C	Caprolactam
GC/MS	EPA 8270C	Carbazole
GC/MS	EPA 8270C	Chrysene
GC/MS	EPA 8270C	Di(2-ethylhexyl) Phthalate
GC/MS	EPA 8270C	Dibenzo(a,h)anthracene
GC/MS	EPA 8270C	Dibenzofuran
GC/MS	EPA 8270C	Diethyl Phthalate

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	Dimethyl Phthalate
GC/MS	EPA 8270C	Di-n-butyl phthalate
GC/MS	EPA 8270C	Di-n-octyl phthalate
GC/MS	EPA 8270C	Dinoseb
GC/MS	EPA 8270C	Diphenylamine
GC/MS	EPA 8270C	Ethyl Methanesulfonate
GC/MS	EPA 8270C	Fluoranthene
GC/MS	EPA 8270C	Fluorene
GC/MS	EPA 8270C	Hexachlorobenzene
GC/MS	EPA 8270C	Hexachlorobutadiene
GC/MS	EPA 8270C	Hexachlorocyclopentadiene
GC/MS	EPA 8270C	Hexachloroethane
GC/MS	EPA 8270C	Hexachlorophene
GC/MS	EPA 8270C	Hexachloropropene
GC/MS	EPA 8270C	Indeno(1,2,3-c,d)pyrene
GC/MS	EPA 8270C	Isophorone
GC/MS	EPA 8270C	Isosafrole
GC/MS	EPA 8270C	m-Cresol
GC/MS	EPA 8270C	Methapyrilene
GC/MS	EPA 8270C	Methyl Methanesulfonate
GC/MS	EPA 8270C	Naphthalene
GC/MS	EPA 8270C	Nitrobenzene
GC/MS	EPA 8270C	N-nitrosodiethylamine
GC/MS	EPA 8270C	N-nitrosodimethylamine
GC/MS	EPA 8270C	N-nitrosodi-n-butylamine
GC/MS	EPA 8270C	N-nitrosodi-n-propylamine
GC/MS	EPA 8270C	N-nitrosodiphenylamine
GC/MS	EPA 8270C	N-nitrosomethylethylamine
GC/MS	EPA 8270C	N-nitrosomorpholine
GC/MS	EPA 8270C	N-nitrosopiperidine
GC/MS	EPA 8270C	N-nitrosopyrrolidine
GC/MS	EPA 8270C	o-Cresol
GC/MS	EPA 8270C	o-Toluidine
GC/MS	EPA 8270C	p-Dimethylaminoazobenzene
GC/MS	EPA 8270C	Pentachlorobenzene
GC/MS	EPA 8270C	Pentachloronitrobenzene

Non-Potable Water		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	Pentachlorophenol
GC/MS	EPA 8270C	Phenacetin
GC/MS	EPA 8270C	Phenanthrene
GC/MS	EPA 8270C	Phenol
GC/MS	EPA 8270C	Pronamide
GC/MS	EPA 8270C	Pyrene
GC/MS	EPA 8270C	Pyridine
GC/MS	EPA 8270C	Safrole
GC/MS	EPA 8270C	Thionazin
GC/PID	EPA 8021B	Benzene
GC/PID	EPA 8021B	Ethylbenzene
GC/PID	EPA 8021B	Methyl tert-butyl Ether (MTBE)
GC/PID	EPA 8021B	Toluene
GC/PID	EPA 8021B	Xylenes, Total
Gravimetric Methods	EPA 1664A	Oil and Grease
Gravimetric Methods	SM 2540B	Residue, Total
Gravimetric Methods	SM 2540C	Residue, Filterable
Gravimetric Methods	SM 2540D	Residue, Non-filterable
Gravimetric	SM 2540F	Residue, Settleable (SS - Settable Solids)
Gravimetric Methods	SM 5520B (20th ed)	Oil and Grease
IC	EPA 300.0	Bromide
IC	EPA 300.0	Chloride
IC	EPA 300.0	Fluoride
IC	EPA 300.0	Nitrate
IC	EPA 300.0	Nitrite
IC	EPA 300.0	Sulfate
ICP	EPA 200.7	Aluminum
ICP	EPA 200.7	Antimony
ICP	EPA 200.7	Arsenic
ICP	EPA 200.7	Barium
ICP	EPA 200.7	Beryllium
ICP	EPA 200.7	Boron
ICP	EPA 200.7	Cadmium
ICP	EPA 200.7	Calcium
ICP	EPA 200.7	Chromium
ICP	EPA 200.7	Cobalt

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP	EPA 200.7	Copper
ICP	EPA 200.7	Hardness (calc.)
ICP	EPA 200.7	Iron
ICP	EPA 200.7	Lead
ICP	EPA 200.7	Magnesium
ICP	EPA 200.7	Manganese
ICP	EPA 200.7	Molybdenum
ICP	EPA 200.7	Nickel
ICP	EPA 200.7	Potassium
ICP	EPA 200.7	Selenium
ICP	EPA 200.7	Silica
ICP	EPA 200.7	Silver
ICP	EPA 200.7	Sodium
ICP	EPA 200.7	Thallium
ICP	EPA 200.7	Tin
ICP	EPA 200.7	Titanium
ICP	EPA 200.7	Vanadium
ICP	EPA 200.7	Zinc
ICP	EPA 6010B	Antimony
ICP	EPA 6010B	Arsenic
ICP	EPA 6010B	Barium
ICP	EPA 6010B	Beryllium
ICP	EPA 6010B	Cadmium
ICP	EPA 6010B	Chromium
ICP	EPA 6010B	Cobalt
ICP	EPA 6010B	Copper
ICP	EPA 6010B	Lead
ICP	EPA 6010B	Molybdenum
ICP	EPA 6010B	Nickel
ICP	EPA 6010B	Selenium
ICP	EPA 6010B	Silver
ICP	EPA 6010B	Sodium
ICP	EPA 6010B	Thallium
ICP	EPA 6010B	Tin
ICP	EPA 6010B	Titanium
ICP	EPA 6010B	Vanadium

Non-Potable Water		
Technology	**Method**	**Analyte**
ICP	EPA 6010B	Zinc
ICP Calc.	SM 2340B	Hardness (calc.)
ISE	EPA 9214	Fluoride
ISE	SM 4500-Cl G	Chlorine
ISE	SM 4500-NH3 D or E (19th/20th ed)	Ammonia
ISE	SM 4500-NH3 D or E (19th/20th ed)	Total Kjeldahl Nitrogen
Titration	SM 4500-NH3 E (18th ed)	Ammonia
ISE	SM 4500-NH3 F or G (18th ed)	Ammonia
ISE	SM 4500 F-C	Fluoride
Meter	EPA 120.1	Conductivity
Meter	EPA 180.1	Turbidity
Meter	EPA 9040B	Corrosivity - pH Determination
Meter	SM 2510B	Conductivity
Meter	SM 4500-H+ B	pH
Physical	EPA 3580A	Extraction - Waste Dilution
Titrimetric	SM 2320B	Alkalinity
TOC	SM 5310C	Total Organic Carbon
Turbidimetric	SM 2130B	Turbidity
UV/VIS	EPA 420.1	Phenols, Total
UV/VIS	EPA 7196A	Chromium (VI)
UV/VIS	HACH8000	Chemical Oxygen Demand
UV/VIS	SM 3500-Cr B (21st ed)	0 Chromium (VI)
UV/VIS	SM 3500-Fe D (18th/19th ed)	Iron
UV/VIS	SM 4500-NO2 B	Nitrite
UV/VIS	SM 4500-NO3 E	Nitrate-nitrite
UV/VIS	SM 4500-NO3 E	Nitrite
UV/VIS	SM 4500-P E	Phosphate, Ortho
UV/VIS	SM 4500-P E	Phosphorus, Total
UV/VIS	SM 4500-S D	Sulfide
IC	Accutest NC SOP Dionex 291	Volatile Fatty Acids
IC	Accutest NC SOP Dionex 291	Acetic Acid
IC	Accutest NC SOP Dionex 291	Butyric Acid

Non-Potable Water		
Technology	**Method**	**Analyte**
IC	Accutest NC SOP Dionex 291	Caproic Acid
IC	Accutest NC SOP Dionex 291	Formic Acid
IC	Accutest NC SOP Dionex 291	Isobutyric Acid
IC	Accutest NC SOP Dionex 291	Isovaleric Acid
IC	Accutest NC SOP Dionex 291	Lactic Acid
IC	Accutest NC SOP Dionex 291	Propionic Acid
IC	Accutest NC SOP Dionex 291	Pyruvic Acid
IC	Accutest NC SOP Dionex 291	Valeric Acid
ICPMS	EPA 200.8	Aluminum
ICPMS	EPA 200.8	Antimony
ICPMS	EPA 200.8	Arsenic
ICPMS	EPA 200.8	Barium
ICPMS	EPA 200.8	Beryllium
ICPMS	EPA 200.8	Boron
ICPMS	EPA 200.8	Cadmium
ICPMS	EPA 200.8	Calcium
ICPMS	EPA 200.8	Chromium
ICPMS	EPA 200.8	Cobalt
ICPMS	EPA 200.8	Copper
ICPMS	EPA 200.8	Iron
ICPMS	EPA 200.8	Lead
ICPMS	EPA 200.8	Manganese
ICPMS	EPA 200.8	Magnesium
ICPMS	EPA 200.8	Molybdenum
ICPMS	EPA 200.8	Nickel
ICPMS	EPA 200.8	Potassium
ICPMS	EPA 200.8	Selenium
ICPMS	EPA 200.8	Silver
ICPMS	EPA 200.8	Sodium
ICPMS	EPA 200.8	Strontium
ICPMS	EPA 200.8	Tin
ICPMS	EPA 200.8	Titanium

Non-Potable Water		
Technology	**Method**	**Analyte**
ICPMS	EPA 200.8	Thallium
ICPMS	EPA 200.8	Zinc
ICPMS	EPA 200.8	Uranium
ICPMS	EPA 200.8	Vanadium
ICPMS	EPA 6020	Aluminum
ICPMS	EPA 6020	Antimony
ICPMS	EPA 6020	Arsenic
ICPMS	EPA 6020	Barium
ICPMS	EPA 6020	Beryllium
ICPMS	EPA 6020	Boron
ICPMS	EPA 6020	Cadmium
ICPMS	EPA 6020	Calcium
ICPMS	EPA 6020	Chromium
ICPMS	EPA 6020	Cobalt
ICPMS	EPA 6020	Copper
ICPMS	EPA 6020	Iron
ICPMS	EPA 6020	Lead
ICPMS	EPA 6020	Manganese
ICPMS	EPA 6020	Magnesium
ICPMS	EPA 6020	Molybdenum
ICPMS	EPA 6020	Nickel
ICPMS	EPA 6020	Potassium
ICPMS	EPA 6020	Selenium
ICPMS	EPA 6020	Silver
ICPMS	EPA 6020	Sodium
ICPMS	EPA 6020	Strontium
ICPMS	EPA 6020	Thallium
ICPMS	EPA 6020	Tin
ICPMS	EPA 6020	Titanium
ICPMS	EPA 6020	Vanadium
ICPMS	EPA 6020	Uranium
ICPMS	EPA 6020	Zinc
Physical	EPA 1010A	Flashpoint/Ignitability (waters)
Physical	SM 5210B	BOD
Physical	SM 2520B	Salinity
Gravimetric Methods	EPA 1664A	SGT-HEM

Non-Potable Water		
Preparation	**Method**	**Type**
Preparation	CCR Chapter11, Article 5, Appendix II	Waste Extraction Test (WET)
Preparation	EPA 1311	TCLP ZHE
Preparation	EPA 1311	TCLP Extractables
Preparation	EPA 1311	TCLP Inorganics (metals)
Preparation	EPA 1312	Synthetic Precipitation Leaching Procedure (SPLP)
Preparation	SM 4500-CN C	Cyanide, Manual Distillation
Preparation	EPA 200.7	Metals Digestion
Preparation	EPA 3010A	Metals Digestion
SepFunnel	EPA 3510C	Extraction - Liquid-Liquid Separatory Funnel
GC/MS	EPA 8270C SIM	1,4-Dioxane
GC/MS	EPA 8270C SIM	N-Nitrosodimethylamine
GC/MS	EPA 8270C SIM	Naphthalene
GC/MS	EPA 8270C SIM	2-Methylnaphthalene
GC/MS	EPA 8270C SIM	1-Methylnaphthalene
GC/MS	EPA 8270C SIM	Hexachlorocyclopentadiene
GC/MS	EPA 8270C SIM	Acenaphthylene
GC/MS	EPA 8270C SIM	Acenaphthene
GC/MS	EPA 8270C SIM	Fluorene
GC/MS	EPA 8270C SIM	Hexachlorobenzene
GC/MS	EPA 8270C SIM	Phenanthrene
GC/MS	EPA 8270C SIM	Anthracene
GC/MS	EPA 8270C SIM	Fluoranthene
GC/MS	EPA 8270C SIM	Pyrene
GC/MS	EPA 8270C SIM	Benz[a]anthracene
GC/MS	EPA 8270C SIM	Chrysene
GC/MS	EPA 8270C SIM	Benzo(b)fluoranthene
GC/MS	EPA 8270C SIM	Benzo(k)fluoranthene
GC/MS	EPA 8270C SIM	Benzo(a)pyrene
GC/MS	EPA 8270C SIM	Indeno(1,2,3-cd)pyrene
GC/MS	EPA 8270C SIM	Dibenz(a,h)anthracene
GC/MS	EPA 8270C SIM	Benzo(g,h,i)perylene

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICP	EPA 6010B	Aluminum
ICP	EPA 6010B	Calcium
ICP	EPA 6010B	Iron
ICP	EPA 6010B	Magnesium
ICP	EPA 6010B	Manganese
ICP	EPA 6010B	Potassium
GC/FID	EPA 8015B	Ethanol
GC/FID	EPA 8015B	Methanol
GC/ECD/ECD	EPA 8081A	Alpha-Chlordane
GC/ECD/ECD	EPA 8081A	Gamma-Chlordane
GC/ECD/ECD	EPA 8082	PCB 1262
GC/ECD/ECD	EPA 8082	PCB 1268
IC	EPA 9056	Chloride
IC	EPA 9056	Nitrate
IC	EPA 9056	Nitrite
IC	EPA 9056	Sulfate
GC/MS	LUFT GC/MS	Total Petroleum Hydrocarbons-Gasoline
GC/FID	NWTPH-Dx	Diesel-range Total Petroleum Hydrocarbons
GC/FID	NWTPH-Gx	Gasoline-range Organics
GC/FID	AK101	Gasoline-range Organics
GC/FID	AK-102	Diesel Range Organics
GC/FID	AK-103	Residual Range Organics
GC/MS	AK101-MS	Gasoline-range Organics
IC	EPA 7199	Chromium VI
GC/FID	EPA 8015AZ1	Arizona TPH
Colorimetric	SM4500-CN E	Cyanide, Total
Colorimetric	SM4500-CN G	Cyanide, amenable
CVAA	EPA 7470A	Mercury
CVAA	EPA 7471A	Mercury
GC/ECD/ECD	EPA 8081A	4,4'-DDD
GC/ECD/ECD	EPA 8081A	4,4'-DDE
GC/ECD/ECD	EPA 8081A	4,4'-DDT
GC/ECD/ECD	EPA 8081A	a-BHC
GC/ECD/ECD	EPA 8081A	Aldrin
GC/ECD/ECD	EPA 8081A	b-BHC
GC/ECD/ECD	EPA 8081A	Chlordane (tech.)

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/ECD/ECD	EPA 8081A	d-BHC
GC/ECD/ECD	EPA 8081A	Dieldrin
GC/ECD/ECD	EPA 8081A	Endosulfan I
GC/ECD/ECD	EPA 8081A	Endosulfan II
GC/ECD/ECD	EPA 8081A	Endosulfan Sulfate
GC/ECD/ECD	EPA 8081A	Endrin
GC/ECD/ECD	EPA 8081A	Endrin Aldehyde
GC/ECD/ECD	EPA 8081A	Endrin Ketone
GC/ECD/ECD	EPA 8081A	g-BHC (Lindane)
GC/ECD/ECD	EPA 8081A	Heptachlor
GC/ECD/ECD	EPA 8081A	Heptachlor Epoxide
GC/ECD/ECD	EPA 8081A	Methoxychlor
GC/ECD/ECD	EPA 8081A	Toxaphene
GC/ECD/ECD	EPA 8082	PCB-1016
GC/ECD/ECD	EPA 8082	PCB-1221
GC/ECD/ECD	EPA 8082	PCB-1232
GC/ECD/ECD	EPA 8082	PCB-1242
GC/ECD/ECD	EPA 8082	PCB-1248
GC/ECD/ECD	EPA 8082	PCB-1254
GC/ECD/ECD	EPA 8082	PCB-1260
GC/ECD	EPA 8011	EDB and DBCP
GC/FID	EPA 8015B	Diesel-range Total Petroleum Hydrocarbons
GC/FID	EPA 8015B	Gasoline-range Organics
GC/MS	EPA 8260B	1,1,1,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,1-Trichloroethane
GC/MS	EPA 8260B	1,1,2,2-Tetrachloroethane
GC/MS	EPA 8260B	1,1,2-Trichloro-1,2,2-Trifluoroethane
GC/MS	EPA 8260B	1,1,2-Trichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethane
GC/MS	EPA 8260B	1,1-Dichloroethene
GC/MS	EPA 8260B	1,1-Dichloropropene
GC/MS	EPA 8260B	1,2,3-Trichlorobenzene
GC/MS	EPA 8260B	1,2,3-Trichloropropane
GC/MS	EPA 8260B	1,2,4-Trichlorobenzene
GC/MS	EPA 8260B	1,2,4-Trimethylbenzene
GC/MS	EPA 8260B	1,2-Dibromoethane

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B	1,2-Dibromo-3-chloropropane (DBCP)
GC/MS	EPA 8260B	1,2-Dichlorobenzene
GC/MS	EPA 8260B	1,2-Dichloroethane
GC/MS	EPA 8260B	1,2-Dichloropropane
GC/MS	EPA 8260B	1,3,5-Trimethylbenzene
GC/MS	EPA 8260B	1,3-Dichlorobenzene
GC/MS	EPA 8260B	1,3-Dichloropropane
GC/MS	EPA 8260B	1,4-Dichlorobenzene
GC/MS	EPA 8260B	1,4-Dioxane
GC/MS	EPA 8260B	2,2-Dichloropropane
GC/MS	EPA 8260B	2-Chloroethyl Vinyl Ether
GC/MS	EPA 8260B	2-Chlorotoluene
GC/MS	EPA 8260B	2-Hexanone (MBK)
GC/MS	EPA 8260B	4-Chlorotoluene
GC/MS	EPA 8260B	4-Methyl-2-pentanone (MIBK)
GC/MS	EPA 8260B	Acetone
GC/MS	EPA 8260B	Acetonitrile
GC/MS	EPA 8260B	Acrolein
GC/MS	EPA 8260B	Acrylonitrile
GC/MS	EPA 8260B	Allyl Chloride
GC/MS	EPA 8260B	Benzene
GC/MS	EPA 8260B	Benzyl Chloride
GC/MS	EPA 8260B	Bromobenzene
GC/MS	EPA 8260B	Bromochloromethane
GC/MS	EPA 8260B	Bromodichloromethane
GC/MS	EPA 8260B	Bromoform
GC/MS	EPA 8260B	Bromomethane
GC/MS	EPA 8260B	Carbon Disulfide
GC/MS	EPA 8260B	Carbon Tetrachloride
GC/MS	EPA 8260B	Chlorobenzene
GC/MS	EPA 8260B	Chloroethane
GC/MS	EPA 8260B	Chloroform
GC/MS	EPA 8260B	Chloromethane
GC/MS	EPA 8260B	Chloroprene
GC/MS	EPA 8260B	cis-1,2-Dichloroethene
GC/MS	EPA 8260B	cis-1,3-Dichloropropene

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B	cis-1,4-Dichloro-2-butene
GC/MS	EPA 8260B	Cyclohexane
GC/MS	EPA 8260B	Dibromochloromethane
GC/MS	EPA 8260B	Dibromomethane
GC/MS	EPA 8260B	Dichlorodifluoromethane
GC/MS	EPA 8260B	Ethyl Methacrylate
GC/MS	EPA 8260B	Ethyl tert-butyl Ether (ETBE)
GC/MS	EPA 8260B	Ethylbenzene
GC/MS	EPA 8260B	Hexachlorobutadiene
GC/MS	EPA 8260B	Iodomethane
GC/MS	EPA 8260B	Isobutyl Alcohol
GC/MS	EPA 8260B	Isopropylbenzene
GC/MS	EPA 8260B	Methacrylonitrile
GC/MS	EPA 8260B	Methyl Acetate
GC/MS	EPA 8260B	Methylcyclohexane
GC/MS	EPA 8260B	Methyl Ethyl Ketone
GC/MS	EPA 8260B	Methyl Methacrylate
GC/MS	EPA 8260B	Methyl tert-butyl Ether (MTBE)
GC/MS	EPA 8260B	Methylene Chloride
GC/MS	EPA 8260B	Naphthalene
GC/MS	EPA 8260B	n-Butylbenzene
GC/MS	EPA 8260B	N-propylbenzene
GC/MS	EPA 8260B	p-Isopropyltoluene
GC/MS	EPA 8260B	Pentachloroethane
GC/MS	EPA 8260B	Propionitrile
GC/MS	EPA 8260B	sec-Butylbenzene
GC/MS	EPA 8260B	Styrene
GC/MS	EPA 8260B	tert-Amyl Methyl Ether (TAME)
GC/MS	EPA 8260B	tert-Butyl Alcohol (TBA)
GC/MS	EPA 8260B	tert-Butylbenzene
GC/MS	EPA 8260B	Tetrachloroethene
GC/MS	EPA 8260B	Tetrahydrofuran
GC/MS	EPA 8260B	Toluene
GC/MS	EPA 8260B	trans-1,2-Dichloroethene
GC/MS	EPA 8260B	trans-1,3-Dichloropropene
GC/MS	EPA 8260B	trans-1,4-Dichloro-2-butene

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8260B	Trichloroethene
GC/MS	EPA 8260B	Trichlorofluoromethane
GC/MS	EPA 8260B	Vinyl Acetate
GC/MS	EPA 8260B	Vinyl Chloride
GC/MS	EPA 8260B	Xylenes, Total
GC/MS	EPA 8270C	1,1'Biphenyl
GC/MS	EPA 8270C	1,2,4,5-Tetrachlorobenzene
GC/MS	EPA 8270C	1,2,4-Trichlorobenzene
GC/MS	EPA 8270C	1,2-Dichlorobenzene
GC/MS	EPA 8270C	1,2-Dinitrobenzene
GC/MS	EPA 8270C	1,3,5-Trinitrobenzene
GC/MS	EPA 8270C	1,3-Dichlorobenzene
GC/MS	EPA 8270C	1,3-Dinitrobenzene
GC/MS	EPA 8270C	1,4-Dichlorobenzene
GC/MS	EPA 8270C	1,4-Dinitrobenzene
GC/MS	EPA 8270C	1,4 Dioxane SIM
GC/MS	EPA 8270C	1,4-Naphthoquinone
GC/MS	EPA 8270C	1,4-Phenylenediamine
GC/MS	EPA 8270C	1-Naphthylamine
GC/MS	EPA 8270C	2,3,4,6-Tetrachlorophenol
GC/MS	EPA 8270C	2,4,5-Trichlorophenol
GC/MS	EPA 8270C	2,4,6-Trichlorophenol
GC/MS	EPA 8270C	2,4-Dichlorophenol
GC/MS	EPA 8270C	2,4-Dimethylphenol
GC/MS	EPA 8270C	2,4-Dinitrophenol
GC/MS	EPA 8270C	2,4-Dinitrotoluene
GC/MS	EPA 8270C	2,6-Dichlorophenol
GC/MS	EPA 8270C	2,6-Dinitrotoluene
GC/MS	EPA 8270C	2-Acetylaminofluorene
GC/MS	EPA 8270C	2-Chloronaphthalene
GC/MS	EPA 8270C	2-Chlorophenol
GC/MS	EPA 8270C	2-Methyl-4,6-dinitrophenol
GC/MS	EPA 8270C	2-Methylnaphthalene
GC/MS	EPA 8270C	2-Naphthylamine
GC/MS	EPA 8270C	2-Nitroaniline
GC/MS	EPA 8270C	2-Nitrophenol

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	2-Picoline
GC/MS	EPA 8270C	3,3'-Dichlorobenzidine
GC/MS	EPA 8270C	3,3'-Dimethoxybenzidine
GC/MS	EPA 8270C	3,3'-Dimethylbenzidine
GC/MS	EPA 8270C	3-Methylcholanthrene
GC/MS	EPA 8270C	3-Methylphenol
GC/MS	EPA 8270C	3-Nitroaniline
GC/MS	EPA 8270C	4-Aminobiphenyl
GC/MS	EPA 8270C	4-Bromophenyl Phenyl Ether
GC/MS	EPA 8270C	4-Chloro-3-methylphenol
GC/MS	EPA 8270C	4-Chloroaniline
GC/MS	EPA 8270C	4-Chlorophenyl Phenyl Ether
GC/MS	EPA 8270C	4-Methylphenol
GC/MS	EPA 8270C	4-Nitroaniline
GC/MS	EPA 8270C	4-Nitrophenol
GC/MS	EPA 8270C	7,12-Dimethylbenz(a)anthracene
GC/MS	EPA 8270C	a,a-Dimethylphenethylamine
GC/MS	EPA 8270C	Acenaphthene
GC/MS	EPA 8270C	Acenaphthylene
GC/MS	EPA 8270C	Acetophenone
GC/MS	EPA 8270C	Aniline
GC/MS	EPA 8270C	Anthracene
GC/MS	EPA 8270C	Aramite
GC/MS	EPA 8270C	Atrazine
GC/MS	EPA 8270C	Benzaldehyde
GC/MS	EPA 8270C	Benzidine
GC/MS	EPA 8270C	Benzo(a)anthracene
GC/MS	EPA 8270C	Benzo(a)pyrene
GC/MS	EPA 8270C	Benzo(b)fluoranthene
GC/MS	EPA 8270C	Benzo(g,h,i)perylene
GC/MS	EPA 8270C	Benzo(k)fluoranthene
GC/MS	EPA 8270C	Benzoic Acid
GC/MS	EPA 8270C	Benzyl Alcohol
GC/MS	EPA 8270C	Bis(2-chloroethoxy)methane
GC/MS	EPA 8270C	Bis(2-chloroethyl) Ether
GC/MS	EPA 8270C	bis(2-Chloroisopropyl)ether

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	bis(2-Ethylhexyl)phthalate
GC/MS	EPA 8270C	Butyl benzyl phthalate
GC/MS	EPA 8270C	Caprolactam
GC/MS	EPA 8270C	Carbazole
GC/MS	EPA 8270C	Chrysene
GC/MS	EPA 8270C	Dibenzo(a,h)anthracene
GC/MS	EPA 8270C	Dibenzofuran
GC/MS	EPA 8270C	Diethyl Phthalate
GC/MS	EPA 8270C	Dimethyl Phthalate
GC/MS	EPA 8270C	Di-n-butyl phthalate
GC/MS	EPA 8270C	Di-n-octyl phthalate
GC/MS	EPA 8270C	Diphenylamine
GC/MS	EPA 8270C	Ethyl Methanesulfonate
GC/MS	EPA 8270C	Fluoranthene
GC/MS	EPA 8270C	Fluorene
GC/MS	EPA 8270C	Hexachlorobenzene
GC/MS	EPA 8270C	Hexachlorobutadiene
GC/MS	EPA 8270C	Hexachlorocyclopentadiene
GC/MS	EPA 8270C	Hexachloroethane
GC/MS	EPA 8270C	Hexachlorophene
GC/MS	EPA 8270C	Hexachloropropene
GC/MS	EPA 8270C	Indeno(1,2,3-c,d)pyrene
GC/MS	EPA 8270C	Isophorone
GC/MS	EPA 8270C	Isosafrole
GC/MS	EPA 8270C	m-Cresol
GC/MS	EPA 8270C	Methapyrilene
GC/MS	EPA 8270C	Methyl Methanesulfonate
GC/MS	EPA 8270C	Naphthalene
GC/MS	EPA 8270C	Nitrobenzene
GC/MS	EPA 8270C	N-nitrosodiethylamine
GC/MS	EPA 8270C	N-nitrosodimethylamine
GC/MS	EPA 8270C	N-nitrosodi-n-butylamine
GC/MS	EPA 8270C	N-nitrosodi-n-propylamine
GC/MS	EPA 8270C	N-nitrosodiphenylamine
GC/MS	EPA 8270C	N-nitrosomethylethylamine
GC/MS	EPA 8270C	N-nitrosomorpholine

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
GC/MS	EPA 8270C	N-nitrosopiperidine
GC/MS	EPA 8270C	N-nitrosopyrrolidine
GC/MS	EPA 8270C	o-Cresol
GC/MS	EPA 8270C	o-Toluidine
GC/MS	EPA 8270C	p-Dimethylaminoazobenzene
GC/MS	EPA 8270C	Pentachlorobenzene
GC/MS	EPA 8270C	Pentachloronitrobenzene
GC/MS	EPA 8270C	Pentachlorophenol
GC/MS	EPA 8270C	Phenacetin
GC/MS	EPA 8270C	Phenanthrene
GC/MS	EPA 8270C	Phenol
GC/MS	EPA 8270C	Pronamide
GC/MS	EPA 8270C	Pyrene
GC/MS	EPA 8270C	Pyridine
GC/MS	EPA 8270C	Safrole
GC/MS	EPA 8270C	Thionazin
GC/PID	EPA 8021B	Benzene
GC/PID	EPA 8021B	Ethylbenzene
GC/PID	EPA 8021B	Methyl tert-butyl Ether (MTBE)
GC/PID	EPA 8021B	Toluene
GC/PID	EPA 8021B	Xylenes, Total
IC	EPA 300.0	Bromide
IC	EPA 300.0	Chloride
IC	EPA 300.0	Fluoride
IC	EPA 300.0	Nitrate
IC	EPA 300.0	Nitrite
IC	EPA 300.0	Sulfate
IC	EPA 314.0 MOD	Perchlorate
ICP	EPA 6010B	Antimony
ICP	EPA 6010B	Arsenic
ICP	EPA 6010B	Barium
ICP	EPA 6010B	Beryllium
ICP	EPA 6010B	Cadmium
ICP	EPA 6010B	Chromium
ICP	EPA 6010B	Cobalt
ICP	EPA 6010B	Copper

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICP	EPA 6010B	Lead
ICP	EPA 6010B	Molybdenum
ICP	EPA 6010B	Nickel
ICP	EPA 6010B	Selenium
ICP	EPA 6010B	Silver
ICP	EPA 6010B	Sodium
ICP	EPA 6010B	Thallium
ICP	EPA 6010B	Vanadium
ICP	EPA 6010B	Zinc
IC	EPA 9056	Fluoride
Meter	EPA 9045C	Corrosivity - pH Determination
ICPMS	EPA 6020	Aluminum
ICPMS	EPA 6020	Antimony
ICPMS	EPA 6020	Arsenic
ICPMS	EPA 6020	Barium
ICPMS	EPA 6020	Beryllium
ICPMS	EPA 6020	Boron
ICPMS	EPA 6020	Cadmium
ICPMS	EPA 6020	Calcium
ICPMS	EPA 6020	Chromium
ICPMS	EPA 6020	Cobalt
ICPMS	EPA 6020	Copper
ICPMS	EPA 6020	Iron
ICPMS	EPA 6020	Lead
ICPMS	EPA 6020	Magnesium
ICPMS	EPA 6020	Manganese
ICPMS	EPA 6020	Molybdenum
ICPMS	EPA 6020	Nickel
ICPMS	EPA 6020	Potassium
ICPMS	EPA 6020	Selenium
ICPMS	EPA 6020	Silver
ICPMS	EPA 6020	Sodium
ICPMS	EPA 6020	Strontium
ICPMS	EPA 6020	Thallium
ICPMS	EPA 6020	Tin
ICPMS	EPA 6020	Titanium

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
ICPMS	EPA 6020	Uranium
ICPMS	EPA 6020	Vanadium
ICPMS	EPA 6020	Zinc
Physical	SW846 Chapter 7	Flashpoint/Ignitability (soils)
GC/MS	EPA 8270C SIM	1,4-Dioxane
GC/MS	EPA 8270C SIM	N-Nitrosodimethylamine
GC/MS	EPA 8270C SIM	Naphthalene
GC/MS	EPA 8270C SIM	2-Methylnaphthalene
GC/MS	EPA 8270C SIM	1-Methylnaphthalene
GC/MS	EPA 8270C SIM	Hexachlorocyclopentadiene
GC/MS	EPA 8270C SIM	Acenaphthylene
GC/MS	EPA 8270C SIM	Acenaphthene
GC/MS	EPA 8270C SIM	Fluorene
GC/MS	EPA 8270C SIM	Hexachlorobenzene
GC/MS	EPA 8270C SIM	Phenanthrene
GC/MS	EPA 8270C SIM	Anthracene
GC/MS	EPA 8270C SIM	Fluoranthene
GC/MS	EPA 8270C SIM	Pyrene
GC/MS	EPA 8270C SIM	Benz[a]anthracene
GC/MS	EPA 8270C SIM	Chrysene
GC/MS	EPA 8270C SIM	Benzo(b)fluoranthene
GC/MS	EPA 8270C SIM	Benzo(k)fluoranthene
GC/MS	EPA 8270C SIM	Benzo(a)pyrene
GC/MS	EPA 8270C SIM	Indeno(1,2,3-cd)pyrene
GC/MS	EPA 8270C SIM	Dibenz(a,h)anthracene
GC/MS	EPA 8270C SIM	Benzo(g,h,i)perylene
Preparation	**Method**	**Type**
ASE	EPA 3545A	Extraction - Accelerated Solvent
Physical	EPA 3580A	Extraction - Waste Dilution
Preparation	CCR Chapter11, Article 5, Appendix II	Waste Extraction Test (WET)
Preparation	EPA 1311	Toxicity Characteristic Leaching Procedure (TCLP)
Preparation	EPA 1312	Synthetic Precipitation Leaching Procedure (SPLP)
Preparation	EPA 3060A	Alkaline Digestion for Hexavalent Chromium
Preparation	EPA 3050B	Metals Digestion
Preparation	EPA 3550C	Sonication

Solid and Chemical Materials		
Technology	**Method**	**Analyte**
Preparation	EPA 9010B	Cyanide, Manual Distillation
Preparation	EPA 9010C	Cyanide, Manual Distillation
SepFunnel	EPA 3510C	Extraction - Liquid-Liquid Separatory Funnel
UV/VIS	EPA 9014	Cyanide, Colorimetric
UV/VIS	EPA 9065	Phenols, Total
UV/VIS	EPA 7196A	Chromium (VI)
Preparation	EPA 3546	Microwave digestion
Additional		
Physical	ASTM D93-08	Flashpoint/Ignitability (solvents and oils)

Notes:

1) This laboratory offers commercial testing service.

Approved by: _____ Date: June 10, 2014

R. Douglas Leonard
Chief Technical Officer

Reissued: 5/1/13 Revised: 7/17/13 Revised: 6/10/14

Appendix D
Site Safety and Health Plan

Final

Site Safety and Health Plan
Removal Action at Salvage Yard
MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JPHH HI 96860-3139

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

Final

Site Safety and Health Plan
Removal Action at Salvage Yard
MARINE CORPS BASE HAWAII, KANEOHE, HAWAII

June 2015

Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Hawaii
400 Marshall Road
JPHH HI 96860-3139

Prepared by:

Cape Environmental Management, Inc

155 Kapalulu Place, Suite 111
Honolulu, HI 96819

Prepared under:

Small Business Remedial Action Contract
Contract Number N62742-10-D-1804, CTO 0025

CAPE

SIGNATURE PAGE

SITE SAFETY AND HEALTH PLAN
FOR
REMOVAL ACTION AT SALVAGE YARD, MCB HAWAII, KANEOHE, HAWAII

June 2015

I hereby certify that the enclosed Site Safety and Health Plan is proposed to be incorporated with Contract Number N62742-10-D-1804, Contract Task Order 0025, "*Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii"* and is submitted for government approval.

This Site Safety and Health Plan has been prepared to be in compliance with requirements of: Naval Facilities Engineering Command (NAVFAC) Pacific Small Business Remedial Action Contract III specifications for Contract Number N62742-10-D-1804; NAVFAC Hawaii CTO 0025 Performance Work Statement (PWS) entitled "*Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii",* dated 17 September 2014; United States Army Corps of Engineers (USACE) "Safety and Health Requirements Manual" (EM 385-1-1), 15 Sep 2008 edition and incorporated changes); and Occupational Safety and Health (OSHA) standards.

***Plan Reviewed By*:**

	8 June 2015
CAPE Site Safety and Health Officer: Emily Molhoek	**Date**

***Plan Prepared and Approved By*:**

	8 June 2015
CAPE Safety and Health Manager: Glen Mayekawa, CIH	**Date**

***Plan Concurrence*:**

	8 June 2015
CAPE Project Manager: Jonathan Borr	**Date**

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS v

1. SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION 1-1

- 1.1 Site Information 1-2
- 1.2 Contamination Characterization 1-2
- 1.3 Scope of Work 1-2
- 1.4 CAPE Safety And Health Policy Statement 1-6
- 1.5 CAPE Safety Record 1-6
- 1.6 CAPE Accident Trend Analysis 1-7
- 1.7 Accident Experience Goal 1-7

2. HAZARD/RISK ANALYSIS 2-1

- 2.1 Chemical Hazards 2-1
  - 2.1.1 Nature and Extent of Contamination 2-1
  - 2.1.2 Chemical Hazard Information 2-2
  - 2.1.3 Polychlorinated Biphenyls 2-3
  - 2.1.4 Airborne Dust Equivalent Action Level Calculation 2-3
  - 2.1.5 PCB Airborne Dust Equivalent Action Level Calculation 2-4
- 2.2 Risk Analysis/Exposure Assessment 2-4
  - 2.2.1 PCB Exposure Risk Analysis/Exposure Assessment 2-4
  - 2.2.2 Silica Exposure Risk Analysis/Exposure Assessment 2-4
- 2.3 Hazard Communication 2-4
- 2.4 Physical Hazards 2-5
- 2.5 Biological Hazards 2-8
- 2.6 Radiological Hazards 2-9
- 2.7 Ordnance and Explosives Hazards 2-9
- 2.8 Dust Control 2-10
- 2.9 Activity Hazard Analyses 2-10

3. STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES 3-1

- 3.1 Key Project Personnel 3-1
- 3.2 Project Team Personnel S&H Responsibilities 3-1
  - 3.2.1 Project Manager 3-1
  - 3.2.2 Site Superintendent 3-2
  - 3.2.3 Safety and Health Manager 3-2
  - 3.2.4 Site Safety and Health Officer 3-3
- 3.3 Site Visitors 3-4
- 3.4 Subcontractors 3-4

4. TRAINING 4-1

- 4.1 Training Requirements 4-1
- 4.2 Safety Indoctrination Briefing 4-1
- 4.3 Hazard Communication Training 4-1
- 4.4 Safety Meetings 4-2
- 4.5 Monthly Supervisor Safety Meetings 4-2
- 4.6 HAZWOPER Training 4-2
- 4.7 Project-Specific PPE Training 4-2
- 4.8 Excavation Competent Person Training 4-2
- 4.9 Heavy Equipment Operator Training 4-2
- 4.10 Powered Industrial Truck Operator Training 4-3

TABLE OF CONTENTS

4.11 PCB Health Hazard Training 4-3
4.12 Emergency Response Plan Training 4-3

5. PERSONAL PROTECTIVE EQUIPMENT 5-1

5.1 Levels of Protection 5-1
5.2 PPE Requirements 5-1
5.3 Levels of Protection for Major Work Tasks 5-1
5.3.1 Mobilization and Site Preparation 5-2
5.3.2 Soil Sampling 5-2
5.3.3 Contaminated Soil Excavation and Loading 5-2
5.3.4 Waste Transportation and Disposal 5-2
5.3.5 Heavy Equipment Decontamination 5-2
5.3.6 Site Restoration and Demobilization 5-2
5.4 Levels of Protection PPE Description 5-2
5.4.1 Level C Protection 5-2
5.4.2 Modified Level D Protection 5-3
5.4.3 Level D Protection 5-3
5.5 Respiratory Protection 5-3

6. MEDICAL SURVEILLANCE 6-1

6.1 Medical Examinations and Reports 6-1

7. EXPOSURE MONITORING/AIR SAMPLING PROGRAM 7-1

7.1 Air Contaminants 7-1
7.2 Air Monitoring Plan 7-1
7.3 Airborne Dust 7-1

8. HEAT/COLD STRESS 8-1

8.1 Heat Stress 8-1
8.2 Heat Strain Monitoring 8-1
8.2.1 Heart Rate Monitoring 8-1
8.2.2 Body Temperature Monitoring 8-2
8.2.3 ACGIH Guidelines for Limiting Heat Strain 8-2

9. STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES 9-1

9.1 CAPE Safety and Health Program Standard Operating Procedures 9-1
9.2 Health and Safety Documentation 9-1
9.3 Safety Inspections 9-1
9.4 Site Safety and Health Plan Forms 9-1

10. SITE CONTROL MEASURES 10-1

10.1 Site Work Zones 10-1
10.1.1 Exclusion Zone 10-1
10.1.2 Contamination Reduction Zone 10-1
10.1.3 Support Zone 10-1
10.1.4 Location of Site Work Zones 10-1
10.2 Site Control Log 10-1
10.3 Site Communications 10-1
10.4 Site Security 10-2

TABLE OF CONTENTS

10.5 Site Visitors 10-2

11. PERSONAL HYGIENE AND DECONTAMINATION 11-1

11.1 Personal Hygiene 11-1
11.2 Personnel Decontamination 11-1
11.3 Dry Decontamination Procedures 11-1
11.4 Decontamination Procedures – Wet Method 11-2

12. EQUIPMENT DECONTAMINATION 12-1

12.1 Equipment Decontamination Facilities 12-1
12.2 Equipment Decontamination Procedures 12-1

13. EMERGENCY PROCEDURES 13-1

13.1 Emergency Response Plan 13-1
13.1.1 Pre-Emergency Planning and Coordination with Outside Parties 13-1
13.1.2 Personnel Roles, Lines of Authority, Training and Communication 13-2
13.1.3 Emergency Recognition and Prevention 13-2
13.1.4 Safe Distances and Places of Refuge 13-2
13.1.5 Site Security and Control 13-2
13.1.6 Evacuation Routes and Procedures 13-3
13.1.7 Decontamination 13-3
13.1.8 Emergency Medical Treatment and First-Aid 13-3
13.1.9 Emergency Alerting and Response Procedures 13-4
13.1.10 Critique of Response and Follow-up 13-5
13.1.11 PPE and Emergency Equipment 13-5

14. REFERENCES 14-1

TABLES

2-1 Chemical Hazard Information
2-2 AHAs Applicable to this CTO
3-1 Project Personnel and Contact Information
4-1 Training Requirements
7-1 Air Monitoring Plan

FIGURES

1-1 Site Map

ATTACHMENTS

1 Site Safety and Health Plan Forms

Activity Hazard Analysis Preparatory Phase Training Log
Air Monitoring Log
Calibration Log: Direct-Reading Monitoring Instrument
Emergency Eyewash Inspection Log
Emergency Medical Notification Form
Equipment Decontamination Release Authorization
Fire Extinguisher Inspection Log
First-Aid Kit Inspection Log

First-Aid Treatment Log
Hazardous Substance Inventory List
Heavy Equipment Inspection Report
Incident Reporting and Investigation Procedures Posting
Incident Report by Supervisor
Incident Statement by Employee
Incident Statement by Witness
Injury and Illness Report
Inspection Checklist: Construction Safety (R&I)
Property Damage, Loss, and General Liability Report
Safety and Occupational Health Deficiency Tracking List
Safety Inspection Report
Site Control Log
Site Control Log for Visitors
Site Safety and Health Plan Change Approval Form
Site Safety and Health Plan Distribution to Subcontractor
Site Safety and Health Plan Review
Tailgate Safety Meeting Record
Training Attendance Roster
Vehicle Accident Report
Visitor Information and Acknowledgement Form
NAVFAC Contractor Significant Incident Report (CSIR) Form
NAVFAC Contractor Site Safety Assessment Form

2 Emergency Contact List and Emergency Hospital Route Map

Emergency Contact List
Emergency Hospital Route Map

3. Subcontractor List

Subcontractor List

4 Resumes, Designations, and Certifications

SSHO Resumes
Designated First-Aid Responder List
Designated Competent Person List
Certifications for Project Personnel

5 Activity Hazard Analyses

AHA-01: Mobilization and Site Preparation
AHA-02: Soil Sampling
AHA-03: Contaminated Soil Excavation and Loading
AHA-04: Waste Transportation and Disposal
AHA-05: Heavy Equipment Decontamination
AHA-06: Site Restoration and Demobilization

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
AHA	activity hazard analysis
ANSI	American National Standards Institute
APP	Accident Prevention Plan
APR	air-purifying respirator
BBP	bloodborne pathogen
bgs	below ground surface
bpm	beats per minute
BT	body temperature
CAPE	Cape Environmental Management Inc
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
COC	chemical of concern
COR	Contracting Officer's Representative
CP	Competent Person
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
CSHP	CAPE Safety and Health Program
CSIR	Contractor Significant Incident Report
CSP	Certified Safety Professional
CTO	contract task order
CY	cubic yard
dBA	decibels on the A-weighted scale
DAFW	days away from work
DART	days away, restricted or transferred
DDT	dichlorodiphenyltrichlorethane
DEET	n,n-diethyl-m-toluamide
DOH	State of Hawaii, Department of Health
DU	decision unit
EA	environmental assessment
Element	Element Environmental, LLC
EM-385-1-1	USACE Safety and Health Requirements Manual
EMR	experience modification rate
EMS	emergency medical services
EOD	explosive ordnance disposal
EPA	U.S. Environmental Protection Agency
EZ	exclusion zone
ºF	degrees
GFCI	ground-fault circuit interrupter
HAZWOPER	Hazardous Waste Operations and Emergency Response
HR	heart rate
HSPP	Health and Safety Program Plan
IAS	initial assessment study
IAW	in accordance with
kV	Kilovolts
LO/TO	lockout/tagout
mg/kg	milligrams per kilogram
mg/m^3	milligrams per cubic meter

ACRONYMS AND ABBREVIATIONS

MCB	Marine Corps Base
MEC	munitions and explosives of concern
MI	Multi-increment
MSDS	material safety data sheet
NAVFAC	Naval Facilities Engineering Command
NRR	noise reduction rating
OEL	occupational exposure limit
OSHA	Occupational Safety and Health Administration
PACDIV	Pacific Division, Naval Facilities Engineering Command
PAH	Polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
PEL	permissible exposure limit
PM	Project Manager
PNOS	particles not otherwise specified
Poly	polyethylene
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
PWS	performance work statement
QC	quality control
QCO	Quality Control Officer
RA	Removal Action
RPM	Remedial Project Manager
RSE	Removal Site Evaluation
S&H	safety and health
SAP	Sampling and Analysis Plan
SDS	safety data sheet
sHHRA	screening Human Health Risk Assessment
SI	site investigation
SLERA	Screening Level Ecological Risk Assessment
SHM	Safety and Health Manager
SOP	standard operating procedure
SS	Site Superintendent
SSHP	Site Safety and Health Plan
SSHO	Site Safety and Health Officer
STEL	short-term exposure limit
TLV	threshold limit value
TSCA	Toxic Substance Control Act
TSDF	Treatment, Storage and Disposal Facility
TWA	time-weighted average
USACE	United States Army Corps of Engineers
WP	Work Plan

1. SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

This Site Safety and Health Plan (SSHP) presents contractor safety and health (S&H) procedures to be implemented by Cape Environmental Management Inc (CAPE) for services associated with the Naval Facilities Engineering Command (NAVFAC) Hawaii, Removal Action (RA) at Salvage Yard, Marine Corps Base (MCB) Hawaii, Kaneohe, Hawaii project.

The SSHP is implemented in conjunction with the contract Health and Safety Program Plan (HSPP)/Accident Prevention Plan (APP) for the NAVFAC Pacific Small Business Remedial Action Contract III (Contract Number N62742-10-D-1804) and CAPE S&H Program (CSHP) standard operating procedures (SOPs).

The SSHP has been prepared to meet requirements of: Occupational Safety and Health Administration (OSHA) standards, 29 Code of Federal Regulations (CFR) Part 1910 and 29 CFR Part 1926; U.S. Army Corps of Engineers (USACE) "Safety and Health Requirements Manual" (EM 385-1-1; 15 July 2011 edition); NAVFAC Pacific Small Business Remedial Action Contract III specifications; and NAVFAC Pacific performance work statement (PWS) entitled "*Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii* ", dated 17 September 2014.

This SSHP serves as the primary S&H guidance for CAPE operations necessary to accomplish project objectives. The purpose of the SSHP is to identify and evaluate S&H hazards at the project worksite and to prescribe safety control measures to be implemented. This SSHP has been organized into the following sections as presented in EM 385-1-1 Section 28 "Hazardous Waste Operations and Emergency Response (HAZWOPER)":

- Site Description and Contamination Characterization
- Hazard/Risk Analysis
- Staff Organization, Qualifications, and Responsibilities
- Training
- Personal Protective Equipment (PPE)
- Medical Surveillance
- Exposure Monitoring/Air Sampling Program
- Heat Stress
- Standard Operating Safety Procedures, Engineering Controls, and Work Practices
- Site Control Measures
- Personal Hygiene and Decontamination
- Equipment Decontamination
- Emergency Equipment and First-Aid
- Emergency Response and Contingency Procedures.

The CAPE Project Manager (PM), Site Superintendent (SS), dual hat Quality Control Officer (QCO)/Site Safety and Health Officer (SSHO), and Safety and Health Manager (SHM) primarily implement the SSHP in coordination with the NAVFAC Task Order Contracting Officer's Representative (COR) and Remedial Project Manager (RPM). Compliance with the SSHP is required of all CAPE personnel, subcontractors,

and associated third parties onsite. A copy of the SSHP will be maintained onsite during work activities and will be available for inspection and review by site or agency personnel. Field personnel will review applicable aspects of the SSHP before site work and will sign an acknowledgment form (see Attachment 1) indicating that they have reviewed the pertinent aspects of the plan.

The contents of the SSHP may be revised and/or amended should additional information become available regarding the hazards present at the site and/or should significant changes occur in the scope of work, operational procedures, site hazards, and/or hazard control measures. The SSHP may be modified by the SSHO upon review and approval of the SHM, PM, and Task Order COR. Changes to the SSHP are documented on a SSHP Change Approval form. Field personnel are informed of changes to the SSHP through safety meetings and written addendum or revision to the SSHP.

1.1 SITE INFORMATION

The Salvage Yard is located in the south-central portion of Kaneohe MCB Hawaii, southeast of the intersection of First and D Streets, adjacent to Kaneohe Bay. MCB Hawaii is located on the southeast (windward) side of Oahu, encompassing the entire 2,951 acre Mokapu Peninsula (Figure 1-1). The Site is surrounded by the inlet to the marina to the West, a wetland area (known as the Salvage Yard Wetland) which faces Kaneohe Bay to the south and east, and open space and Buildings 139 and 140 (occupied by the Installation's Public Works Department) to the north.

The MCB Hawaii uses the majority of the Site to store unused equipment and materials. Currently the Site contains the Marina Secondary Boat Storage Area (in the western portion, used by Marina Operations for boat storage), the Vehicle Impoundment Lot, a covered concrete pad area used for storage of old generators, the abandoned Dry Ice Blast Building (Building 6502), a Wetland area, stockpiled soil, and excess material storage including wooden pallets, construction lumber, toilets, large diameter clay pipes, water heaters, air conditioner units, concrete manholes, piles of asphalt patching, and miscellaneous piles of sand, aggregate and excess oil generated during various construction projects around the installation.

1.2 CONTAMINATION CHARACTERIZATION

Historically the Site was used as a storage area for transformers and drums of waste liquids (mostly waste oils). Additionally, until 1978 a small area at the northwest corner of the Site was used to dispose of dilute pesticide rinsate.

Environmental concerns have been previously addressed in a number of investigations and reports. Investigations have indicated that the Site contains total polychlorinated biphenyl (PCB) concentrations above the proposed 10 milligram per kilogram (mg/kg) cleanup goal for soil (1,800 mg/kg) (Element Environmental LLC [Element] 2014).

1.3 SCOPE OF WORK

The objective of the project is to remove PCB-contaminated soil exceeding cleanup goals and to evaluate levels of residual contamination remaining at the Site. The Removal Action will be achieved by excavating contaminated soil in excess of the site cleanup goals and properly disposing of the soil. Confirmation soil sampling will be performed to evaluate whether all soils in excess of the site screening levels (which are discussed in detail in the site specific Sampling and Analysis Plan [SAP]) have been removed. The Scope of Work elements specific to this project are summarized below:

- **Permitting and Planning:** Prior to mobilization to the Site, final Work Plans will be prepared and submitted to the Navy and all appropriate agencies will be notified of Cape Environmental Management Inc (CAPE's) intended start date. A dig permit will be obtained for the duration of the field activities, and a pre-construction meeting will be conducted prior to any field activities.
- **Mobilization and Site Preparation:** Underground utility toning will be performed prior to disturbing the soil to identify subsurface structures. Additionally, a site survey will be conducted to re-establish

pre-determined delineation sampling locations, in order to use those locations to mark the excavation areas. The chain-link fence separating the Boat Storage Yard from the Salvage Yard will be removed, where necessary, to enable excavation or temporary access into the Salvage Yard for Salvage Yard Personnel.

Prior to excavation at the two eastern excavation areas in the Salvage yard, temporary fencing and shade cloth will be erected between the excavation area and the adjacent wetland boundary in order to shield the wetlands/nesting areas during construction activities. Within the Salvage Yard, CAPE will use temporary orange construction fencing to surround excavation areas. Any brush clearing activities in the Eastern Salvage Yard will be completed outside the bird nesting season is (1 March to 15 September).

The heavy equipment and materials staging areas located in open sections of the Salvage Yard will be demarcated with temporary orange fencing or caution tape. A pathway to allow access to the open-air storage structure in the Salvage Yard will be maintained on the southern side or eastern side. The equipment, including generators, stored within the open-air structure will be covered with plastic to protect the equipment from dust.

- **Delineation Sampling:** Prior to excavation, additional delineation samples will be collected and analyzed for PCBs as Aroclors. The results from samples collected in this area will be used to delineate lateral and vertical extent of contamination and to characterize the impacted soil for disposal. If a delineation sampling location or a historical surveyed sampling location with results below the PAL is excavated all the way to that location it will also serve as confirmation sampling. Pre-excavation delineation sampling will be performed using a slide hammer sampler or hand auger. Samples will be analyzed for PCBs as Aroclors, the contaminant of concern present at the Site. See the SAP for details.
- **Waste Characterization Sampling:** Based on previous investigations at the site, locations where PCB concentrations in soil exceed 50 mg/kg will be characterized as TSCA-regulated waste and disposed of off-island at a treatment, storage, and disposal facility (TSDF) permitted to receive the soil. Soil with PCB concentrations between 10 and 50 mg/kg will be characterized as CERCLA non-hazardous waste, and be disposed at the local PVT Landfill. Prior to excavation of these soils, a representative composite waste characterization soil samples will be collected from each excavation area. It is estimated that fifteen composite samples will be collected from CERLCA non-hazardous excavation areas to be analyzed for PVT Landfill acceptance criteria parameters. An estimated six samples will be collected from TSCA regulated excavations to confirm that lead TCLP concentrations are below RCRA hazardous waste levels. This waste characterization data will be used to meet landfill facility testing requirements. See Section 7 of this WP for additional details.
- **Excavation, Hauling and Disposal:** Excavation will take place in three phases; first in the Western Salvage Yard, second in the Boat Storage Yard, and last in the Eastern Salvage Yard. This phasing of work suits two purposes, excavation to site restoration of the Western Salvage Yard allows for the boats in the Boat Storage Yard to move here while the Boat Storage Yard is being excavated and restored. By the time the Western Salvage Yard and Boat Storage Yard is fully completed, the end of the bird nesting season is expected, opening up the Eastern Salvage Yard for excavation to site restoration activities. Within each excavation phase, the TSCA-regulated soil will be removed first in each excavation if present, followed then by the CERCLA non-hazardous waste soil. Excavations will not extend below the groundwater table or below structures.

  TSCA regulated waste soil will be excavated, direct loaded into supersacks and weighed for off-island disposal at a TSDF permitted to accept TSCA regulated soil waste.

CERCLA non-hazardous waste soil will be direct loaded into dump trucks for immediate disposal at PVT landfill or into roll off bins for future disposal. Wherever possible, the excavation will be extended to re-established sampling locations from previous investigations or to sampling locations collected during the pre-excavation delineation sampling which had concentrations of PCBs below the PAL.

- **Confirmation Sampling:** Following excavation, discrete confirmation samples will be collected from floors and sidewalls as required to meet confirmation sampling coverage requirement per the SAP.

  Excavations with TSCA Regulated Waste Soil. If an initial confirmation sample indicates that PCB concentrations in a TSCA regulated excavation remain above 50 mg/kg, additional soil will be excavated and placed into supersacks for disposal. After removal of the additional soil identified as TSCA regulated is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed or excavation has reached boundary limitations, excavation of CERCLA non-hazardous soils will commence in that excavation, or if the results indicate that all soil has been removed to the PAL, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

  Excavations with only CERCLA Non-Hazardous Waste Soil. If an initial confirmation sample indicates that PCB concentrations in a CERCLA Non-Hazardous excavation remain above the PAL, additional soil will be excavated and placed into the dump truck or roll off bin for disposal. After removal of the additional soil identified above the PAL is completed, confirmation sampling will be repeated. Once confirmation sampling results indicate that all soils with concentrations above the PAL has been removed or excavation has reached boundary limitations, no further excavation is required and the post excavation survey and site restoration can commence in that excavation.

  As noted under delineation sampling summary, in locations where the excavation was extended to the surveyed location of a historical investigation sample or to a pre-excavation delineation sample location with PCB concentration less than the PAL, this sampling point will be used as confirmation of removal. Once enough excavation confirmation sampling points meet the confirmation sampling coverage requirements or the boundary limitations are reached, the excavation is considered completed and no further excavation will be completed.

  Confirmation samples will be analyzed for PCBs as Aroclors. See SAP for details.

- **Site Restoration:** Once excavation is completed, the excavated areas will be surveyed. A demarcation liner then installed at the base of excavations, to mark the separation of clean backfill from existing native soil. The excavation will then be backfilled with virgin material from the quarry or clean certified material in mechanically compacted lifts with certified clean material and grade. The imported backfill will be free of organics and construction materials. If the imported backfill is not virgin material or clean certified, it will be sampled to ensure it is not contaminated prior to backfilling. Topsoil and seeding will be required in some disturbed grass areas to match existing conditions.

- **Demobilization:** Following completion of all the above-mentioned tasks, all construction equipment and facilities will be demobilized from the field Site.

The provisions of the Work Plan (WP) are applicable to all CAPE employees and subcontractors engaged in this project, and any individual or agent acting as a vendor to CAPE to provide support services and/or commodities. Certain portions of the WP apply to personnel from the Navy or regulatory agencies who may visit the site. Certain provisions will be applicable to NAVFAC Hawaii, primarily safety precautions for emergency notifications in the event of an accident or incident. Work conducted under this plan will be performed in accordance with (IAW) all applicable federal, state, and local safety and occupational health laws and regulations.

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REVISIONS:

No.	Date	Remarks

PROJECT NAME

REMOVAL ACTION AT SALVAGE YARD
MCB HAWAII, KANEOHE,
HAWAII

SHEET TITLE

SITE LOCATION MAP

CONTRACT NO: N62742-10-D-1804	T.O. NO: CTO 0025
CHECKED BY: E.MOLHOEK	JOB NO: 01804.025.003
DRAWN BY: C.RIOS	DATE: NOVEMBER 2014
SCALE: AS SHOWN	FILE NAME: (FILE)

SHEET NUMBER

FIGURE 1

1.4 CAPE SAFETY AND HEALTH POLICY STATEMENT

It is the policy of CAPE to perform work in a safe and healthful manner. The S&H of employees is considered to be of paramount concern in performance of company operations. Employees are our most important asset and their well-being our greatest responsibility. The S&H of every worker must be a primary consideration in every business decision and plan. CAPE management will maintain an S&H program that conforms to the best practice of organizations of our type. To be successful, such a program must encourage proper attitudes toward incident prevention on the part of management, supervisors and employees. It also requires cooperation in all S&H program aspects, not only between supervisors and employees, but also between employees and their fellow workers. Only through such a cooperative effort can an effective S&H program be maintained.

One of the primary objectives of the CAPE S&H program is to prevent incident occurrence. There is no phase of company operations of greater importance than incident prevention. Our S&H goal at CAPE is to have incident-free operations. This goal can only be achieved through total and demonstrated commitment to this S&H policy from each individual CAPE staff member. We must all recognize and understand that incidents, injuries and illnesses are preventable.

To establish and maintain an effective S&H program, the following must be accomplished:

- We must provide a safe work environment by having a safe workplace, equipment, and materials;
- We must establish safe work operations, safe work rules and procedures, and comply with accepted safe work practices and S&H regulations;
- We must provide effective S&H training so that every CAPE staff member has the necessary knowledge to identify potential hazards and the necessary protocols, tools and equipment to appropriately mitigate identified hazards;
- We must all understand that we have a duty and responsibility to maintain our own safety and the safety of our co-workers, at all times and in all situations; and
- Everyone must actively support the CAPE S&H Program and embrace the philosophy that "Incidents Can Be Prevented".

1.5 CAPE SAFETY RECORD

CAPE recognizes a responsibility to provide employees with a safe and healthful workplace and to provide clients with safe and effective services. CAPE considers safe operations and incident prevention to be a priority. A key CAPE goal for incident prevention is to maintain its excellent safety record. CAPE injury and illness history (experience modification rate [EMR], recordable injury and illness case rate, Days Away, Restricted or Transferred [DART] injury and illness case rate, and Days Away From Work [DAFW] Only injury and illness case rate) for the past 4 years is as follows:

2014: EMR of 0.64; recordable injury and illness case rate of 1.18; DART injury and illness case rate of 0.59; and DAFW Only injury and illness case rate of 0.00.

2013: EMR of 0.62; recordable injury and illness case rate of 1.65; DART injury and illness case rate of 0.83; and DAFW Only injury and illness case rate of 0.28;

2012: EMR of 0.74; recordable injury and illness case rate of 1.34; DART injury and illness case rate of 1.07; and DAFW Only injury and illness case rate of 0.53;

2011: EMR of 0.77; recordable injury and illness case rate of 1.30; DART injury and illness case rate of 1.04; and DAFW Only injury and illness case rate of 0.26;

2010: EMR of 0.84; recordable injury and illness case rate of 0.30; DART injury and illness case rate of 0.30; and DAFW Only injury and illness case rate of 0.00; and

1.6 CAPE ACCIDENT TREND ANALYSIS

Review of the CAPE accident record over the past few years indicates an overall trend that the frequency and severity of CAPE injuries and illnesses is low.

1.7 ACCIDENT EXPERIENCE GOAL

Our accident experience goal for this Contract Task Order (CTO) is zero accidents.

2. HAZARD/RISK ANALYSIS

Site hazards, hazard control measures, and risk analysis information for chemical, physical, and biological hazards that are likely to be encountered during project work are reviewed in this section of the SSHP. Activity Hazard Analyses (AHAs) associated with this project is also indicated.

2.1 CHEMICAL HAZARDS

The primary chemical hazard that may be present during site work is PCBs and is reviewed below. Information on the nature and extent of contamination at the site was obtained from an Environmental Assessment (EA), The Site Investigation (SI) (Element 2013), The Screening Human Health and Ecological Risk Assessment Facilities Department Salvage Yard, dated 7 July 2014 (Intrinsik 2014) and the Removal Site Evaluation (RSE) (Element 2014)

2.1.1 Nature and Extent of Contamination

Various investigations have indicated that the Salvage Yard contains total PCB concentrations above the 10 mg/kg cleanup goal for soil.

An Initial Assessment Study (IAS) evaluated sites posing potential health or ecological risks. The study found that transformers potentially containing PCBs had been historically stored on the Site. No signs of stained soil were visible, and a soil sample collected from the transformer storage area in 1982 contained less than 20 parts per million (ppm) PCBs (the detection limit of the analytical technique at the time of the study). The study recommended no confirmation studies for the Salvage Yard Site (Luecker et al. 1984), however, in a U.S. Environmental Protection Agency (EPA) Region 9 letter dated August 2, 1996, addressed to the Pacific Division, Naval Facilities Engineering Command ([PACDIV], now known as NAVFAC Pacific), the EPA requested that additional confirmation sampling be performed at the Site prior to close-out (EPA 1996).

In April 2010 soil sampling was conducted in support of the preparation of an Environmental Assessment (EA) for the improvements project, one of the proposed improvements involved paving the Boat Storage Area and additional areas located in the western portion of the Salvage Yard Site. A single multi-increment (MI) surface soil sample (0-0.5 feet bgs) collected from the boat storage area contained trace to low levels of diesel, oil, lead, 4,4'- dichlorodiphenyltrichlorethane (DDT), and nine polycyclic aromatic hydrocarbon (PAH) compounds as well as PCBs that exceeded the State of Hawaii, Department of Health (DOH) environmental action limits (EALs) for unrestricted and industrial land use (Element 2010).

In 2012 a site inspection (SI) was performed, to evaluate potential soil and groundwater contamination. The Site was broken up into 11 DUs; elevated levels of PCBs were identified as potential human health risks associated with ongoing commercial exposure. Sampling methodology involved collection of both MI and discrete surface samples, MI subsurface soil samples, and shallow groundwater samples. MI samples were collected from four depth intervals (0-0.5 feet bgs, 0.5-1 feet bgs, 1-2 feet bgs, and 2-4 feet bgs), with the exception of the two wetland DUs where just surface MI samples were collected. Discrete surface soil samples were collected from 30 sample locations within 8 main DUs (Salvage Yard and Marina areas). All discrete surface soil samples were collected as splits of the MI samples. Of a total of 240 primary samples, Aroclor 1260 equaled or exceeded the residential EAL of 1.1 mg/kg in 49 samples. Concentrations ranged from 1.1 to 75 mg/kg. The highest levels of PCBs detected in surface soil samples were concentrated in the northwest corner of the Salvage Yard and within the Marina boat storage area. PCBs were not detected in the groundwater of any monitoring wells.

It should be noted that all surface MI results were below Tier 1 industrial EALs, with the exception of PCBs in 0.5 feet bgs in the DU adjacent to the coast in the Marina boat storage area (7.9 mg/kg). Sampling indicated that elevated PCB contamination was primarily in the west and northwest sections of the Site, and in isolated hotspots in the central portion as well as wetland sections of the Site. The highest concentrations of PCBs was presumed to extend to a maximum depth of 2 feet bgs. The SI recommended collection of

additional data to better delineate the lateral and vertical extent of PCB contamination at the Site, as well as a comprehensive assessment of the potential risk posed to human and ecological receptors at the Site (Element 2013).

The screening risk assessment was intended to aid risk managers in the development of the RSE. In 2013 and 2014, discrete PCB samples were collected from areas where elevated PCB levels were observed during the 2012 investigation, to address characterization concerns (Intrinsik 2014). This assessment included a screening Human Health Risk Assessment (sHHRA) and a Screening Level Ecological Risk Assessment (SLERA).

The sHHRA, which follows DOH environmental hazard evaluation guidance, applying both Tier 1 and 2 EALs in the screening process, concluded that the hazards posed by PCBs in Site soils may warrant remedial action. The calculated risk in many of the areas is driven by a single or handful of very high PCB levels, therefore a targeted soil removal action in some areas would likely lower the residual human health risk to acceptable levels for receptors.

The SLERA was performed following EPA risk assessment guidance, and was limited to the two Wetland DUs where ecological receptors are present. The SLERA concluded that the adjacent Salvage Yard areas have much higher detected PCB concentrations than the areas in the wetland, therefore berming the upland areas of the Site to prevent run-off to the wetland (effectively removing the source) could be a remedial measure. For the RSE, the Site was divided into ten DUs, based on the 2012 SI results. Five of the DUs are located in the main Salvage Yard area, three in the unpaved marina boat storage area, and two in the wetland area. Soil sampling during this evaluation targeted three discrete depths in each DU: 0-0.5 bgs, 0.5-1 foot bgs, and 1-2 feet bgs. Samples were also collected up to 4 feet bgs in two of the main Salvage Yard area DUs. Samples were collected from locations following grids to provide coverage of the DUs. Surface water samples were collected from two ponds during two sampling events (one in the wet season, and one in the dry season).

PCB concentrations exceeded the Tier 1 residential EAL in 195 of the 911 soil samples collected. The highest levels of PCBs in site soils are concentrated in the northwest corner of the Salvage Yard, as well as within the current Marina boat storage area. Localized areas of PCB contamination were identified in adjacent DUs. Over all, exceedances of the residential soil PCB EAL decreased with sample depth, although some exceedances were observed in samples collected from 4 feet bgs in one DU in the northeast corner of the Site. PCBs were not detected in surface water samples (Element 2014).

Contaminated soil volumes were estimated using Surfer ® Surface Mapping System modeling software, which uses the Kriging method to interpolate concentrations between data points. Interpolated areas were calculated in AutoCAD ® and multiplied by depth of contamination to estimate soil volumes. The RSE concluded that the volume of soil with PCB concentrations between 10 and 50 mg/kg was approximately 1,890 CY; the volume of soil with PCB concentrations greater than 50 mg/kg was estimated to be approximately 365 CY.

The RSE states that future remedial activities performed at this Site will comply with the substantive requirements of TSCA for PCB remediation wastes, and that the requirements of 40 CFR 761.61(a), "Self-implementing On-Site Cleanup and Disposal of PCB Remediation Waste", will serve as a general guide for developing appropriate sampling, analysis, disposal, and decontamination procedure for the removal actions.

2.1.2 Chemical Hazard Information

Table 2-1 below provides chemical hazard information for the anticipated site contaminants. The table includes a summary of the health effects, potential routes of entry, and the OSHA permissible exposure limits (PELs) or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs) for these hazardous substances (lowest value). These occupational exposure limits (OELs)

are reported as 8-hour time-weighted average (TWA), 15-minute short-term exposure limit (STEL), and/or ceiling limit values and also by a SKIN notation if the chemical substance may be absorbed into bloodstream through skin, mucous membranes, and/or eye and contribute to overall exposure.

Table 2-1 Chemical Hazard Information

Compound	Occupational Exposure Limit	Routes of Exposure/ Primary Health Effects/ Other Comments
Polychlorinated biphenyl (PCB), 42% and 54% chlorine	42% chlorine PCB: 1 mg/m^3 (TLV-TWA) (SKIN); 54% chlorine PCB: 0.5 mg/m^3 (TLV-TWA) (SKIN)	Inhalation, ingestion and dermal routes of exposure. Eye, skin, and respiratory irritation; chloracne dermatitis; possible liver damage; suspected carcinogen.

LEGEND:

mg/m^3:	milligrams per cubic meter
TWA:	time-weighted average
AL:	action level
PEL:	permissible exposure limit
ACGIH:	American Conference of Governmental Industrial Hygienists
TLV:	threshold limit value
TLV-TWA:	ACGIH 8-hour TWA TLV
SKIN:	Skin notation (may be absorbed into bloodstream through skin, mucous membranes and/or eye, and contribute to overall exposure)

2.1.3 Polychlorinated Biphenyls

PCB, also known as chlorodiphenyl, is a colorless to dark brown liquid with a mild hydrocarbon odor. PCBs are used in dielectric insulating liquids for transformers and capacitors, heat exchange fluids, and hydraulic fluids. They are also used in synthetic rubbers, plasticizers, flame-retardants, sealants, waxes, asphalt, and adhesives. PCBs are chemically stable, resistant to biodegradation, and are lipid soluble.

It is believed that the more highly chlorinated forms of PCB are more toxic than the less chlorinated forms. Acute exposure to PCBs can result in anorexia, nausea, edema of the face and hands, abdominal pain, irritation of the eye, skin and respiratory tract, chloracne dermatitis, and liver damage. Chronic exposure to PCBs is suspected to cause liver cancer.

2.1.4 Airborne Dust Equivalent Action Level Calculation

An equivalent airborne dust action level can be calculated that represents the predicted maximum non-volatile contaminant airborne dust concentrations that could be encountered. Airborne dust action levels are based on the cumulative total of the highest soil sample concentrations of a non-volatile contaminant obtained during site assessment soil sampling. Airborne dust concentrations exceeding the action level trigger use of additional dust control measures. The action level is also used as an upgrade concentration for respirator use by workers.

The equivalent airborne dust action level is calculated using the following formula:

$$El_{mix} = \frac{(EL\ mg/m^3)}{(Conc.\ g/g) \times (SF)} = \frac{(10^6\ mg/kg) \times (EL\ mg/m^3)}{(Conc.\ mg/kg) \times (SF)}$$

Legend:

El_{mix}:	Total dust concentration where contaminants would be at their PEL/TLV
EL:	Exposure limit (lower of PEL/TLV) of specific non-volatile soil contaminant (mg/m^3)
10^6:	Conversion factor
Conc.	Estimated maximum specific contaminant soil concentration (mg/kg)
SF:	Safety factor (1-10X depending upon confidence with soil sampling data)

Reference: Safety Now! Controlling Chemical Exposures at Hazardous Waste Sites with Real-Time Measurements, Christopher S.E. Marlowe, CIH, 1999

2.1.5 PCB Airborne Dust Equivalent Action Level Calculation

PCB maximum surface soil concentrations of 220 mg/kg and maximum subsurface soil concentrations of 1,800 mg/kg at 1 foot bgs have been detected. PCB Airborne Dust Equivalent Action Level Calculation: The 8-hour TWA-TLV for 54% chlorine PCB is 0.5 mg/m^3. Using the subsurface soil PCB maximum concentration of 1,800 mg/kg, if a safety factor of 2 is used, the calculated PCB-equivalent airborne dust action level is 139 mg/m^3.

2.2 RISK ANALYSIS/EXPOSURE ASSESSMENT

2.2.1 PCB Exposure Risk Analysis/Exposure Assessment

Excavation of low concentrations of PCB-contaminated soil will be performed during this project. It is anticipated that there will be a minor potential for inhalation and dermal exposure to contaminated soil during excavation and loading of contaminated soil into super sacks and roll-off bins for waste transportation and disposal. The heavy equipment operator will be operating from inside an enclosed cab excavator. Water spray will be used to control generation of airborne dust. Personnel will not be directly handling the contaminated soil. Decontamination procedures will be implemented so there will be minimal potential for skin contact. No eating, drinking or smoking will be allowed in the exclusion zone and decontamination procedures will be implemented so the potential for ingestion of contaminated soil is minimal. Modified Level D protection will be used as a precautionary measure during these activities. Provisions will be established for upgrade to Level C protection if the air monitoring action level is exceeded.

Equivalent airborne dust action levels were calculated for the primary site contaminants (see calculation information above). Calculated values were high and well above ACGIH guidelines for insoluble or poorly soluble Particles Not Otherwise Specified (PNOS) of less than 3 mg/m^3 for respirable particles and 10 mg/m^3 for inhalable particles. Since it is generally recognized that dust is visible in the 2 to 3 mg/m^3 range, it is expected that use of a "no visible dust" action level and water spray for dust control should be sufficient to keep airborne particulate exposures to a minimum.

The primary activity that will generate airborne dust is expected to be the excavation and loading of contaminated soil. Airborne dust monitoring will be conducted during the initial excavation and loading process. Airborne dust monitoring will conducted to document a negative exposure assessment.

2.2.2 Silica Exposure Risk Analysis/Exposure Assessment

Concrete cutting will be performed. There is a very minor potential for airborne dust and silica exposure during this activity. A concrete saw cutter equipped with water injection will be used or water spray to wet down concrete will be performed during concrete cutting to minimize airborne dust.

2.3 HAZARD COMMUNICATION

A Hazardous Substances Inventory List will be prepared by the SSHO and will include approximate quantities that will be on site at any given time and a site map showing the locations where the hazardous substances are stored. The SSHO will maintain material safety data sheets (MSDSs)/safety data sheets (SDSs) on site for hazardous substances to be used during site work with an explanation of how the hazardous substances will be used. Full details regarding the CAPE Hazard Communication Program are included in Attachment 6. A listing of the type of hazardous substances with anticipated use during site fieldwork is provided below

- Fuels: Fuel for vehicles and equipment;
- Lubricants: Oil, grease, and other lubricants for equipment;
- Fire Extinguishing Agent: Dry chemical for fire extinguishers;

- Cleaning Solutions: Alconox or Liquinox; and
- Paint: Spray paint for marking of locations.

2.4 PHYSICAL HAZARDS

The primary physical hazards that may be encountered during site work are reviewed below.

Fire Protection: Fire hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Diesel and gasoline fuel will be used for vehicles, heavy equipment, and machinery operation. Fire extinguishers will be available onsite. No hot work will be conducted.

Underground Utilities: Underground utility hazards may be present during the following work activities: Contaminated Soil Excavation and Loading (AHA-03) and Site Restoration and Demobilization (AHA-06). Underground utility lines may be present at the site. Underground utility clearance procedures will be implemented prior to excavation at the site. The markings and locations of any utilities will be maintained throughout the duration of the project.

Overhead Utilities: Overhead utility hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). The presence of overhead utilities will be surveyed before bringing equipment with high extensions (e.g., heavy equipment) into the work area. Equipment with high overhead projections is not allowed to operate within a 10-foot radius (minimum distance) of overhead power lines. Overhead high-voltage power lines more than 50,000 volts require additional distance. Verify the voltage of the overhead lines and check against EM 385-1-1 Section 11, Table 11-1 to ensure that the required minimum distance from overhead lines is maintained. The following minimum clearance from energized overhead electrical lines are required: up to 50 kilovolts (kV) (10 feet); 51 to 200 kV (15 feet); 201 to 350 kV (20 feet); 351 to 500 kV (25 feet); 501 to 750 kV (35 feet); 751 to 1,000 kV (45 feet); Over 1,000 (as established by the utility owner/operator or registered professional engineer who is a qualified person with respect to electrical power transmission and distribution).

Heavy Equipment Operation: Heavy equipment operation hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Heavy equipment will be used for soil excavation and loading and other earthwork activities. Ground personnel will at times be working in the general vicinity of equipment operation. Heavy equipment will be inspected daily and documented. Ground personnel will position themselves out of the swing radius of operating heavy equipment whenever possible. Personnel will not be allowed to walk underneath loaded buckets. Ground personnel will wear American National Standards Institute (ANSI) Class 2 high-visibility safety vests and be required to maintain visual contact with equipment operators. Verbal and hand signals will be used while operating and working near or around mobile heavy equipment. Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. The hand signal of a “closed fist” will be used by ground personnel to signal to the equipment operator to stop equipment operation. Ground personnel will “point to themselves” and then “point toward the operator” to indicate that they want to approach the heavy equipment operator to communicate verbally. The equipment operator will use a “thumbs up” hand signal to indicate that it is authorized for the ground personnel to approach the heavy equipment. Ground personnel will position themselves outside of the pathway and swing radius of heavy

equipment during operation. Where possible, ground personnel will position themselves on the side of an excavator where the operators' vision of them is not blocked by the excavator arm. Heavy equipment operators will check in front, at the sides, and behind to make sure personnel are clear prior to equipment movement. Heavy equipment will be equipped with audible alarms (backup alarm and horn) and visual signals (warning lights) to alert ground personnel of equipment operation and movement. Training will be provided to site personnel during the site safety orientation briefing and daily safety meetings on heavy equipment hazards, safety procedures, and communication procedures. Use water mist as needed during concrete breaking to minimize airborne dust and silica. Keep ground personnel away from the concrete breaking area. Have heavy equipment operators' work inside enclosed cab equipment. Use respiratory protection as needed to prevent exposure. Wear hearing and eye protection when working near concrete breaking to prevent exposure to noise and flying concrete.

Excavation and Trench Safety: Excavation and trench safety hazards are associated with the Contaminated Soil Excavation and Loading (AHA-03) work activity. Soil excavation to be accomplished per the scope of work in the PWS will largely be at shallow depths (1 to 2 feet). Excavation and trench hazards are anticipated when excavation activities involve entry into trenches 4 feet or more in depth or excavations 5 feet or more in depth; then entry will require protective systems for excavation operations (sloping, benching, shielding, and/or shoring) and strict implementation of OSHA excavation standard requirements. For these operations, an excavation competent person will supervise operations, conduct daily inspections, and implement protective systems for excavation operations. Access to site excavation areas will be controlled and limited to authorized personnel only.

Vehicle and Equipment Traffic: Vehicle and equipment traffic hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Use of traffic signs, barricades, flashers, delineators, traffic cones, caution tape, and/or flagmen will be used as needed. Concurrent operation of heavy equipment and vehicles and the presence of ground personnel will occur. Traffic patterns will be established at the site for truck traffic and reviewed during safety meetings. Personnel will wear ANSI Class 2 high-visibility safety vests with reflective striping when working near mobile equipment and traffic areas. Spotters will be used for backing of vehicles into tight work areas.

Material Handling: Material handling hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Material handling involving lifting and carrying of materials will be required. Personnel will review proper lifting techniques during safety meetings. Personnel will be trained in safe lifting procedures, including: size up the load first; get help if the load is bulky, heavy, or of unwieldy length; be sure of footing; lift with your legs while keeping your back straight; keep your balance; do not twist under strain or jerk the load; and keep the load close to your body.

Tools, Machinery, and Equipment Use: Tools, machinery, and equipment use hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Hand tools will be used. Tools will be used according to design. Tools and equipment will be inspected daily or before each use for defects. Defective or unsafe equipment will be tagged as defective until repaired or otherwise made acceptable. Power tools requiring electrical cords will use ground fault circuit interrupters (GFCIs).

Electrical Equipment: Electrical hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01) and Site Restoration and Demobilization (AHA-06). A generator may be used to provide electrical power onsite. GFCIs will be used and electrical extension cords

inspected should portable electrical equipment be needed. Electrical power tools and electrical extension cords will be checked to make sure that they have ground plugs.

Noise Exposure: Noise exposure hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Contaminated Soil Excavation and Loading (AHA-03); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Noise exposure above 85 decibels on the A-weighted scale (dBA) is expected when working near or operating machinery and equipment (e.g., heavy equipment, generators). Noise exposures in excess of 85 dBA are assumed to be present whenever voices must be raised to be heard in normal conversation at 3 feet apart and also whenever working in the immediate areas of operating generators, compressors, and similar equipment. Earplugs will be used for worker protection. Site personnel will use Moldex Spark Plugs with a noise reduction rating (NRR) of 33 for hearing protection.

Heat Stress: Heat stress hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Heat stress conditions will be present due to elevated ambient temperatures, moderate to heavy workloads, and impermeable protective clothing use. Workers shall observe each other and themselves for development of heat stress symptoms. Personnel will be encouraged to drink generous amounts of water and electrolyte replacement fluids (even if not thirsty) to prevent dehydration. Adequate shelter will be provided to protect personnel from direct sun exposure. Sufficient breaks will be provided so that personnel can remove protective clothing and cool down. Work/rest schedules will be adjusted as required to avoid heat stress.

Power Saw Operation: Power saw hazards may be present during the following work activity: Mobilization and Site Preparation (AHA-01). A chain saw will be used during vegetation removal. Safety procedures will be used when operating chain saws, reciprocating saws, chop saws, or similar equipment. Power saw operators will wear PPE to include eye, ear, hand, foot, and leg protective equipment. Power saw operators will hold the saw with both hands during cutting operations. Power saws are not allowed to be used to cut above the operator's shoulder height. Power saws must not be fueled while running, while hot, or near an open flame. Power saws must not be started within 10 feet of a fuel container. Gasoline and mixed gas fuels for power saws shall be stored in OSHA-approved metal cans with self-closing lids and flame arrestor.

Wood Chipper: Wood chipper saw hazards may be present during the following work activity: Mobilization and Site Preparation (AHA-01). A wood chipper may be used. Wood chipping equipment safety procedures include: Rotary drum and disk-type wood chippers, not equipped with a mechanical in-feed system, must be equipped with an in-feed hopper located 85 inches or more above the ground (measured from blades to ground level over centerline of the hopper); have sufficient height on its side members to prevent personnel from contacting machine blades during normal operation; and have a flexible anti-kickback device installed in the in-feed hopper to protect the operator and others in the machine area from flying chips and debris. Disk-type wood chippers equipped with a mechanical in-feed system shall have a quick stop and reversing device on the in-feed. The activating mechanism for the quick stop and reversing device should be located across from the top, along each side, and as close as possible to the feed end of the in-feed hopper and within easy reach of the operator. Wood chipping equipment shall have a feed chute or feed table with sufficient height on side members to prevent operator contact with blades during normal operation; have a swinging baffle mounted in front of blades to prevent throwback of material; have an exhaust chute of sufficient length or design to prevent contact with blades; have a locking device on the ignition system to prevent unauthorized starting of equipment; and have cutting bars and blades sharpened, properly adjusted, and operated/maintained IAW manufacturer recommendations. Trailer-mounted wood chippers detached from trucks will be chocked and secured when parked. Wood chipper workers shall be instructed in the safe operation of the equipment. Workers feeding brush into wood

chippers shall wear eye and hearing protection and not wear loose clothing, long-gauntlet gloves, rings, watches, or other items that could get caught on debris or parts of the machine. Workers must be instructed to never place any part of their body on the feed table when the wood chipper is in operation or the rotor is turning (sticks of brush can be used to push/poke material as needed). Materials shall be fed into wood chippers from the side of the hopper centerline and operators must immediately turn away from the feed table when brush is taken into the rotor of the machine. Materials such as stones, nails, and other hard/sharp debris shall not be fed into wood chippers. Wood chipper chutes shall not be raised while machine rotors are turning. When servicing or maintaining wood chipper equipment, lockout/tagout (LO/TO) procedures will be used to prevent accidental start-up of machinery during servicing.

Forklift Operation: Forklift operation hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); and Heavy Equipment Decontamination (AHA-05). A telehandler forklift will be used to load and off load materials and handle pallets of supersacks. Forklift operators must be trained. Inspect forklifts daily. Check for operational backup alarm. Travel at safe speeds and look for ground personnel. Workers must be cautioned to look carefully where they walk to avoid forklift equipment and to maintain eye contact with forklift operators. Personnel are not permitted to ride on the forks of a forklift. Do not cross the path of an operating forklift. Forklift operators must look in the direction of travel and must not move the forklift until all persons are clear. Forks of forklifts must be carried as low as possible during operation. If the load obscures vision, operate the forklift in reverse so that the travel area is fully visible. Forklift operators must lower the forks, place controls in neutral, and set brakes (or block wheels if on incline) when a forklift is dismounted and the operator is in view of and within 25 feet of the forklift. Additionally, the engine shall be shut off before leaving a forklift unattended (operator out of sight or 25 feet or more away from the forklift).

Inclement Weather and Adverse Environmental Conditions: Inclement weather and adverse environmental condition hazards may be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). Heavy rain, lightning, and strong winds could occur during outside work operations. Provisions will be made to shut down outdoor operations should this occur. Presence of heavy rain or lightning requires stoppage of affected work activities where it can create safety hazards due to limited visibility, wet work surfaces, slippery equipment controls, or increased hazard of electrocution. Work activities at elevated work locations require stoppage of use of equipment whose safe operation can be affected by high winds. Emergency procedures are established in this plan for response to a hurricane.

Miscellaneous Physical Hazards: Miscellaneous physical hazards will be present during the following work activities: Mobilization and Site Preparation (AHA-01); Soil Sampling (AHA-02); Contaminated Soil Excavation and Loading (AHA-03); Waste Transportation and Disposal (AHA-04); Heavy Equipment Decontamination (AHA-05); and Site Restoration and Demobilization (AHA-06). General safety hazards will be present during all project tasks. Poor housekeeping, uneven or slippery walking surfaces, and other slip, trip, and fall hazards, poor illumination, and overhead obstructions are primary hazards. General safety information will be communicated during safety meetings to review these hazards and safety precautions.

2.5 BIOLOGICAL HAZARDS

The primary biological hazards that may be encountered during site work are reviewed below.

Poisonous Plants: Common poisonous plants of Hawaii include: Apple of Sodom, Black-Eyed Susan, Castor Bean Plant, Coral Plant, Crown Flower, Jimson Weed, Oleander, Pencil Plant, Physic Nut, Poinsettia, Star-of-Bethlehem, and Yellow Oleander. Be familiar with the appearance of these plants and

avoid contact. The Hawaii State Department of Health pamphlet on Common Poisonous Plants of Hawaii has photos and can be referenced for safety information (contact the SHM for further information).

Poisonous Spiders: Poisonous spiders, such as the black widow spider, may be encountered during site work. Spiders are usually found in dark, cool, protected areas and such areas should be inspected before placing hands or feet in these areas. Spider bite first-aid procedures are: wash wound; apply a cold pack; and get medical care.

Rodents: Rodents include rats, mice, mongooses, and other related mammals and are characterized by gnawing and nibbling traits. Rodents can act as a vector for many diseases that may be transmitted directly or through other vectors, such as fleas or ticks. Precautionary measures are: avoid and/or be cautious when working near rodent habitats (wood piles, inside sheds).

Scorpions and Centipedes: Scorpions and centipedes may be encountered during site work. Scorpions are most active at night and live under rocks, logs, bark of certain trees, and often seek shelter in sleeping bags, boots, and clothing left out overnight. Scorpions are non-aggressive and sting only if disturbed. Poisonous scorpion precautions include: keep alert when moving rocks, wood, and debris and check areas before placing hands by faucet or other water source. Scorpion bite first aid procedures are to remain motionless, wash wound, apply cold pack, and get medical care.

Insects: Ant bites and bee, wasp, and hornet stings can be deadly to those who are hypersensitive. Anaphylactic shock can occur to sensitized individuals upon repeated stinging. Signs and symptoms of envenomation are usually local pain, redness, itching, and swelling. Sensitive individuals may have more serious symptoms such as welts, itching palms and feet, headache, nausea, vomiting, labored breathing, and in severe cases, respiratory paralysis or heart failure. Individuals who are hypersensitive should carry a kit containing an antihistamine and epinephrine. Mosquitoes can act as a vector for many diseases. The best protection from mosquito-borne diseases includes wearing long-sleeved shirts and pants and applying a mosquito repellent containing 20 percent to 30 percent DEET (n,n-diethyl-m-toluamide) when outdoors for any prolonged time.

2.6 RADIOLOGICAL HAZARDS

Radiological hazards are not expected for site work.

2.7 ORDNANCE AND EXPLOSIVES HAZARDS

Ordnance and explosive materials are not expected for site work. If any Munitions and Explosives of (MEC) are discovered while any work is being conducted at the site, the following precautions will be conducted, but are not limited to:

- Stop all work in the area and isolate area of concern;
- Notify Navy personnel as per the reporting chain below:
  - First call - Regional Operations Center (ROC): (808) 473-3215/6
  - Second call – MDSU-1 Det EOD: LT Eric Bokhoven, (808) 474-3614/5 And/or Senior Chief Byant Little, (808) 474-3614/5
  - Third call – CNRH/JBPHH Explosives Safety: Patrick Mallard, (808) 471-1111 x131
  - Fourth call – NAVFAC HI Environmental Coordinator Terence Tengan, (808) 471-1111 x320; COR: Dennis Makabe, (808) 282-1886; RPM: Eric Shigeki, (808) 471-1171 x264

Work will resume only after proper disposal and/or removal of the MEC/MPPEH has occurred and clearance given by Explosive Ordnance Disposal (EOD).

2.8 DUST CONTROL

Dust will be primarily controlled at the work site using water spray application. A water truck is anticipated to be used during excavation activities for dust control. Note: water spray for dust suppression shall not be applied near live electrical equipment.

2.9 ACTIVITY HAZARD ANALYSES

AHAs are prepared before beginning each major phase of work operations. The AHA reviews hazards and control measures for primary site tasks. The AHA defines the activities to be performed and identifies the sequence of work, specific hazards anticipated, and control measures to be implemented to eliminate or reduce hazards to an acceptable level. Work does not proceed on that phase of work until the AHA has been accepted and the AHA has been reviewed with personnel involved with the activity. The AHA is reviewed and modified to address changing site conditions or operations. AHA modification occurs with the concurrence of the SHM, PM, SS, SSHO, and Task Order COR.

Table 2-2 below lists AHAs applicable to this CTO. AHAs are provided in Attachment 5.

Table 2-2 AHAs Applicable to This CTO

#	AHA Title
AHA-01	Mobilization and Site Preparation
AHA-02	Soil Sampling
AHA-03	Contaminated Soil Excavation and Loading
AHA-04	Waste Transportation and Disposal
AHA-05	Heavy Equipment Decontamination
AHA-06	Site Restoration and Demobilization

3. STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

Information of key project personnel is reviewed in this section of the SSHP.

3.1 KEY PROJECT PERSONNEL

Key project personnel are identified in the project Emergency Contact List (see Attachment 2). Attachment 3 contains contact information of known subcontractors that are not key project personnel. **Table 3-1** below identifies key project personnel and provides their telephone contact information.

Table 3-1 Project Personnel and Contact Information

Position	Name	Telephone Number
CAPE		
Project Manager (PM)	Jonathan Borr	(808) 791-6885 office phone (808) 554-8015 mobile phone
Site Superintendent (SS)	Jamie White	(808) 479-2324 mobile phone
Quality Control Officer (QCO) / Site Safety and Health Officer (SSHO)	Emily Molhoek	(808) 791-6891 office phone (907) 223-9942 mobile phone
SS Alternates	Alan Ahsing Jonathan Borr	(808) 292-0390 mobile phone (808) 554-8015 mobile phone
QCO/SSHO Alternates	Alan Ahsing Carrie Plath Jonathan Borr Haley Miranda	(808) 292-0390 mobile phone (907) 349-5207 mobile phone (808) 554-8015 mobile phone (808) 652-3384 mobile phone
NAVAL FACILITIES ENGINEERING COMMAND – HAWAII		
Remedial Project Manager (RPM)	Eric Shigaki	(808) 471-1171 x264
Contracting Specialist	Jenny Yatsushiro	(808) 471-5694
Task Order Contracting Officer's Representative (COR)	David Chock	(808) 474-3220 x286

3.2 PROJECT TEAM PERSONNEL S&H RESPONSIBILITIES

3.2.1 Project Manager

The PM is responsible for overall direction, coordination, technical consistency, and review of the project contract. PM S&H responsibilities are listed below:

- Direct, coordinate, and implement the project CTO;
- Approve the SSHP and ensure NAVFAC Pacific approval before field work start;
- Provide resources and support to the Site Superintendent and SSHO;
- Ensure assigned field personnel have required training and other certifications;
- Emphasize S&H and hold personnel accountable for safe work performance;
- Enforce implementation/compliance with the HSPP, SSHP and S&H procedures;
- Monitor and evaluate S&H performance of project operations;
- Monitor overall safety performance of field personnel;

- Ensure correction of unsafe work practices and/or unsafe conditions;
- Ensure unplanned events, incidents, and accidents are properly reported;
- Immediately stop operations in the event of an emergency or serious hazard;
- Prepare and submit required work progress and other reports; and
- Communicate with the Task Order COR to evaluate and resolve S&H issues.

3.2.2 Site Superintendent

The SS is charged with the overall responsibility for the successful completion of field operations. The SS reports to the PM for project-related matters. SS S&H responsibilities are to:

- Prepare and organize project activities on site;
- Review and implement the site-specific SSHP;
- Provide equipment and materials for project operations;
- Communicate S&H issues, daily work plans, and schedules with the SSHO;
- Emphasize S&H and hold personnel accountable for safe work performance;
- Enforce implementation/compliance with the HSPP, SSHP and S&H procedures;
- Ensure correction of unsafe work conditions and/or unsafe work practices;
- Immediately stop site operations in emergency or exposure to serious hazard;
- Monitor and evaluate S&H performance of project personnel and operations;
- Report and investigate accidents and incidents and sign reports; and
- Communicate with the PM to evaluate and resolve S&H issues.

3.2.3 Safety and Health Manager

The SHM is the overall safety manager assigned to support the project. The SHM is a Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP). The SHM shall oversee the HSPP and develop, implement, and sign SSHPs. Changes to the HSPP or SSHP shall be at the direction and approval of the SHM with concurrence of the Contracting Officer or designated representatives. The SHM is not necessarily required to be on site during remedial activities, but shall be readily available for consultation, when required by the contract or the Contracting Officer and designated representatives.

The SSHO has a direct reporting relationship to the SHM regarding all S&H matters. The SHM oversees the activities of the SSHO and implementation of the HSPP and SSHP. The SHM has an independent reporting relationship from project management and supervision. A resume for the SHM is provided in Appendix A of this plan. SHM S&H responsibilities are listed below:

- Review, approve, sign, and date the CTO-specific SSHPs prior to submittal;
- Prepare and/or review AHAs prepared for project work tasks;
- Participate in quality control (QC) planning;
- Provide S&H supervision for the SSHO;
- Be available (24-hour basis) to assist the SSHO during emergencies or as needed;
- Provide on-site consultation as needed for HSPP/SSHP implementation;
- Coordinate SSHP modifications with the SSHO, PM, and Task Order COR;

- Provide support for level of protection upgrade and/or downgrade;
- Evaluate air monitoring data and recommend changes to controls, as needed;
- Assist in developing on-site training to be provided by the SSHO;
- Conduct S&H inspections and audits as scheduled with the PM;
- Provide S&H technical assistance to the SSHO, SS, and PM; and
- Communicate with the PM and Task Order COR to evaluate and resolve S&H issues.

3.2.4 Site Safety and Health Officer

The SSHO is the onsite project S&H supervisor responsible for implementing the S&H program at the site. The SSHO assists and represents the SHM in continued implementation and enforcement of the approved HSPP and SSHP. The SSHO has a direct reporting relationship to the SHM regarding all S&H matters. The SSHO has the authority to act in all safety matters to perform S&H management, surveillance, inspections, and safety enforcement. The SSHO has stop-work authority should imminent S&H hazards exist. The SSHO has the authority to remove personnel from the site for failure to comply with S&H requirements or other S&H reasons. The SSHO is the main contact for onsite emergency situations. The SSHO is present during fieldwork activities. If the SSHO must be absent from the site, the S&H duties must be delegated to a qualified alternate SSHO. SSHO resumes are provided in Appendix B of this plan. SSHO S&H responsibilities are listed below:

- Maintain copies of the HSPP and SSHP on site during field activities;
- Review and implement provisions of the HSPP, SSHP and the CSHP;
- Require that site personnel meet training and medical surveillance requirements;
- Conduct site orientation training, HSPP/SSHP review, and daily safety meetings;
- Emphasize S&H and hold personnel accountable for safe work performance;
- Review site hazards and establish safety control measures;
- Establish communications with potential emergency response organizations;
- Maintain a hazardous substance inventory list;
- Maintain copies of MSDSs/SDSs;
- Maintain safety equipment and supplies;
- Perform inspections for safe work operations;
- Enforce implementation/compliance with the HSPP, SSHP and S&H procedures;
- Perform and/or coordinate exposure monitoring;
- Report safety violations or S&H concerns promptly to the SHM and PM;
- Ensure correction of unsafe work conditions and/or unsafe work practices;
- Monitor and evaluate S&H performance of project operations;
- Maintain S&H records;
- Report and investigate accidents and incidents; and
- Communicate with the SHM and PM to evaluate and resolve S&H issues.

3.3 SITE VISITORS

Any official visitor who seeks entry into an exclusions zone (EZ) or contamination reduction zone (CRZ) shall present the SSHO with: proof of S&H training in compliance with OSHA HAZWOPER requirements; medical surveillance examination clearance, and respirator fit testing certification (if applicable). The SSHO shall maintain a Visitors Log at the site. If qualifications are met, authorized site visitors may enter the site upon meeting the following conditions:

- Sign in on the site Visitor Log upon arrival at the site;
- Receive site hazard and safety instructions from the SSHO;
- Review and comply with essential elements of the SSHP and applicable SOPs; and
- All personnel entering the site, including visitors, shall wear the proper PPE.

3.4 SUBCONTRACTORS

Subcontractors will be used to provide various services on this project (i.e., laboratory analysis, waste transportation and disposal, surveying). Subcontractors will be required to prepare and submit AHAs or collaborate with CAPE in the preparation of AHAs for the tasks they will perform. A list of subcontractors (currently known) that will be used on this project is provided in Attachment 3.

4. TRAINING

Training requirements are reviewed in this section of the SSHP.

Copies of S&H training certificates will be reviewed and maintained by the SSHO. Personnel will not be allowed to perform fieldwork until such documentation has been presented to the SSHO and the SSHO has determined this documentation to be complete and sufficient.

Certifications and designations [(first-aid responders, competent persons (CPs)] for project personnel and a resume for the SSHO are provided in Attachment 4.

4.1 TRAINING REQUIREMENTS

Table 4-1 Training Requirements

Training Description	Personnel
Initial Safety Briefing	Site Personnel
Daily Safety Briefing	Site Personnel
40-Hour HAZWOPER Initial Training and current refresher	Site Personnel
HAZWOPER Supervisor Training	Site Supervisors (SSHO; Site Superintendent; PM)
First-Aid/ cardiopulmonary resuscitation (CPR) Training	Minimum of 2 trained first-aid responders (SSHO plus 1)
Bloodborne Pathogen (BBP) Training	First-aid responders
30-Hour OSHA Construction S&H Training	SSHO and Alternate SSHO
40-Hour NAVFAC Construction Safety Hazard Awareness Training	SSHO and Alternate SSHO
Excavation Competent Person Training	SSHO and Alternate SSHO
Heavy Equipment Operator Training	Heavy Equipment Operator
Powered Industrial Truck Operator Training	Powered Industrial Truck Operator
PCB Health Hazard Training	Site Personnel Performing PCB Soil Excavation /Loading
Monthly Supervisor Safety Meeting	Site Supervisors
Visitor Safety Indoctrination Briefing	Site Visitors

4.2 SAFETY INDOCTRINATION BRIEFING

New workers must receive a site orientation briefing and review the SSHP before start of work. Personnel will sign a form documenting that they have reviewed the plan, understand the SSHP requirements, and agree to follow the plan.

Before start of work, the SSHO will provide a site orientation briefing to workers related to project operations and SSHP requirements. The briefing will include review of (as applicable): provisions of the SSHP; facility background and scope of work; key personnel and S&H responsibilities; site hazards anticipated; exposure monitoring program; site control procedures; PPE requirements (including discussion and demonstration of PPE inspection, donning/doffing, cleaning, storage and change-out); procedures for reporting unsafe conditions or unsafe work practices; procedures for reporting an injury/illness; emergency procedures, including warning signals and evacuation procedures; location/route to the emergency hospital; training requirements; medical surveillance requirements; and recordkeeping procedures.

4.3 HAZARD COMMUNICATION TRAINING

The SSHO will train each site worker on the location of MSDS/SDS sheets, storage/location areas of hazardous substances, and will review the MSDS/SDS sheets for specific safety and health protection hazards, procedures, and protective measures. Training will include acceptable containers and labeling requirements for hazardous substances should any hazardous substance be transferred from its original container to another container or the label on the container becomes damaged or ineligible.

4.4 SAFETY MEETINGS

Daily safety meetings will be conducted at the beginning of each work shift by the Site Superintendent or SSHO to review, with the work crew, past activities, plan for new or changed operations, review pertinent aspects of appropriate AHAs (by trade), establish safe working procedures for anticipated hazards, and provide pertinent S&H training and motivation. Attendance by all project personnel is mandatory. Meetings will be documented, including the date, subjects discussed, name of individual who conducted the meeting, and attendees. Those in attendance will be required to sign the Tailgate Safety Meeting or equivalent form. Documentation will be maintained and copies furnished to the designated authority on request.

4.5 MONTHLY SUPERVISOR SAFETY MEETINGS

Supervisor safety meetings will be held at least once a month for all supervisors on the project location. The SHM and/or SSHO will conduct the safety meeting and will discuss safety-related issues directed toward supervisor responsibilities. Meetings will be documented, and attending personnel will sign a Safety Meeting Attendance Roster. Safety meeting forms will be maintained by the SSHO, and copies will be furnished to the Task Order COR upon request.

4.6 HAZWOPER TRAINING

Personnel involved in hazardous waste activities at the site must have completed hazardous waste operations training as required by the OSHA HAZWOPER standard. Certificates of HAZWOPER training will be maintained by the SSHO at the site. Copies of current training certification statements will be submitted before initial entry onto the work site.

Required HAZWOPER training includes: 40 hours of initial training and 3 days of supervised field experience (workers and supervisors); 8 hours of additional specialized manager/supervisor training (supervisors); 8 hours of refresher training annually (workers and supervisors).

4.7 PROJECT-SPECIFIC PPE TRAINING

Project specific PPE training will be provided to site personnel based on the work task and PPE that will be used. Modified Level D Protection will be used for work tasks involving the potential for direct contact with PCB-contaminated soil. Modified Level D protection consists of: disposable coveralls [Kleenguard® or Tyvek® for dust exposure; polyethylene-coated Tyvek® for incidental splash protection; polyvinyl chloride (PVC) for liquid contact protection]; boots, steel-toed, chemical-resistant (PVC or equivalent) or steel-toed work boots (leather) with boot covers (latex); inner gloves (surgical nitrile); outer gloves (PVC); and hard hat; safety glasses; ear plugs (if noise levels more than 85 dBA); and ANSI Class 2 safety vest. PPE inspection, donning/doffing, cleaning, storage and change-out procedures will be reviewed.

4.8 EXCAVATION COMPETENT PERSON TRAINING

Excavation safety training is required for persons that are designated to perform as an Excavation CP for trenching and excavation operations that involve entry of personnel into trenches four feet or more or excavations five feet or more in depth. CPs must be knowledgeable in the OSHA "Excavation" standard (29 CFR 1926 Subpart P) and requirements for safe performance of excavation operations. Excavation safety training involves review of: OSHA excavation standards and company procedures; excavation safety hazards; soil analysis methods and classifications; protective systems for excavation safety; and duties, authority, and responsibilities of the CP.

4.9 HEAVY EQUIPMENT OPERATOR TRAINING

Personnel who will operate heavy equipment shall have experience and knowledge in the safe operation of the heavy equipment to be operated. The heavy equipment operator shall be familiar with the equipment manufacturer's operating procedures and safe practices for the equipment.

4.10 POWERED INDUSTRIAL TRUCK OPERATOR TRAINING

Powered industrial truck (i.e., forklift; telehandler; skid steer with fork attachment) operator safety training is required for forklift operators and must be provided at the time of initial assignment and periodically thereafter as required by OSHA regulation (29 CFR 1910.178 "Powered Industrial Trucks"). Forklift operator training consists of a combination of formal instruction, practical exercises, and evaluation of the operators' performance in the workplace. Forklift operators must receive initial training in forklift equipment and workplace topics, refresher training, and training certification.

4.11 PCB HEALTH HAZARD TRAINING

Personnel who may potentially be exposed to PCBs will be provided with training on PCB health hazards and safety control measures. The training will review health hazards associated with PCB exposure; nature of operations that could result in PCB exposure; measures that can be taken to protect from exposure to PCBs, and specific procedures to protect employees from exposure to PCB such as safe work practices, emergency procedures, and PPE including respirators, if applicable.

4.12 EMERGENCY RESPONSE PLAN TRAINING

Emergency response plan training is conducted by the SSHO during initial site safety orientation briefings and elements are periodically reviewed during daily safety meetings. Emergency response plan training reviews: SSHP emergency response plan information that includes escape procedures and routes, critical plant operations, employee accounting following an emergency evacuation, rescue and medical duties, means of reporting emergencies, persons to be contacted for information or clarification, and off-site emergency support services and agreements. The SSHO shall conduct an exercise of the Emergency Response Plan and complete a critique of the exercise.

5. PERSONAL PROTECTIVE EQUIPMENT

PPE requirements are reviewed in this section of the SSHP.

PPE will be required for certain field operations based on the potential for contaminant exposures. The SSHO and SHM will establish appropriate levels of protection for each work activity based on review of historical site information, existing contaminant data, and evaluation of the potential for exposure. The SSHO and SHM will establish action levels for upgrade or downgrade in the initial minimum levels of protection.

5.1 LEVELS OF PROTECTION

PPE requirements will be referenced to the EPA levels of protection system that consists of four levels of protection (A-D) as described below:

Level A Protection: Level A protection is worn when the highest level of respiratory, eye, and skin protection is needed. Level A protection is used for initial entry into certain confined spaces, entry into areas with extensive skin and respiratory hazards, and entry into areas where the hazard of significant exposure to unknown contaminant concentrations exists.

Level B Protection: Level B protection is worn when the highest level of respiratory and eye protection is needed, but a lesser level of skin protection is needed than for Level A. Level B protection is used for initial entry into certain confined spaces, entry into areas with significant skin and respiratory hazards, and entry into areas where the hazard of significant exposure to unknown contaminant concentrations exists.

Level C Protection: Level C protection is worn when a similar level of skin protection as Level B is needed, but a lower level of respiratory protection is needed. Level C protection is used when limited skin hazards exist and concentrations of contaminants are within the protection factor of an air-purifying respirator (APR).

Level D Protection: Level D protection is worn when minimal protection is needed and activities are not likely to involve direct contact with contaminated materials. Modified Level D protection is used when some skin protection is desired for protection against accidental skin contact with contaminants.

5.2 PPE REQUIREMENTS

It is anticipated that Level D and Modified Level D protection will be used for project activities. Provisions will be established for upgrade to Level C protection if air monitoring action levels are exceeded. Level A and B work is not expected.

The primary basis for the level of protection selection is as follows: Level C protection is used for work where there is potential for low-level exposure to air contaminants above exposure monitoring plan action levels and limited direct contact with contaminants. Modified Level D protection is used for work where there is no potential for significant air contaminant exposure, and protective clothing is used for protection from limited direct contact with contaminants. Level D protection is used for work where there is no significant potential for contaminant exposure.

5.3 LEVELS OF PROTECTION FOR MAJOR WORK TASKS

Levels of protection to be used for the following major project activities are reviewed below:

- Mobilization and Site Preparation
- Soil Sampling
- Contaminated Soil Excavation and Loading
- Waste Transportation and Disposal

- Heavy Equipment Decontamination
- Site Restoration and Demobilization.

5.3.1 Mobilization and Site Preparation

Level D protection will be used during mobilization and site preparation work tasks. Level D protection is used for activities that do not involve exposure to contaminants (site reconnaissance, laydown area setup, work zone delineation, fence removal, utility locating and mark-out, erosion and sediment controls).

5.3.2 Soil Sampling

Modified Level D and Level D protection will be used for soil sampling activities. Modified Level D protection is used where there are no significant airborne contaminant concentrations but the potential for direct contact with contaminants is present (soil sampling). Level D protection is used for activities that do not involve contaminant exposure (sample container packaging for shipment).

5.3.3 Contaminated Soil Excavation and Loading

Modified Level D (with provisions for Level C upgrade) will be used for contaminated soil excavation and loading. Modified Level D protection is used where there are no significant airborne contaminant concentrations but the potential for direct contact with contaminants is present (excavation and loading). Level C protection will be used if the air monitoring action level is exceeded.

5.3.4 Waste Transportation and Disposal

Level D protection will be used for waste transportation and disposal activities. Level D protection is used for activities that do not involve contaminant exposure (truck driving; off-loading of pallets of supersacks; off-loading of soil at landfill).

5.3.5 Heavy Equipment Decontamination

Modified Level D protection will be used for heavy equipment decontamination. Modified Level D protection is used where there are no significant airborne contaminant concentrations but the potential for direct contact with contaminants is present (heavy equipment decontamination).

5.3.6 Site Restoration and Demobilization

Level D protection will be used for site restoration and demobilization. Level D protection is used for activities that do not involve contaminant exposure (general site cleanup, backfill and grading, fence reinstallation, topsoil and seeding, and other site restoration activities).

5.4 LEVELS OF PROTECTION PPE DESCRIPTION

5.4.1 Level C Protection

Level C protection consists of:

- Air-purifying respirator (APR), full-face (protection factor of 100) or half-face (protection factor of 10), with appropriate cartridge/filter (P100 for dust exposure)
- Disposable coveralls (Kleenguard® or Tyvek®) for dust exposure; polyethylene-coated Tyvek® for incidental splash protection; PVC for liquid contact protection)
- Boots, steel-toed/shank, chemical-resistant (PVC or equivalent) or steel-toed work boots (leather) with boot covers (PVC or latex)
- Gloves, inner, chemical-resistant (surgical nitrile or latex) and outer gloves, chemical-resistant (nitrile; PVC or neoprene)

- Hard hat; safety glasses with side shields or goggles; ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.4.2 Modified Level D Protection

Modified Level D protection consists of:

- Disposable coveralls (Kleenguard® or Tyvek® for dust exposure; polyethylene-coated Tyvek® for incidental splash protection; PVC for liquid contact protection)
- Boots, steel-toed/shank, chemical-resistant (PVC or equivalent) or steel-toed work boots (leather) with boot covers (PVC or latex)
- Gloves, inner, chemical-resistant (surgical nitrile or latex) and outer gloves, chemical-resistant (nitrile; PVC or neoprene)
- Hard hat; safety glasses with side shields or goggles; face shield (polycarbonate for pressure washing); ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.4.3 Level D Protection

Level D protection consists of:

- Coveralls or standard work clothing
- Steel-toed work boots (leather)
- Hard hat; safety glasses with side shields or goggles; face shield (polycarbonate for pressure washing); work gloves (leather); ear plugs or ear muffs (if noise levels more than 85 dBA); ANSI Class 2 high-visibility safety vest with reflective striping; and two-way radio communication (optional)

5.5 RESPIRATORY PROTECTION

The SSHO is responsible for implementing the respiratory protection program at the site. The SSHO is responsible for ensuring that workers have had required medical examinations, respirator training, and respirator fit testing current within the past year. SSHO respiratory protection program duties include:

- Ensure workers complete medical exams and are approved for respirator use
- Arrange for and/or conduct respirator training
- Conduct and document respirator fit tests
- Ensure the availability of appropriate respirators and supplies
- Review tasks requiring the use of respiratory protection
- Monitor work areas and operations continually to identify respiratory hazards
- Monitor and enforce the proper use of respirators
- Ensure that respirators are properly cleaned, maintained, and stored
- Maintain respirator training and fit testing records.

6. MEDICAL SURVEILLANCE

Medical surveillance requirements are reviewed in this section of the SSHP.

Medical surveillance requirements exist for site personnel who will be entering site EZs. Required medical qualification documentation consists of a written physician opinion regarding any detected medical conditions that may limit work hazardous waste remediation activities and an opinion regarding protective clothing and respirator use. Copies of medical surveillance examination reports for site personnel will be reviewed and maintained by the SSHO and will be made available to the Task Order COR as required.

6.1 MEDICAL EXAMINATIONS AND REPORTS

CAPE medical examinations for field personnel are completed before job assignment and annually thereafter. CAPE uses WorkCare for medical service outsourcing. WorkCare physicians that are Occupational Medicine vice Preventative Medicine, Board-Certified provide occupational physician support services to CAPE. The occupational medicine Board-Certified physician will perform the physical or directly supervise the physical.

Medical examination reports for personnel are presented in the form of work status medical reports. These reports indicate any detected medical conditions that would increase an individual's risk of material health impairment from occupational exposure or if the individual has limitations in the use of PPE such as protective clothing or respirator use. Copies of medical examination reports for site personnel will be maintained by the SSHO and will be provided to the Task Order COR as required.

7. EXPOSURE MONITORING/AIR SAMPLING PROGRAM

Exposure monitoring and air sampling program requirements are reviewed in this section of the SSHP.

Air monitoring will be necessary to determine personnel exposures to chemical contaminants and/or physical agents during various project activities. The SSHO or designee will be responsible for completing air monitoring activities during field operations where there is potential exposure to combustible gases, oxygen deficiency, and/or airborne contaminants above OSHA 8-hour TWA and 15-minute STEL PELs or ACGIH TLVs. A description of the plan for air monitoring to be implemented during the project is provided in this section of the SSHP.

7.1 AIR CONTAMINANTS

Air contaminants that may potentially be encountered during project fieldwork operations are PCBs.

7.2 AIR MONITORING PLAN

The primary activity that will generate airborne dust is expected to be the excavation and loading and disposing of contaminated soil. Airborne dust monitoring will be conducted during the initial excavation process. Contaminant concentrations in soil are low and the likelihood of significant airborne contaminant exposure is remote. Airborne dust monitoring will be conducted to document a negative exposure assessment.

The SSHO or designee completes air monitoring. Should action level concentrations be exceeded, response actions will be initiated to implement engineering controls, safe work practices, upgrade or downgrade in PPE, work stoppage, emergency evacuation, and notification and evaluation by the PM and SSHO. The SSHO is responsible for maintaining copies of applicable monitoring records at the site for the duration of the project. The SSHO notifies site personnel of air monitoring results through correspondence or posting of information.

Table 7-1 Air Monitoring Plan

Method	Tasks / Frequency	Action Levels / Action
Airborne Dust		
MIE PdR-1000 aerosol monitor, or equivalent	TASKS: During contaminated soil excavation and loading. FREQUENCY: Periodic monitoring in breathing zone of workers in the excavation and loading area.	ACTION LEVEL: Airborne dust concentrations exceed 3 mg/m^3. ACTION: Increase dust control measures. Contact the SSHO to evaluate. Use Level C protection if directed by the SSHO.

7.3 AIRBORNE DUST

The primary activity that will generate airborne dust is expected to be the excavation, loading, stabilization, and disposing of contaminated soil. Airborne dust monitoring will be conducted during the initial excavation process. Contaminant concentrations in soil are low and the likelihood of significant airborne contaminant exposure is remote. Airborne dust monitoring will be conducted to document a negative exposure assessment.

Airborne dust monitoring is conducted to measure potential exposures to air contaminants during soil excavation and handling. An equivalent airborne dust action level can be calculated that represents the predicted maximum, non-volatile contaminant airborne dust concentrations that could be encountered. Airborne dust action levels are based on the cumulative total of the highest soil sample concentrations of non-volatile contaminant obtained during site assessment soil sampling. Airborne dust concentrations

exceeding the action level trigger use of additional dust control measures. The action level is also used as an upgrade concentration for respirator use by workers.

The equivalent airborne dust action level is calculated using the following formula:

$$El_{mix} = \frac{(EL\ mg/m^3)}{(Conc.\ g/g) \times (SF)} = \frac{(10^6\ mg/kg) \times (EL\ mg/m^3)}{(Conc.\ mg/kg) \times (SF)}$$

Legend:

El_{mix}:	Total dust concentration where contaminants would be at their PEL/TLV
EL:	Exposure limit (lower of PEL/TLV) of specific non-volatile soil contaminant (mg/m^3)
10^6:	Conversion factor
Conc.	Estimated maximum specific contaminant soil concentration (mg/kg)
SF:	Safety factor (1-10X depending upon confidence with soil sampling data)

Equivalent airborne dust action levels were calculated for PCB and based on a maximum concentration of 1,800 mg/kg and a safety factor of 2, and airborne dust level of 139 mg/m3 would be the lowest dust concentration that could allow exposure at the TLV. This calculated value is high and well above ACGIH guidelines for insoluble or poorly soluble Particles Not Otherwise Specified (PNOS) of less than 3 milligrams per cubic meter (mg/m^3) for respirable particles and 10 mg/m^3 for inhalable particles.

Since it is generally recognized that dust is visible in the 2 to 3 mg/m^3 range, it is expected that use of a "no visible dust" action level and water spray for dust control should be sufficient to keep airborne particulate exposures to a minimum.

Airborne dust monitoring will be conducted using an MIE PdR-1000 aerosol monitor (or equivalent) during contaminated soil handling. This direct-reading dust monitor is capable of measuring dust with a particle size of 0.1 to 10 micrometer (µm) over a range of 0.01 to 100 mg/m^3. A Z-bag unit is used for zeroing the instrument under field conditions IAW manufacturer instructions.

Airborne Dust Monitoring Action Level: Airborne dust concentrations exceed 3 mg/m^3. ACTION: Increase dust control measures. Contact the SSHO to evaluate. Use Level C protection if directed by the SSHO.

8. HEAT/COLD STRESS

Heat and cold stress hazards are reviewed in this section of the SSHP.

Cold stress conditions are not anticipated to be encountered during the project. Heat stress safety procedures are reviewed below.

8.1 HEAT STRESS

Personnel must be aware of the potential for heat stress during periods of elevated ambient temperatures (70 degrees Fahrenheit [ºF] or above), moderate to heavy workloads, and when impermeable or semi-permeable protective clothing is in use. Personnel will be informed about the various forms of heat stress (e.g., heat cramps, heat exhaustion, and heat stroke) and the symptoms of exposure.

Heat Cramps: Signs and symptoms of exposure are: painful spasms in muscles used during work (arms, legs, or abdomen). Treatment is to: remove to cooler area; rest lying down; and increase fluid intake.

Heat Exhaustion: Signs and symptoms of exposure are: fatigue, nausea, headache, giddiness, clammy and moist skin, pale or flushed complexion; dizziness or disorientation; may faint on standing; rapid pulse and low blood pressure; normal or low temperature. Treatment is to: remove victim from further exposure prior to starting treatment; remove to cooler area; rest lying down with head in low position; administer fluids by mouth; and seek medical attention.

Heat Stroke: Signs and symptoms of exposure are: red, hot, dry skin; dizziness; confusion; rapid breathing and pulse; can lose consciousness or have convulsions. Heat stroke is an extremely serious medical emergency. Treatment is to: remove victim from further exposure; remove all PPE and as much personal clothing as decency permits; cool rapidly by soaking in cool, but not cold, water; call ambulance and get immediate medical attention.

Initial phases of work activity will be closely monitored by the SSHO because workers may not be acclimatized to hot conditions. The SSHO will try to identify personnel who are more susceptible to heat exposure.

Workers are responsible for observing each other and themselves for development of heat stress symptoms. Personnel will be encouraged to drink generous amounts of water and electrolyte replacement fluids (even if not thirsty) to prevent dehydration. Adequate shelter will be provided to protect personnel from direct sun exposure. Sufficient breaks will be provided so personnel can remove protective clothing and cool down. Work/rest regimens will be adjusted as required to avoid heat stress.

8.2 HEAT STRAIN MONITORING

Heat strain monitoring is conducted at times when elevated ambient temperatures, moderate to heavy workloads and impermeable protective clothing are being used. Heat stress monitoring is completed, as required by the SSHO, when impermeable protective clothing is in use and ambient temperatures exceed 70 ºF. The frequency of monitoring increases as the ambient temperature increases or if slow recovery rates are indicated. When ambient temperatures exceed 80ºF, monitoring is completed after each work period.

Heat strain monitoring and establishment of work-rest regimens for heat stress prevention is completed through physiological monitoring of workers. Physiological monitoring is conducted by monitoring the heart rate and/or body temperature.

8.2.1 Heart Rate Monitoring

Heart rate monitoring is accomplished by measuring the worker's radial pulse rate. Monitoring is completed at the beginning of work and following each work period. Complete baseline measurements at the start of work before entering the Exclusion Zone. Measure the heart rate (HR) by counting the radial pulse for a 30 second period and multiply the value by 2 to determine the number of beats per minute (bpm). Following

the first work period, measure the HR as early as possible in the resting period. If the HR exceeds 110 bpm, then reduce the next work period by one-third while keeping the length of the rest period the same. Following the next work period, if the HR still exceeds 110 bpm, then again shorten the following work cycle by one-third while keeping the length of the rest period the same.

Watch for signs and symptoms of heat stress throughout the work process. Contact the SSHO for an evaluation when a worker's HR exceeds 110 bpm.

8.2.2 Body Temperature Monitoring

Body temperature monitoring is accomplished using an ear thermometer set on an adult oral temperature setting. Monitoring is completed at the beginning of work and following each work period. Complete baseline measurements at the start of work before entering the Exclusion Zone. Measure the body temperature (BT) using an ear thermometer. Following the first work period, measure the BT as soon as possible in the rest period before drinking. If the BT exceeds 99.6ºF (or the baseline by 1ºF), reduce the next work cycle by one-third without changing the duration of the rest period. Following the next work period, if the BT still exceeds 99.6ºF (or the baseline by 1ºF), then again shorten the following work cycle by one-third while keeping the length of the rest period the same.

Watch for signs and symptoms of heat stress throughout the work process. Pay strict attention to anyone whose body temperature exceeds 99.6ºF (or 1 to 2ºF above baseline) and contact the SSHO for an evaluation of the individual. Do not permit a worker to wear semi-impermeable or impermeable garments when the BT exceeds 100.6ºF. If the BT exceeds 100.6ºF, immediately contact the SSHO, remove the worker from the work area, remove protective clothing from the worker, and treat for heat exhaustion/heat stroke if symptoms are evident. If the BT exceeds 100.6ºF, the worker must not be allowed to do work involving heat exposure for the rest of the workday.

8.2.3 ACGIH Guidelines for Limiting Heat Strain

ACGIH has established guidelines for limiting heat strain for workers. One of the following measures may mark excessive heat strain, and an individual's exposure to heat stress should be discontinued when any of the following occur:

- Sustained (several minutes) HR is in excess of 180 bpm minus the individual's age in years (e.g., 180 – age) for individuals with assessed normal cardiac performance;
- BT is greater than 38.5°C (101.3°F) for medically selected and acclimatized personnel or greater than 38°C (100.4°F) for unselected, unacclimatized workers (Note: ACGIH cites the BT as a core temperature measurement. Body core temperature monitoring will not be conducted on this project. Ear thermometer measurements will be used instead);
- Recovery HR at one minute after a peak work effort is greater than 120 bpm; and
- There are symptoms of sudden and sever fatigue, nausea, dizziness, or lightheadedness.

9. STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS, AND WORK PRACTICES

Standard operating safety and occupational health procedures, engineering controls, and work practices are reviewed in this section of the SSHP.

9.1 CAPE SAFETY AND HEALTH PROGRAM STANDARD OPERATING PROCEDURES

The SSHO shall maintain a copy of the CAPE Safety and Health Program standard operating procedures (SOPs) on site for reference.

9.2 HEALTH AND SAFETY DOCUMENTATION

S&H documentation records associated with SSHP implementation will be maintained by the SSHO. S&H documentation records, as applicable, include the following: MSDSs/SDSs; S&H training documentation; medical surveillance examination documentation; respirator fit testing forms; SSHP review and safety meeting records; safety inspection reports; equipment inspection forms; confined space entry permits; exposure monitoring records and employee notifications; incident reporting and investigation records; and other S&H documents.

9.3 SAFETY INSPECTIONS

The SSHO will perform daily S&H inspections of the work site. Quality control personnel, as part of their quality control responsibilities, conduct and document safety observations. Project QC personnel shall note and document S&H issues in daily QC reports. Daily inspections will be documented in the SSHO logbook and included in the Daily QC Report. Weekly inspections will be documented using a Safety Inspection Report Form. Copies of safety inspections will be maintained onsite and available for review. The weekly safety inspection report will provide the basis for the Safety and Occupational Health Deficiency Tracking Log.

9.4 SITE SAFETY AND HEALTH PLAN FORMS

Completed SSHP forms are maintained onsite by the SSHO for the duration of the project. SSHP forms (see Attachment 1) that may be used during the project are indicated below:

- AHA Preparatory Phase Training Log;
- Air Monitoring Log;
- Calibration Log: Direct-Reading Monitoring Instrument;
- Emergency Eyewash Inspection Log;
- Emergency Medical Notification Form;
- Equipment Decontamination Release Authorization;
- Fire Extinguisher Inspection Log;
- First-Aid Kit Inspection Log;
- First-Aid Treatment Log;
- Hazardous Substance Inventory List;
- Heavy Equipment Inspection Report;
- Incident Reporting and Investigation Procedures Posting;
- Incident Report by Supervisor;
- Incident Statement by Employee;

- Incident Statement by Witness;
- Injury and Illness Report;
- Inspection Checklist: Construction Safety (R&I);
- Inspection Form: Forklift;
- Property Damage, Loss, and General Liability Report;
- Safety and Occupational Health Deficiency Tracking List;
- Safety Inspection Report;
- Site Control Log;
- Site Control Log for Visitors;
- Site Safety and Health Plan Change Approval Form;
- Site Safety and Health Plan Distribution to Subcontractor;
- Site Safety and Health Plan Review;
- Tailgate Safety Meeting Record;
- Training Attendance Roster;
- Vehicle Accident Report;
- Visitor Information and Acknowledgement Form;
- NAVFAC Contractor Significant Incident Report (CSIR) Form; and
- NAVFAC Contractor Site Safety Assessment Form.

10. SITE CONTROL MEASURES

Site control requirements are reviewed in this section of the SSHP. Site control procedures are established to: restrict access to controlled areas of the worksite, identify means for site communication, and establish measures for site security.

10.1 SITE WORK ZONES

Site work zones are established based on the type of operations to be conducted in the work zone, potential for exposure to contaminants, and potential for contact with other safety hazards. The establishment of controlled work zones (i.e., EZ, CRZ, and support zone) may be required only during specific operations identified by the SSHO. Site work zone requirements are established to limit access to work areas to authorized personnel, prevent the spread of contamination from the work area, establish site communication, and site security measures. Work zone demarcation will be established through use of caution tape or other means (e.g., barricades, fencing, signs) as approved by the SSHO.

10.1.1 Exclusion Zone

The EZ is the work zone that represents the area of highest contamination at the site. The EZ will be identified by the SSHO for each work area. The level of protection used within the EZ may vary dependent upon the various work tasks to be conducted and is determined by the SSHO.

10.1.2 Contamination Reduction Zone

The CRZ is the work zone that represents the transition area between the EZ and the support zone at the site. Entry to/exit from the EZ will be through a designated location in the CRZ. Upon exit from the EZ, workers will be required to pass through the CRZ before entering the support zone. Personnel decontamination will occur within the decontamination station in the CRZ.

10.1.3 Support Zone

The support zone is the work zone outside of the CRZ that represents the clean areas established at the site. The command post, medical station, equipment and supplies, and other support facilities will be located in the support zone. All breaks, lunch, and meetings will take place in the support zone. Whenever possible, support zone activities will be located upwind of the EZ to reduce the possibility of vapor and/or dust exposures.

10.1.4 Location of Site Work Zones

The EZ generally coincides with the extent of contamination/excavation. The CRZ is located between the EZ and the support zone. The CRZ comprises the personnel and equipment decontamination area.

10.2 SITE CONTROL LOG

A log of personnel visiting, entering, or working at the site will be maintained. A Site Control Log form will be completed daily. This log includes entries for the date, name, organization, and time entering and exiting the site. The Site Control Log is maintained onsite by the SSHO. All personnel are required to report and sign in with the SSHO upon arrival at the site. Personnel who wish to enter a CRZ or EZ at the site must provide to the SSHO copies of required training, medical fitness for duty, and respirator fit testing documentation before site entry is authorized.

10.3 SITE COMMUNICATIONS

Site communications are critical to allow for expedient communication of operational instructions, safety information, and emergency communications and include:

- The Site Superintendent and SSHO will have a mobile phone on-site at all times; and

- Emergency communication instructions are found in the emergency response plan section of the SSHP.

10.4 SITE SECURITY

Site security measures are required to prevent unauthorized access to controlled areas of the site. Site security measures include:

- Personnel are required to check-in at the project office and sign in on the Site Control Log form before entering controlled areas of the site. If a project office is not established at the site, then personnel shall check-in with the SSHO to sign in and out. Unauthorized persons are not allowed into the controlled areas of the site;
- Temporary fencing, barricades, signs, and/or caution tape will be used for delineation of controlled areas, if needed;
- Protection is required around open holes during off hours (e.g., temporary fencing, barricades with flashing lights, and signs/caution tape); and
- Site personnel are required to comply with facility security measures.

10.5 SITE VISITORS

Authorized site visitors may visit the site upon meeting the following conditions:

- Sign in on the site Visitor Log;
- Receive site hazard and safety instructions from the SSHO;
- Review and comply with the essential elements of the SSHP;
- Use their own PPE, or that provided by others, to enter regulated work areas; and
- Report observed unsafe acts and/or conditions at, or affecting, the work site.

In addition, any official visitor who seeks entry into an EZ or CRZ shall present the SSHO with: proof of S&H training in compliance with OSHA HAZWOPER requirements; medical surveillance examination clearance; and respirator fit testing certification (if applicable). The SSHO shall maintain a Site Control Log for visitors at the site.

11. PERSONAL HYGIENE AND DECONTAMINATION

Personal hygiene and decontamination requirements are reviewed in this section of the SSHP. Personnel hygiene and personnel decontamination measures will be required for site work. It is anticipated that dry decontamination measures will be used for site work.

11.1 PERSONAL HYGIENE

Food, beverages, tobacco products, or cosmetics are not allowed in contaminated areas or potentially contaminated areas. Eating, drinking, chewing gum or tobacco, and smoking are allowed only in designated areas.

Good personal hygiene and decontamination practices will be followed at all times. Site washing facilities will be provided at the job location, and personnel will be instructed to practice good personal hygiene by washing the face, hands, and forearms before eating, drinking, smoking, etc. Portable toilets will be readily available at the job location.

11.2 PERSONNEL DECONTAMINATION

The SSHO will determine the procedures to be used for personnel decontamination. It is anticipated that dry decontamination measures will be used for site work. A dry decontamination method is used when there is limited contact with contaminants (i.e., soil excavation). A wet decontamination method is used when there is significant contact with contaminants due to contact with liquid contaminants, muddy surface contamination, or other heavy contamination.

General personnel decontamination requirements include:

- The SSHO must review specific decontamination procedures with personnel required to enter controlled work zones of the site and will monitor and ensure use of prescribed decontamination procedures;
- Personnel will be instructed to minimize contact with contaminants, to the extent feasible, to reduce the potential for personal or equipment contamination;
- Personnel decontamination occurs at the decontamination station established within the CRZ for each work location. Decontamination activities occur in the CRZ after working in the EZ and before entrance into the support zone; and
- Personnel must clean, remove, and place contaminated disposable protective clothing in marked containers before leaving the CRZ.

11.3 DRY DECONTAMINATION PROCEDURES

A dry decontamination method is used when there is limited contact with contaminants and when the SSHO has determined that a wet decontamination method is not necessary. The decontamination sequence should be completed as follows:

- Station 1 - Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;
- Station 3 - Boots and Outer Garment Removal: Remove boots and suit and deposit in containers with plastic liners;
- Station 4 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and

- Station 5 - Field Wash: Wash hands and face thoroughly.

11.4 DECONTAMINATION PROCEDURES – WET METHOD

A wet decontamination method is not expected for site work, however, will be used when there is significant contact with contaminants (i.e., contact with liquid contaminants, muddy surface contamination, other heavy contamination) or when the SSHO has determined it is necessary. The decontamination sequence should be completed as follows:

- Station 1 – Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Boots and Outer Garments Wash/Rinse: Scrub outer boots, outer gloves, and suit with detergent/water solution. Rinse off with water;
- Station 3 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;
- Station 4 - Cartridge/Canister or Mask Change-Out: Change-out APR cartridges/canister or face piece as needed. For respirator change-out and return to EZ, don new outer gloves and boot covers, tape at joints, and return to EZ. For entry into the support zone, continue decontamination sequence;
- Station 5 - Boots and Outer Garment Removal: Remove boots and suit and deposit on sheet plastic or in containers with plastic liners;
- Station 6 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and
- Station 7 - Field Wash: Wash hands and face thoroughly.

12. EQUIPMENT DECONTAMINATION

Equipment decontamination requirements are reviewed in this section of the SSHP. Equipment decontamination measures will be required for site work. It is anticipated that dry decontamination measures will be used for equipment decontamination.

12.1 EQUIPMENT DECONTAMINATION FACILITIES

A decontamination area will be established as needed for decontamination of vehicles and equipment.

12.2 EQUIPMENT DECONTAMINATION PROCEDURES

Procedures are required to prevent the spread of contamination from vehicles and equipment used in the EZ into support zone and off-site areas. Equipment will be decontaminated by procedures established by the SSHO and include:

- Vehicle and equipment use in the EZ and/or contact of vehicle and equipment tires with contaminated surfaces will be minimized to the extent possible;
- Dirt will be brushed or scraped off of vehicles and heavy equipment to remove visible materials before moving from the CRZ offsite; and
- Following decontamination, the equipment will be inspected and an Equipment Decontamination Release Authorization Form prepared by the SSHO to document decontamination before equipment will be allowed to move offsite.

13. EMERGENCY PROCEDURES

Emergency response and contingency procedures are reviewed in this section of the SSHP.

13.1 EMERGENCY RESPONSE PLAN

A written emergency response plan must be developed and implemented for HAZWOPER operations to handle anticipated emergencies prior to commencement of emergency response operations.

Elements of an emergency response plan for HAZWOPER operations include:

- Pre-emergency planning and coordination with outside parties;
- Personnel roles, lines of authority, training and communication;
- Emergency recognition and prevention;
- Safe distances and places of refuge;
- Site security and control;
- Evacuation routes and procedures;
- Decontamination;
- Emergency medical treatment and first aid;
- Emergency alerting and response procedures;
- Critique of response and follow-up; and
- PPE and emergency equipment.

13.1.1 Pre-Emergency Planning and Coordination with Outside Parties

Pre-emergency planning will involve coordination with outside parties. Onsite emergency planning shall be integrated with offsite emergency support. The SSHO will contact the local emergency medical services (EMS) and apprise them of the location, schedule, type of work, and inventory of flammable materials to be on site. The SSHO will offer the emergency service providers with an onsite orientation to the project to review site hazards. The SSHO will document the emergency service agreements (e.g., documentation may include written agreements, memoranda for record, telephone conversation logs).

Onsite Medical Support: CAPE trained first-aid responders will provide initial first-aid/CPR support for jobsite medical emergencies. A minimum of two first-aid/CPR-trained workers shall be present on site during field work. A list of designated first-aid responders will be included as an attachment to the SSHP. This list will be reviewed during site orientation briefings and safety meetings and posted by the first-aid station in the job trailer.

Offsite Medical Support: CAPE will rely on support from the designated emergency hospital for serious medical emergency incidents. For minor injuries or other medical services (i.e., drug testing, medical exams); the SHM and SSHO may designate a local medical clinic to provide offsite medical support services.

Medical Consultation: CAPE uses WorkCare, Inc. to provide occupational physician support services. WorkCare physicians are Board-Certified (or Board-Eligible) and provide medical director services to CAPE.

Fire Incidents: CAPE will request facility fire department support in case of a fire incident on site. Onsite fire extinguishers will be used by trained personnel to extinguish small fires if it is safe to do so.

Chemical Spill Incidents: CAPE and its subcontractors have personnel onsite that are HAZWOPER trained and will respond to chemical spills at the job site. Spill incidents will be reported as indicated by facility requirements but spill response support from outside parties is not anticipated.

Weather-Related Emergencies: CAPE will follow facility requirements for site preparation and evacuation in case of impending typhoon or other weather-related emergency.

13.1.2 Personnel Roles, Lines of Authority, Training and Communication

Personnel Roles: The SSHO is the primary emergency response coordinator for all emergency events. The Site Superintendent, QCO, and other site supervisors will provide support to the SSHO in his efforts to resolve and emergency incident.

Lines of Authority: The SSHO is the primary emergency response coordinator for all emergency events. All site supervisors report to the SSHO in times of emergency.

Training: Before start of work, the SSHO will provide a site orientation briefing to workers related to project operations and SSHP requirements. The briefing will include review of procedures for reporting an injury/illness, emergency procedures including warning signals and evacuation procedures, location/route to the emergency hospital.

Communications: Site and emergency communication procedures include:

- Cellular telephones will be used for site and emergency communications;
- The SSHO will maintain an Emergency Contact List (see Attachment 2). The SSHO is responsible for designating an emergency hospital and determining the route to the emergency hospital before the start of field operations;
- The SSHO will ask CAPE site personnel to complete an Emergency Medical Notification Form to advise the SSHO of if the individual has a medical condition that could require emergency medical assistance (e.g., hypersensitivity to bee stings); and
- The SSHO will establish emergency communications procedures before site work and will communicate this information to site personnel during site orientation briefings and safety meetings.

13.1.3 Emergency Recognition and Prevention

In the event of an emergency incident, the SSHO and Site Superintendent will be immediately notified. The SSHO will obtain information regarding the emergency and will respond immediately to the emergency location. The SSHO shall determine the situation and hazards involved. As needed, the SSHO will contact the SHM (industrial hygienist) to assist with the hazard assessment, evaluation, and control measures needed to resolve and emergency incident.

13.1.4 Safe Distances and Places of Refuge

Places of refuge will be designated by the SSHO during the site orientation briefing and periodically during daily safety meetings. The job trailer will be the main place of refuge in an emergency incident, except in cases where toxic air contaminants may be involved and the job trailer is in proximity to and downwind of the incident location.

13.1.5 Site Security and Control

Site security measures are necessary to prevent unauthorized access to controlled areas of the site; especially in times of emergency. Site security measures include:

- Personnel are required to check-in at the project office and sign in on the Site Control Log form before entering controlled areas of the site. The Site Control Log will be used by the SSHO to account for site personnel in the event of an onsite emergency;
- Temporary fencing, barricades, signs, and/or caution tape will be used as needed to control access to an emergency location; and
- As directed by the SSHO, a guard will be posted at the entrance to the site to control and restrict site access to only those essential personnel needed in the event of an emergency incident.

13.1.6 Evacuation Routes and Procedures

Evacuation routes will be reviewed during site safety orientation briefings and periodically during daily safety meetings.

For major emergency events (e.g., large fires, gas line or electrical line breaks, etc.) an emergency evacuation alarm will be sounded. The alarm will be a single long blast on a vehicle horn or a compressed air horn.

Nonessential personnel will be evacuated from the work area until the SSHO determines that it is safe for work to resume. Personnel will evacuate to a refuge area that has been designated by the SSHO in the initial site safety orientation or tailgate safety meeting. Typically the onsite assembly area will be at the job trailer and the offsite assembly area will be at a designated area upwind and outside of the entrance point into the site. The SSHO will notify the facility emergency contact and local fire, police, and/or EMS as necessary. The SSHO and Site Superintendent will complete a head count to make sure that all site personnel are accounted for.

13.1.7 Decontamination

In response to an emergency event, a dry decontamination method will be use. The decontamination sequence should be completed as follows:

- Station 1 - Equipment Drop: Deposit used equipment on sheet plastic or in container with plastic liner;
- Station 2 - Outer Boot Covers and Outer Gloves Removal: Remove outer boot covers and outer gloves. Deposit in container with plastic liner;
- Station 3 - Boots and Outer Garment Removal: Remove boots and suit and deposit in containers with plastic liners;
- Station 4 - Respirator Face Piece and Inner Gloves Removal: Remove respirator face piece (avoid touching face with fingers) and deposit on sheet plastic or in plastic bag. Remove inner gloves; and
- Station 5 - Field Wash: Wash hands and face thoroughly.

13.1.8 Emergency Medical Treatment and First-Aid

First-aid Responders: First-aid responders will be present at the project location. Supervisory site personnel will have completed first-aid and CPR training, and at least two persons trained in first-aid/CPR will be onsite during project activities. Designated first-aid responders are indicated on the Designated First-Aid Responder List (see Attachment 4).

Emergency Hospital and Route Information: The SSHO will select an emergency hospital and determine the route to the emergency hospital before site work. It is required that the SSHO and Site Superintendent drive the route prior to site work. The emergency hospital information and emergency hospital route map

will be provided in the SSHP. The SSHO will post emergency hospital information in the project office and place in site vehicles.

13.1.9 Emergency Alerting and Response Procedures

Notification of Site Emergency: All site personnel are required to immediately notify the SSHO and Site Superintendent immediately in the event of any type of site emergency. An "Emergency Contact List" will be provided in the SSHP. The SSHO will post the Emergency Contact List in the job trailer (if applicable) and it will be placed inside site vehicles. An emergency route map will be provided in the SSHP. The SSHO will post emergency hospital information in the job trailer office and it will be placed inside site vehicles.

Response to Medical Emergency Incident: In the event of a medical emergency, the following procedures will be implemented:

- The exposed or injured person will be removed from immediate danger and first-aid and/or CPR will be administered by trained site personnel;
- Emergency medical assistance will be called and will be informed of the following: name and location of person reporting; location of accident or incident; specific directions to the emergency location, as needed; phone number from which the person is calling; number of persons needing help; what is currently being done for the victim (for life-threatening injuries, request instructions from emergency services dispatcher); name and affiliation of injured party; description of injuries; details of any chemical involved; summary of the accident, including suspected causes and time of occurrence; and temporary control measures taken to minimize further risk;
- Nonessential personnel will be evacuated from the work area until the SSHO determines that it is safe for work to resume;
- A medical emergency involving chemical exposure will require communication between the SSHO and emergency hospital personnel regarding chemicals involved; and
- The SSHO will designate an individual to accompany or follow the victim to the emergency hospital to assist with any needs that arise and to report back regarding the victim's status.

Response to Fire Incident: The SSHO will consult with the local fire department before initiating site activities regarding response to fire incidents associated with site work. In the event of a fire, the following will be implemented:

- Large fire (beyond the immediate control of a small on-site fire extinguisher): The site alarm will be sounded; personnel will immediately evacuate and assemble at a predetermined upwind site location; the fire department will be called; and personnel will not reenter the fire area and will wait for fire department arrival; and
- Small fire (within the immediate control of a small on-site fire extinguisher): The site alarm will be sounded; trained personnel will use an on-site fire extinguisher to put out the fire.

Response to Chemical Spill Incident: A spill kit will be available onsite (located in designated area by the SSHO) with supplies for spill containment and control and includes: absorbent pads; solid absorbent; 55-gallon drums; fire extinguisher; PPE; eyewash supplies; and a first-aid kit.

In the event of a small chemical spill incident, the SSHO and Site Superintendent shall be immediately notified. The SSHO will obtain information regarding the spill and will respond immediately to the spill location. The SSHO shall determine the hazards and hazardous or toxic agents involved. As needed, the SSHO will contact the SHM (industrial hygienist) to assist with the hazard assessment, evaluation, and control measures needed to perform the response. Atmospheric hazard monitoring, PPE, and work methods shall be implemented as specified by the SSHO in order to perform a response.

If containment can be done safely without exposure to personnel, the following will be implemented:

- Liquid chemical spills will be contained through prompt application of absorbents (e.g., absorbent pads or solid absorbent); and
- Solid chemical spills are contained by covering with sheet plastic (or by an equivalent method). Spilled material is collected in bags, drums, or other suitable containers and disposed of as required.

13.1.10 Critique of Response and Follow-up

Following an emergency incident, the SSHO shall conduct a critique (debrief) of the emergency incident response. Action items will be developed where deficiencies are identified during the incident debriefing. Follow up actions will be implemented to correct incident response deficiencies. Pertinent information from the incident critique will be communicated to site personnel during a safety meeting.

13.1.11 PPE and Emergency Equipment

PPE to include protective clothing and equipment and respiratory protective equipment will be readily available in the event of an emergency response incident. It is anticipated that the following PPE and safety equipment will be available on site: hardhats, safety glasses, face shields, gloves, disposable coveralls, boot covers, and air-purifying respirators with P100 cartridges.

Emergency supplies that will be immediately available at the site include: first-aid kit(s) (meeting EM 385-1-1 03.B.01 requirements); eye wash (15-minute unit meeting ANSI Z358.1-2004 or later); eyewash bottles; fire extinguisher(s); potable water; and spill kit supplies (e.g., absorbent pads; solid absorbent; container).

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NAVFAC Hawaii. Performance Work Statement, Contract Task Order No. 0025, Environmental Remedial Action Contract for Sites in Hawaii and Other Areas for Naval Facilities Engineering Command Hawaii, *Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii*, 17 September 2014.

Safety Now! Controlling Chemical Exposures at Hazardous Waste Sites with Real-Time Measurements; Christopher S.E. Marlowe; AIHA Marketplace Publication Product ID: AHWK98-349; ISBN: 0-932627-90-0, 1998

United States Army Corps of Engineers, Safety and Health Requirements Manual, EM 385-1-1 (and incorporated changes), 15 July 2008.

United States Department of Labor, Occupational Safety and Health Administration, Title 29, Code of Federal Regulations, Part 1910 and 1926, 2014.

Attachment 1
SSHP Forms

ACTIVITY HAZARD ANALYSIS PREPARATORY PHASE TRAINING LOG

Activity Hazard Analysis Phase Number(s): _____

Project Name:	
Project Location:	
Conducted By:	

The following individuals have reviewed and have agreed to follow the Activity Hazard Analysis prepared by CAPE for the above indicated site and understand the hazards and control measures required on this phase of the project.

I agree to follow the procedures outlined in this plan and to inform the CAPE Project Manager, Superintendent, and/or Site Safety and Health Officer should any unsafe condition be noted.

I understand that failure to follow safety regulations can be reason for removal from this project.

Name	Signature	Company

AIR MONITORING LOG

Project Name: _____

Project Location: _____

Date: _____

Conducted By: _____

Page Number: _____

Time	Location	_____ (____)	_____ (____)	_____ (____)	_____ (____)	_____ (____)

LEGEND:

VOC: Volatile organic compound
PID: Photoionization detector
FID: Flame ionization detector
LEL: Lower explosive limit
O_2: Oxygen meter
mg/m^3: Milligrams per cubic meter
ppm: Parts per million

CALIBRATION LOG: DIRECT-READING MONITORING INSTRUMENT

Project Name: _____

Project Location: _____

Conducted By: _____

Instrument: _____

Date: Name:	Calibration Gas: Concentration:
Initial Reading: Adjusted Reading:	Comments:

Date: Name:	Calibration Gas: Concentration:
Initial Reading: Adjusted Reading:	Comments:

Date: Name:	Calibration Gas: Concentration:
Initial Reading: Adjusted Reading:	Comments:

Date: Name:	Calibration Gas: Concentration:
Initial Reading: Adjusted Reading:	Comments:

Date: Name:	Calibration Gas: Concentration:
Initial Reading: Adjusted Reading:	Comments:

EMERGENCY EYEWASH INSPECTION LOG

Project Name:	
Project Location:	
Date:	
Conducted By:	

EMERGENCY EYEWASH INSPECTION CHECKLIST

Eyewash I.D.	Eyewash Location	Eyewash Type and Description	Last Service	Operable

EMERGENCY MEDICAL NOTIFICATION FORM

Employee Name:	
Mailing Address:	
Home Telephone:	

EMERGENCY NOTIFICATION INFORMATION

IN CASE OF EMERGENCY NOTIFY:
Name / Relationship / Telephone:
Name / Relationship / Telephone:
ALLERGIES
List any health-threatening allergies (i.e., medications, food, bee stings):
MEDICATIONS
List current medications that may affect the ability to safely operate equipment and machinery:
OTHER INFORMATION
List any other information that should be known in case of an emergency:

Name (print):	
Signature:	
Date:	

EQUIPMENT DECONTAMINATION RELEASE AUTHORIZATION

Date / Day:	
Project Name:	
Project Location:	
Equipment Type:	
Mfr / Model:	

Item	Inspection Description	Clean	Not Clean	N/A
1	Tires / Rims, outside			
2	Tires / Rims, inside			
3	Buckets / Blades			
4	Rippers / Other			
5	Cross-members			
6	Undercarriage			
7	Tracks			
8	Drive carriage			
9	Drip pans			
10	Brush guards			
11	Belly pans			
12	Scraper can interior			
13	Truck beds			
14	Frames			
15	Engine compartment			
16	Cab			

Equipment Use:

Decontamination Description:

I certify that I have inspected the equipment indicated above and have observed that visible material has been removed from the equipment.

Inspected By:	
Signature:	
Date:	

FIRE EXTINGUISHER INSPECTION LOG

Project Name:	
Project Location:	
Date:	
Conducted By:	

FIRE EXTINGUISHER INSPECTION CHECKLIST

Ext. I.D.	Ext. Location	Extinguisher Type/Description	Last Service	Charged	Operable

FIRST AID KIT INSPECTION LOG

Project Name:	
Project Location:	
Date:	
Conducted By:	

FIRST AID KIT INSPECTION CHECKLIST

Kit I.D.	Kit Location	First Aid Kit Type / Description	Inventory Complete?	Missing Items

FIRST-AID TREATMENT LOG

Project Name:	
Project Location:	

Date	Name	Description of First-Aid Treatment Rendered	First-Aid Kit Supplies Used

HAZARDOUS SUBSTANCE INVENTORY LIST

Project Name:	
Project Location:	

MSDS on File	Product Name	Manufacturer	Location and Container Type

HEAVY EQUIPMENT INSPECTION REPORT

Date / Day:	
Project Name:	
Project Location:	
Equipment Type:	
Mfr / Model:	

Inspection Description	Checked	Observations (readings, levels, condition, damage, repairs needed)
General appearance		
Hour meter reading		
Engine operation / check belts		
Engine oil / water level		
Transmission oil level		
Hydraulic / misc. oil level		
Brake operation / fluid level		
Grease		
Batteries		
Fuel level (gas / diesel)		
Hoses & fittings (air, hydraulic…)		
Operation / controls		
Tires / tracks		
Cab (mirrors, seatbelt, glass, horn, turn signals, lights, wipers)		
Back-up lights and alarm		
Fire extinguisher condition		
Coupling devices and connectors		
Exhaust system		
Blade / boom / bucket		
Frame, ladders and walkway		
Steering		

Defects and Repairs Needed / Comments:

Inspected By: **Signature:**

POST AT JOB SITE

INCIDENT REPORTING AND INVESTIGATION PROCEDURES

(Injury/Property Damage/Liability Exposure/Spills/Fires/Serious Near Miss Incidents)

Notify the Site Supervisor or Site Safety and Health Officer (SSHO) immediately of injuries, property damage, liability exposure, spills, fires, and serious near miss incidents. The Site Supervisor or his/her representative shall:

- Take care of injured personnel immediately and secure the area
- Secure remaining dangerous conditions to prevent accidents and additional damage
- Secure the incident scene to preserve information
- Identify employees involved in the incident and witnesses and obtain initial information
- Notify the Project Manager (PM), Corporate Health and Safety Manager (CHSM), and Sr VP Compliance (SVPC) about the incident and receive instructions. Drug/alcohol testing may be needed. **Notify as soon as possible - No later than 2 hours of the incident**
- Initiate fact finding. Investigate the site, interview witnesses, and document circumstances and facts. Take photos of the incident area and equipment involved. Complete preliminary documentation forms. Depending upon incident severity and complexity, fact finding may involve other investigators as determined by the CHSM
- Complete required CAPE forms: Incident Statement by Employee, Incident Statement by Witness, Incident Report by Supervisor, Injury and Illness Report, Vehicle Accident Report, and/or Property Damage, Loss and General Liability Report. Submit all forms (if a form is not applicable write N/A on the form.)
- **Submit completed forms to the CHSM, SVPC and PM within 24 hours of an incident and immediately forward additional information as it becomes available**.

NOTE: Accidents resulting in a fatality or multiple hospitalizations require reporting to the nearest OSHA office within 8 hours (1-800-321-OSHA). This report shall be made by the CHSM. A written report shall follow that provides OSHA with all details of the accident required by 29 CFR 1904.8. Any equipment, material, or related evidence that might help in an investigation must not be moved except to prevent further accidents.

INCIDENT REPORTING CONTACT INFORMATION:

PM: _____ - Office _____ – Fax _____ – Cell _____

CHSM: Glen Mayekawa – Office (714) 599-9071 – Fax (714) 599-9087 – Cell (714) 920-7483

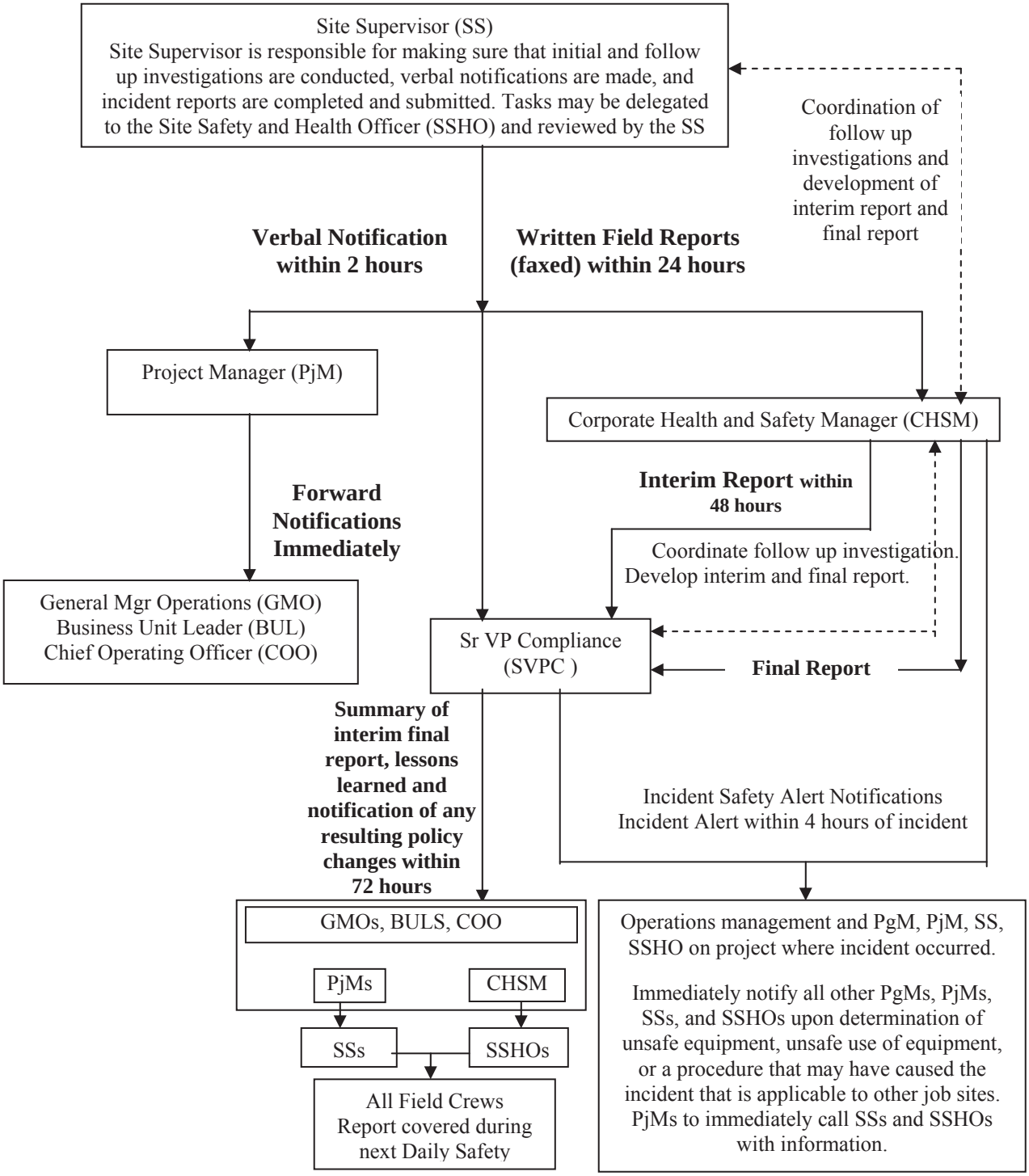
SVPC: Chris Caviness – Office (770) 908-7200 – Fax (770) 908-7219

FAILURE OF A CAPE EMPLOYEE TO PROMPTLY REPORT A SAFETY INCIDENT OR FAILURE TO PRESERVE AN ACCIDENT SCENE UNTIL AN INVESTIGATION IS COMPLETED, IS GROUNDS FOR DISCIPLINARY ACTION.

POST AT JOB SITE

INCIDENT REPORTING AND INVESTIGATION PROTOCOL FLOW CHART

(Includes: injuries, property damage, liability exposure, spills, fires, and serious near miss incidents)



INCIDENT REPORT BY SUPERVISOR

Date / Time of Incident:
Project Name / Project No.:
Client Name / Location:
Specific Location of Incident:
Employees Involved in Incident (if applicable):
Detailed Description of Incident:
Primary Cause of Incident:
Contributing Cause(s) of Incident:
Recommendation for Preventing Such Incidents in the Future:
Supervisor Name (print):
Signature:
Date:

INCIDENT STATEMENT BY EMPLOYEE

Employee Name:
Date / Time of Incident:
Project Name / Project No.:
Client Name / Location:
Specific Location of Incident:
Describe What You Were Doing Just Before the Incident:
Detailed Description of How the Incident Occurred:
Names of Witnesses:
Other Relevant Information:
How Can the Likelihood of this Happening Again Be Reduced:
Employee Name (print):
Signature:
Date:

INCIDENT STATEMENT BY WITNESS

Witness Name / Address / Telephone:
Employer / Telephone:
Date / Time of Incident:
Project Name / Project No.:
Client / Location:
Specific Location of Incident:
DETAILED DESCRIPTION OF INCIDENT BASED ON PERSONAL OBSERVATION
Describe where you were and what you were doing just before the incident:
Describe any injuries:
Describe any property damaged:
Describe what was the apparent nature of the injury and/or damage:
Describe what personnel and/or equipment were involved:
Describe what caused the injury and/or damage:
Describe the sequence of events:
List any observed unsafe acts or conditions:
Names of other witnesses:
Other relevant information:
Witness Name (print):
Signature:
Date:

INJURY AND ILLNESS REPORT

Injured Employee Name:	**Date / Time of Injury:**
Social Security Number:	**Date of Birth / Age:**
Sex: M ☐ F ☐ **# of Dependents:**	**Date of Hire:**
Job Title:	**Pay Rate:**
Home Address:	**Home Telephone:**
CAPE Home Office:	**Injury on CAPE Premises: Yes☐ No☐**
Client / Location:	**Injury on Client Premises: Yes☐ No☐**
Specific Accident Location:	
Nature of Injury:	
Exact Body Part Injured:	
Medical Attention: None ☐ First Aid ☐ Paramedics ☐ Doctor ☐ Hospital ER ☐ Overnight ☐	
Medical Attention Description:	
Hospital / Doctor Name / Telephone:	
Hospital / Doctor Address:	
Date / Time Injury Reported: **By Whom:**	
Time employee began work:	**Avg. # of hours worked per week:**
Did employee leave work: Yes ☐ No ☐ **When:**	
Has employee returned to work: Yes ☐ No ☐ **When:** **Note: Employee must present a return to work release from examining physician before return to work**	
Did employee have a work activity restriction: Yes ☐ No ☐ **Describe:**	**Dates restricted:**
Did employee miss a regularly scheduled work shift: Yes☐ No ☐	**Dates missed:**
Injury Incident Description:	
What actions have been taken to prevent recurrence:	
What was the employee doing just before the incident occurred?	
Witness Name:	**Telephone:**
Address:	**Statement Attached: Yes ☐ No ☐**
INVESTIGATION AND REVIEW (Report to CHSM within 2 hours of injury)	
Completed by Name (print) / Signature / Date:	
Title / Phone:	
Site Supervisor Name (print) / Signature / Date:	
Project Manager Name (print) / Signature / Date:	
CHSM Name (print) / Signature / Date:	
Attached to this report: ☐ Incident Statement by Employee ☐ Incident Report by Supervisor ☐ Incident Statement by Witness ☐ Photographs ☐ Maps/Sketches ☐ Other _____	
(Section to be completed by a CAPE Safety Team Representative) Cape Case #: D/D:	

INSPECTION CHECKLIST: CONSTRUCTION SAFETY (R&I)

Date / Supervisor:	
Project Name / Number:	
Project Location:	
Inspector(s):	

S=Satisfactory (check in box indicates entire category was satisfactory); U=Unsatisfactory; N =Not Applicable

PPE		**HAZ COM**	
Safety glasses/goggles available and being used?		MSDS openly available to all employees?	
Face shield available for liquid handling/grinding tasks?		Flammable liquids are in approved safety cans?	
Hand protection used/worn as required?		Flammable liquids storage containers labeled properly?	
Foot protection worn as required?		All hazardous containers labeled appropriately?	
Hearing protection worn where required?		Supplies on hand for accidental chemical spills?	
Hard hats worn on construction site at the job?		**LADDER/STAIR SAFETY**	
Respirators if required? Type: _____		Ladders are safe and inspected as appropriate?	
Fall protection, full body harness & lanyard used at >6 ft?		Stair rails for 30-inch change in elevation or 4 risers?	
ELECTRICAL SAFETY		Stairs or ladder provided for access points >19-inch high?	
GFCI's used for portable electrical hand tools?		Extension & straight ladders extend 3-ft beyond landing?	
Electrical panels are labeled appropriately?		Stepladders are only used in open position?	
Light bulbs for lights protected from breakage?		**CONFINED SPACE**	
LO/TO is being used for appropriate tasks?		Confined space entry work? Posted?	
Strain relief integrity for cords and plugs intact?		Permit for entry into permit-required confined space?	
Extension cords rated for hard usage? (S; ST; SO; STO; SJ; SJO; SJT; SJTO)		Fire/Rescue notified for permit-required confined spaces?	
Electrical cords inspected and all prongs are intact?		Air monitoring?	
Portable generators are grounded per NEC?		Training in place?	
Electrical power tools are double-insulated or grounded?		**MATERIAL HANDLING**	
COMPRESSED GASES		Forklift operators are trained on the equipment?	
Compressed gas cylinders stored secured and upright?		Wire rope used for lifting? Deterioration is absent?	
Oxygen/acetylene torch units have flash back arrestors?		Web slings used for lifting? Deterioration is absent?	
Compressed gas cylinders not in use have caps in place?		Crane used? Approved written plan with load capacities?	
EXCAVATION		Hooks used for lifting have safety latch in place?	
Excavation-ladders if > 4ft deep? Extend 3 ft? 25 ft apart?		**EMERGENCY/FIRST AID**	
Excavation – protection from cave-ins for > 5 ft?		Emergency phone numbers posted and known by all?	
Sloping, shoring evaluated?		Emergency eyewash and/or shower units accessible?	
Daily inspection?		First-aid kit available at work site?	
HAND TOOLS/POWER TOOLS		Fire extinguishers readily available (not blocked)?	
Grinders (portable and stationary) have guards in place?		Fire extinguishers inspected?	
Impact style air tools have safety clips/retainers installed?		Hot work/burn permits used for grinding, cutting, welding?	
Pneumatic power tools have hoses secured?		Exits marked? Not blocked?	
Portable circular saws equipped with protective guards?		**GENERAL SAFETY**	
Unsafe hand tools are prohibited?		General housekeeping is neat and orderly?	
Impact tools, hammers kept free of splinters/mushrooms?		Wall openings and floor holes are covered or guarded?	
OTHER		Rebar caps used for protruding bars?	
Permits in place (Dig, Hot Work)?		Concrete work? Silica dust training documented?	
Safety meetings conducted and documented?		Scaffolding–guardrails used?	
Safety training is current and documented.		Scaffold design by Qualified Person?	
Project-specific training conducted and documented?		Scaffold Competent Person? Name: _____	
Health & Safety Plan available? Reviewed with workers?		Lasers in use (Class 2 or 3A/3R only)? Area posted?	
Competent Person on site? Name: _____		Illumination adequate?	

INSPECTION CHECKLIST: CONSTRUCTION SAFETY (R&I)

WELDING		BLASTING/PAINTING	
Are welding leads in good condition with NO visible damage within 10 feet of the rod/wire holder?		Are all pressure hoses inspected? (air, blast, etc.) Hoses are without cuts, blisters, soft areas, etc.?	
Are welding machines grounded?		Fittings on blast pot are secure?	
Are flammables store 50 ft. or greater from the work area?		"Deadman" control properly working?	
Are there requirements for a Fire Watch?		Are all hose connections and fitting safety wired, or clipped to ensure security?	
Are appropriate fire extinguishers available? Inspected?		Are Whip checks present and in good condition?	
Are welding hoods in good condition?		Are all hoses neatly laid out and without kinks?	
Is the appropriate shade available, is it in place?		Are all Blast hoods in a safe working condition?	
Are welding blinds necessary to protect others?		Proper lifting techniques used?	
Will wind or a breeze affect the work?		Hearing protection is worn when equipment is running?	
Hot Work Permit acquired, completed and signed?		Is the area Lead restricted and posted? Y / N	

INSPECTION CHECKLIST: CORRECTIVE ACTION PLAN

For all items marked as "U," list the item, person responsible, and expected completion date.

ACTION ITEM	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED[1]	VERIFIED BY[2]

OTHER OBSERVATIONS NOT RECORDED ABOVE

OBSERVABLE ITEM	REF.	PERSON RESPONSIBLE	DATE DUE	DATE VERIFIED[1]	VERIFIED BY[2]

[1] Date Observation/Corrective Action was verified as completed.

[2] Initials of the individual verifying the Observation/Corrective Action was verified, as completed.

Reference columns contain the OSHA regulation or other standard or regulation cited *if known*.

(check) ☐ **NO VIOLATIONS NOTED DURING THIS INSPECTION**

CAPE Inspector Name (Print):	
CAPE Inspector Signature:	

PROPERTY DAMAGE, LOSS AND GENERAL LIABILITY REPORT

Project Name / Project No.:
Project Location:
Project Manager / Supervisor:
Date / Time of Damage or Loss:
Description / Identification of damaged or lost property:
Location of damaged or lost property (before loss):
Detailed description of how the damage or loss occurred:
Cause and corrective action recommended to prevent recurrence:
OWNER
Owner of damaged or lost property Name / Telephone:
Address:
Employer Name and Address:
WITNESS
Witness Name / Telephone:
Witness Address:
Employer Name and Address:
WITNESS
Witness Name / Telephone:
Witness Address:
Employer Name and Address:
REPAIR COST
Repair or Replacement Cost:
Attachments: [ ] Photographs [ ] Police Report [ ] Incident Statement by Witness [ ] Incident Report by Supervisor [ ] Incident Statement by Employee [ ] Injury Report
Supervisor Name (print):
Signature:
Date:

CAPE

SAFETY AND OCCUPATIONAL HEALTH DEFICIENCY TRACKING LIST

List and monitor the status of safety and health deficiencies in chronological order. Post this list on the project safety bulletin board (or post a notice as to its location) and update daily.

Date Deficiency Identified	Description of Deficiency	Name of Person Responsible to Correct Deficiency	Projected Date Deficiency to be Resolved	Date Deficiency Was Actually Resolved

SAFETY INSPECTION REPORT

Date / Day:	
Project Name:	
Project Location:	
Work Description:	
Comments:	

OBSERVATIONS

Safety Conditions Requiring Corrective Action	Corrective Action, Assignment, and Completion Date

Project Manager:	
Safety Inspector:	
Distribution:	

SITE CONTROL LOG

Date / Day:	
Project Name:	
Project Location:	

Time		Name	Organization
In	**Out**		

SITE CONTROL LOG FOR VISITORS

Date / Day / Time:	
Project Name:	
Project Location:	

Time		**Name**	**Organization**
In	**Out**		

SITE SAFETY AND HEALTH PLAN
CHANGE APPROVAL FORM

Project Name:	
Project Location:	
Date:	
Requested By:	
Approval By:	
Distribution:	

DESCRIPTION OF SSHP CHANGE REQUESTED

SUPPORTING DOCUMENTATION FOR SSHP CHANGE
(Describe and list attachments)

SSHP CHANGE APPROVAL

SSHO Name / Signature / Date:	
SHM Name / Signature / Date:	
PM Name / Signature / Date:	
COR Name / Signature / Date:	

SITE SAFETY AND HEALTH PLAN
DISTRIBUTION TO SUBCONTRACTOR

Project Name:	
Project Location:	

A copy of the CAPE Site Safety and Health Plan for the site is being provided to subcontractors who may be affected by activities covered under the scope of this plan. Distribution of the Site Safety and Health Plan to subcontractor firms and their designated contact person is with the understanding that subcontractor personnel involved in this project will review this document, abide by its provisions, and comply with OSHA and other applicable health and safety rules and regulations for work onsite.

Date	Name	Signature	Organization

SITE SAFETY AND HEALTH PLAN REVIEW

Project Name:	
Project Location:	
Conducted By:	

I have reviewed the CAPE Site Safety and Health Plan for the above indicated site and understand the hazards and control measures required on this project.

I agree to follow the procedures outlined in this plan and to inform the CAPE Project Manager, Superintendent, and/or Site Safety and Health Officer should any unsafe condition be noted.

I understand that failure to follow safety regulations can be reason for removal from this project.

Date	Name	Signature	Company

TAILGATE SAFETY MEETING RECORD

Date / Day:	**Time**:
Project Name:	**Project Number**:
Client:	**Location**:
Specific Location:	
Work Description:	
Comments:	

SAFETY TOPICS PRESENTED

Protective Clothing / Equipment:
Chemical Hazards:
Physical Hazards:
Emergency Procedures:
Emergency Hospital:
Hospital Telephone:
Hospital Directions:
Special Equipment:
Other:
NOTE: Company policy requires that you notify your supervisor of any injury or safety incident.

SAFETY MEETING ATTENDEES

Name Printed / Initial	Name Printed / Initial
1.	6.
2.	7.
3.	8.
4.	9.
5.	10.
Meeting conducted by (print name / signature):	

TRAINING ATTENDANCE ROSTER

Project Name:	
Project Location:	
Topic	

Date	Name	Signature	Company

Instructor Name:	
Signature:	
Date:	

VEHICLE ACCIDENT REPORT

CAPE VEHICLE	
Date / Time:	**Location:**
Driver Name:	**Accident Date:**
Drivers License #:	**State:**
Driver Address:	**Project Location:**
Vehicle Year/Make /Model:	
License Plate #:	**State:**
Vehicle Owner (Circle): Owned / Leased / Rented / Private	
Vehicle Owner Name:	**Telephone:**
Vehicle Owner Address:	
Vehicle Damage:	**Est. Repair Cost:**
OTHER VEHICLE	
Driver Name:	**Telephone:**
Drivers License #:	**State**
Drivers Address:	
Vehicle Owner Name:	**Telephone:**
Vehicle Owner Address:	
Insurance Company:	**Telephone:**
Address:	**Policy No.:**
Vehicle Year / Make / Model:	**Agents Name:**
License Plate No.:	**State:**
Vehicle Damage:	
Passengers (list on back): ☐ Yes ☐ No	**Injuries (list on back): ☐ Yes ☐ No**
ACCIDENT DESCRIPTION	
Sketch Attached: ☐ Yes ☐ No	**Photos Attached: ☐ Yes ☐ No**
Description:	
WITNESS INFORMATION	
Witness Name:	**Telephone:**
Address:	
Statement Attached: ☐ Yes ☐ No	
POLICE REPORT	
Police Department:	**Telephone:**
Police Officer Name:	**Police Report #:**
Date / Time Reported:	
INVESTIGATION AND REVIEW	
Report Prepared By / Date:	
Supervisor Name / Signature / Date:	

VISITOR INFORMATION AND ACKNOWLEDGEMENT FORM

Project Name:	
Project Location:	
Conducted By:	

You are entering a hazardous waste/construction site. Unprotected exposure to hazardous chemicals can cause mild to serious health effects. Heavy equipment operations and other inherently dangerous work is in progress. You will remain with your designated escort at all times and follow their instructions for your safety and the safety of others. Minimum personal protective equipment requirement is Level D protection (hard hat, ANSI-approved safety footwear, and safety glasses). Equipment issued must be returned prior to leaving the site.

VISITOR'S CERTIFICATION

I acknowledge that I have been advised of the dangers present at this hazardous waste/construction site. I agree to immediately follow all directions of my escort on site. I also certify that I do relieve, CAPE, the US Government, the applicable state in which the project site is located, their officers, employees, and agents of all liability of all consequences arising from and related to the potential hazards associated with entry onto this site.

Date	Name	Signature	Company

☐ Initial Report
☐ Follow-up Report
☐ Final Report

Contractor Significant Incident Report (CSIR)

1. General Information

Contracting Activity/ROICC Office:

Accident Classification:

☐ Injury ☐ Fatality ☐ Environment ☐ Procedural Issues ☐ Lessons Learned
☐ Illness ☐ Property Damage ☐ Other_____

Involving:

☐ Confined Space ☐ Equip/Mrt Ver/Mat Handling (Heavy Construction Equip.) ☐ Hazardous Material
☐ Crane and Rigging ☐ Equip/Mrt Ver/Mat Handling (Material Handling) ☐ Trenching/Excavation
☐ Diving ☐ Equip/Mrt Ver/Mat Handling (Man-Lift/Elevated Platform) ☐ Waterfront/Marine
☐ Demolition/Renovation ☐ Fall from Ladder ☐ Fall from Scaffold ☐ Other_____
☐ Electrical ☐ Fall from Roof ☐ Fire

2. Personal Information

Name (Last, First, MI):	**Age:**	**Sex:**

Job Title/Description:	**Employed By:**
Supervisor Name (Last, First, MI) & Title:	**Was the person trained to perform this activity/task?** ☐ **Yes** ☐ **No**
What type of training was received (OJT, classroom, etc)?	**Date of the most recent formal training and topics discussed?**

3. Witness Information

Witness #1: Name (Last, First, MI):	**Job Title/Description:**
Employed By:	**Supervisor Name (Last, First, MI):**
Witness #2: Name (Last, First, MI):	**Job Title/Description:**
Employed By:	**Supervisor Name (Last, First, MI):**

Additional Witnesses: ☐ **Yes** ☐ **No**
(List any additional witnesses on a separate sheet and attach.)

4. Contract Information

Type of Contract:

A/E BOS CLEAN Construction Design Build FSCC FSSC

JOC RAC Service Other_____

Contract Number & Title:	**Industrial Group & Industrial Type:**

Prime Contractor Name/Address/Phone & Fax No:	**Sub Contractor Name/Address/Phone & FAX No:**
Safety Manager (Last, First, MI):	**Safety Manager (Last, First, MI):**
Insurance Carrier:	**Insurance Carrier:**

5. Accident Description

Date of Accident:	**Time of Accident:**	**Exact Location of Accident:**

Describe the accident in detail in your words: ***(Use the back of page if you need additional space)***

Direct Cause(s) of Accident:

Indirect Cause(s) of Accident:

Action(s) taken to prevent re-occurrence or provide on-going corrective actions:

Corrective Action Beginning Date:	**Anticipated Completion Date:**

Personal Protective Equipment:

☐ Available and used ☐ Available and not used ☐ Not Required

☐ Not related to Mishap ☐ Wrong PPE for job

List PPE Used:

Type of Construction Equipment (Make, Model, Serial #, VIN#) Involved:

Was Hazardous Material Spilled/Released? ☐ **Yes** ☐ **No**

Please List Hazardous Material(s) Involved:

Who provided first aid or cleanup of mishap site?

Any blood-borne pathogen exposure, other than EMTs? ☐ **Yes** ☐ **No**

Who?

List OSHA and WM-385-1-1 standards that were violated:

Was site secured and witness statements taken immediately? ☐ **Yes** ☐ **No**

By Whom?

6. Injury Illness/Fatality Information

Severity of Injury/Illness:

- Fatality
- Lost Workday Case Involving Days Away From Work
- Temporary Disabillity
- Recordable Workday Case Involving Restricted Duty
- Permanent Total Disability
- Other Recordable Case
- Recordable First Aid Case
- Permanent Partial Disability
- Non-Recordable Case
- No Injury

Estimated Days Lost:	Estimated Days Hospitalized:	Estimated Days Restricted Duty:

List Primary Body Part Affected:	List Other Body Part(s) Affected:

Nature of Injury/Illness for Primary Body Part (Examples: Amputation, Burn, Hernia):

Type of Accident (Examples: Fall same level, Lifting, Bitten, Exerted):

Source of Accident (Examples: Crane, Carbon Monoxide, Ladder, Welding Equipment):

7. Casual Factors *(Explain answers on supplementary sheet)*

• **Design – Design of facility, workplace, or equipment was a factor?**	**Yes** **No**
• **Inspection/Maintenance – Inspection & Maintenance procedures were a factor?**	**Yes** **No**
• **Persons Physical Condition – In your opinion, the physical condition of the person was a factor?**	**Yes** **No**
• **Operation Procedures – Operating procedures were a factor?**	**Yes** **No**
• **Job Practices – One or more job safety/health practices not being followed when the accident occurred contributed to the accident?**	**Yes** **No**
• **Human Factors – One or more human factors, such as a person's size or strength contributed to the accident?**	**Yes** **No**
• **Environmental Factors – Heat, cold, dust, sun, glare, etc., contributed to the accident?**	**Yes** **No**
• **Chemical and Physical Agent Factors – Exposure to chemical agents, such as dust, fumes, mist, vapors, or physical agents such as noise, radiation, etc., contributed to the accident?**	**Yes** **No**
• **Office Factors – Office setting such as lifting office furniture, carrying, stooping, contributed to the accident?**	**Yes** **No**
• **Support Factors – Inappropriate tools/resources were provided to perform the task?**	**Yes** **No**
• **PPE – Improper selection, use or maintenance of PPE contributed to the accident?**	**Yes** **No**
• **Drugs/Alcohol – In your opinion, were drugs or alcohol a factor?**	**Yes** **No**
• **Job Hazard Analysis – The lack of an adequate (IAW-EM-385-1-1 Sec 01.A) activity hazard analysis was a contributing factor.**	**Yes** **No**
• **Job Hazard Analysis – JHA was not site specific and/or did not address the type of work/operations performed when the mishap occurred.**	**Yes** **No**
• **Management – A lack of adequate supervision contributed to the accident.**	**Yes** **No**
• **Management – Inadequate information was provided at pre con meeting.**	**Yes** **No**

8. OSHA Information			
Date OSHA was Notified:	**Date(s) of Investigation:**	**Date of citation:** ***(Attach Copy)***	**Dollar amount of Penalties:**

9. Report Preparer	
Name (Last, First, MI):	**Date of Report:**
Title: **Employer:** **Phone #:**	**Signature:**

CONTRACTOR SIGNIFICANT INCIDENT REPORT (CSIR) INSTRUCTIONS

Complete Sections Appropriate to Incident (Rev. 06/02).

NOTE: THE ATTACHED CSIR FORM IS TO BE USED BY CONTRACTORS TO RECORD THE RESULTS OF THEIR ACCIDENT/INCIDENTS INVESTIGATIONS AND SHALL BE PROVIDED TO THE CONTRACTING OFFICER WITHIN THE REQUIRED TIMEFRAMES.

GENERAL. Complete a separate report for each person who was injured in the accident. A report needs to be completed for all OSHA recordable accidents, property damage in excess of $2000.00 (This amount is for record purposes only. GOV is not required to enter property damage reports into FAIR database if it is less than $10,000.00.), WHE accidents, or near miss/high visibility mishaps. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es), non-applicable sections shall be marked "N/A". If additional space is needed, provide the information on a separate sheet of paper and attach to the completed form.

Mark the report:
INITIAL – If this form is being used as initial notification of a Fatality or High Visibility Mishap. The initial form is due within 4 hours of a serious accident. A form marked 'Follow-up' or 'Final' is required within 5 days.
FOLLOW-UP – If you are providing additional information on a report previously submitted.
FINAL – If you are providing a completed report and expect no changes.

SECTION 1 – GENERAL INFORMATION

CONTRACTING ACTIVITY/ROICC OFFICE - Enter the name and address of the Contracting Office administering the contract under which the mishap took place (e.g. ROICC MCBH, ROICC NORFOLK, PWC GUAM, etc.).

ACCIDENT CLASSIFICATION - INJURY/ILLNESS/FATALITY/PROPERTY DAMAGE/-PROCEDURAL ISSUES/-ENVIRONMENTAL/LESSONS LEARNED/OTHER – Mark the appropriate block(s) if the incident resulted in any of these conditions.

INVOLVING - If the mishap involved any of the conditions listed under "Involving" mark the appropriate box(es). Specific questions associated with each of these conditions are available from the Contracting Officer to assist you in your investigation. When these questions are used they shall be attached as part of this report.

SECTION 2 - PERSONAL INFORMATION

NAME - Enter last name, first name, middle initial of person involved.
AGE - Enter age.
SEX - Enter M for Male and F for Female.
JOB TITLE/DESCRIPTION - Enter the job title/description assigned to the injured person (e.g. carpenter, laborer, surveyor, etc.).
EMPLOYED BY - Enter employment company name of the person involved.
SUPERVISOR'S NAME & TITLE - Enter name and title of the immediate supervisor.
WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? - For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.
TYPE OF TRAINING - Indicate the specific type of training (classroom or on-the-job) that the injured person received before the accident happened.
DATE OF MOST RECENT FORMAL TRAINING/TOPICS DISCUSSED - Enter the month, day, and year of the last *formal* training completed that covered the activity/task being performed at the time of the accident. List topics that were discussed at the training identified above.

SECTION 3 - WITNESS INFORMATION

The following applies to Witness #1 and Witness #2:
WITNESS NAME - Enter last name, first name, middle initial of the witness.
JOB DESCRIPTION/TITLE - Enter the job title/description assigned to the witness (e.g. carpenter, laborer, surveyor, etc.).
EMPLOYED BY - Enter the name of the employment company of the witness.
SUPERVISORS NAME - Enter name of immediate supervisor of the witness.
ADDITIONAL WITNESSES - Provide same information, as above, for each witnesses. Use additional pages if necessary.

SECTION 4 - CONTRACTOR INFORMATION

TYPE OF CONTRACT - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.
CONTRACT NUMBER/TITLE - Enter complete contract number and tile of prime contract (e.g. N62477-85-C-0100, 184 Pearl City Hsg. Revitalization).
CONSTRUCTION INDUSTRIAL GROUP AND INDUSTRIAL TYPE – This is the type of construction that will be done at this project.

1. First, you must choose the Industrial Group. You have 4 choices to choose from: (**NOTE**! Review of the Industrial Types below and knowing what the projects scope of work is will assist you in deciding what the Industrial Group should be.)
   a. Buildings
   b. Heavy Industrial
   c. Infrastructure
   d. Light Industrial

2. Once you have chosen the Industrial Group, you now select the Industrial Type. You have multiple choices under each Group, chose the one you feel fits the project most closely because on most projects there won't be an exact match:
   a. Buildings:
      (1) Communications Ctr.
      (2) Dormitory/Hotel
      (3) High-rise Office
      (4) Hospital
      (5) Housing
      (6) Laboratory
      (7) Low-rise Office
      (8) Maintenance Facility
      (9) Parking Garage
      (10) Physical Fitness Ctr.
      (11) Restaurant/Nightclub
      (12) School
      (13) Warehouse
   b. Heavy Industrial:
      (1) Chemical Mfg.
      (2) Electrical (Generating)
      (3) Environmental
      (4) Metals Refining/Processing
      (5) Mining
      (6) Natural Gas Processing
      (7) Oil Exploration/Production
      (8) Oil Refining
      (9) Pulp and Paper
   c. Infrastructure:
      (1) Airport
      (2) Electrical Distribution
      (3) Flood Control
      (4) Highway
      (5) Marine Facilities
      (6) Navigation
      (7) Rail
      (8) Tunneling
      (9) Water/Wastewater
   d. Light Industrial:
      (1) Automotive Assembly/Mfg.
      (2) Consumer Products Mfg.
      (3) Foods
      (4) Microelectronics Mfg.
      (5) Office Products Mfg.
      (6) Pharmaceuticals Mfg.

CONTRACTOR'S NAME/ADDRESS/PHONE NUMBER

(1) PRIME - Enter the exact name (title of firm), address, phone and fax numbers of the prime contractor.

(2) SUBCONTRACTOR - Enter the exact name, address, phone and fax numbers of any subcontractor involved in the accident.

SAFETY MANAGER'S NAME

(1) PRIME - Enter the name of the prime contractor safety manager.

(2) SUBCONTRACTOR - Enter the name of the subcontractors safety manager.

INSURANCE CARRIER

(1) PRIME - Enter the exact name/title of the prime's insurance company. Policy number not required.

(2) SUBCONTRACTOR - Enter the exact name of the subcontractor's insurance company. Policy number not required.

SECTION 5 - ACCIDENT DESCRIPTION

DATE OF ACCIDENT - Enter the month, day, and year of accident.
TIME OF ACCIDENT - Enter the local time of accident in military time. Example: 14:30 hrs (not 2:30 p.m.).
EXACT LOCATION OF ACCIDENT - Enter facts needed to locate the accident scene (installation/project name, building/room number, street, direction and distance from closest landmark, etc.).
DESCRIBE THE ACCIDENT IN DETAIL. Fully describe the accident in the space provided. If property damage involved, give estimated dollar amount of damage and/or repair costs involved. If additional space is needed continue on a separate sheet and attach to this report. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and

equipment are clearly specified. Ensure questions below regarding direct cause(s), indirect cause(s), and actions taken are answered. **NOTE!** Review questions in Section 7 below before completing.
DIRECT CAUSE(S) - The direct cause is that single factor which most directly lead to the accident. See examples below.
INDIRECT CAUSE(S) - Indirect cause are those factors, which contributed to, but did not directly initiate the occurrence of the accident.

Examples for Direct and Indirect Cause:
1. Employee was dismantling scaffold and fell 12 feet from unguarded opening.
Direct cause: Failure to provide fall protection at elevation
Indirect causes: Failure to enforce safety requirements: improper training/motivation of employee (possibility that employee was not knowledgeable of fall protection requirements or was lax in his attitude toward safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

2. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by contractor vehicle. (note contractor vehicles was in proper safe working condition.)
Direct cause: Failure of contractor driver to maintain control of and stop contractor vehicle within safe distance.
Indirect cause: Failure of employee to pay attention to driving (defensive driving).

ACTION(S) TAKEN TO PREVENT RE-OCCURRENCE OR PROVIDE ON-GOING CORRECTIVE ACTIONS. Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/illnesses. Continue on back or additional sheets of paper if necessary to fully explain and attach to the complete report form.
CORRECTIVE ACTION DATES -
(1) Beginning - Enter the date when the corrective action(s) identified above will begin.
(2) Anticipated Completion - Enter the date when the corrective action(s) identified above will be completed.
PERSONAL PROTECTIVE EQUIPMENT (PPE) - Mark appropriate box(es) and list PPE which was being used by the injured person at the time of the accident (e.g. protective clothing, shoes, glasses, goggles, respirator, safety belt, harness, etc.)
TYPE OF CONTRACTOR EQUIPMENT - Enter the Serial Number, Model Number and specific type of equipment involved in the mishap (e.g. dump truck (off highway), crane (rubber tire), pump truck (concrete), etc.).
WAS HAZARDOUS MATERIAL SPILLED/RELEASED? - Mark appropriate block and list name(s) of any reportable quantities of hazardous materials spilled/released during the mishap.
WHO PROVIDED FIRST AID OR CLEAN-UP OF MISHAP SITE? - List name(s) of individual(s) and employer, if known.
ANY BLOOD-BORNE PATHOGEN EXPOSURE, OTHER THAN EMT? - Mark appropriate block and list name(s) of individual(s) and employer, if known.
LIST OSHA AND/OR EM 385-1-1 STANDARDS THAT WERE VIOLATED. - Self explanatory.
WAS SITE SECURED AND WITNESS STATEMENT TAKEN IMMEDIATELY? - Mark appropriate block and list by whom.

SECTION 6 - INJURY/ILLNESS/FATALITY INFORMATION

SERVERITY OF INJURY/ILLNESS – Mark appropriate box.
ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work. Update when final data is known.
ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized. Update when final data is known.
ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties. Update when final data is known.
BODY PART(S) AFFECTED - Enter the most appropriate primary and when applicable, secondary, etc. body part(s) affected (e.g. arm: wrist: abdomen: single eye; jaw : both elbows: second finger: great toe: collar bone: kidney, etc.).
NATURE OF INJURY/ILLNESS FOR PRIMARY BODY PART - Enter the most appropriate nature of injury/illness (e.g. amputation, back strain, dislocation, laceration, strain, asbestosis, food poisoning, heart conditions, etc.).
TYPE AND SOURCE OF INJURY/ILLNESS - Type and Source Codes are used to describe what caused the incident.
(1) TYPE Code stands for an "Action" (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Type Code: Fell different levels".) Select the most appropriate Type of injury from the list below:

TYPE OF INJURY/ILLNESS

STRUCK BY/AGAINST	CONTACTED CONTACTED WITH (INJURED PERSON MOVING) CONTACTED BY (OBJECT WAS MOVING)
FELL, SLIPPED, TRIPPED SAME LEVEL/DIFFERENT LEVEL/NO FALL	EXERTED LIFTED, STRAINED BY (SINGLE ACTION) STRESSED BY (REPEATED ACTION)
CAUGHT ON/IN/BETWEEN	EXPOSED INHALED/INGESTED/ABSORBED/EXPOSED TO
PUNCTURED, LACERATED PUNCTURED BY/CUT BY/STUNG BY/BITTEN BY	TRAVELING IN

(2) SOURCE Code stands for an "object or substance." (Example: Worker, installing conduit, lost his balance and fell five feet from a ladder. Source Code: "Ladder".) Select the most appropriate Source of injury from the list below:

SOURCE OF INJURY/ILLNESS

BUILDING OR WORKING AREA WALKING/WORKING AREA STAIRS/STEPS LADDER FURNITURE BOILER/PRESSURE VESSEL EQUIPMENT LAYOUT WINDOWS/DOORS ELECTRICITY	DUST, VAPOR, ETC. DUST (SILICA, COAT, ETC.) FIBERS ASBESTOS GASES CARBON MONOXIDE MIST, STEAM, VAPOR, FUME WELDING FUMES PARTICLES (UNIDENTIFIED)
ENVIRONMENT CONDITION TEMPERATURE EXTREME (INDOOR) WEATHER (ICE, RAIN, HEAT, ETC.) FIRE, FLAME, SMOTE (NOT TABACCO) NOISE RADIATION LIGHT VENTILATION TOBACCO SMOKE STRESS (EMOTIONAL) CONFINED SPACE	CHEMICAL, PLASTIC, ETC. DRY CHEMICAL - CORROSIVE DRY CHEMICAL - TOXIC DRY CHEMICAL - EXPLOSIVE DRY CHEMICAL - FLAMMABLE LIQUID CHEMICAL - CORROSIVE LIQUID CHEMICAL - TOXIC LIQUID CHEMICAL - EXPLOSIVE LIQUID CHEMICAL - FLAMMABLE PLASTIC WATER MEDICINE
MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANCIAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT	INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES
MACHINE OR TOOL HAND TOOL (POWERED: SAW, GRINDER, ETC.) HAND TOOL (NON POWERED) MECHANCIAL POWER TRANSMISSION APPARATUS GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) VIDEO DISPLAY TERMINAL PUMP, COMPRESSOR, AIR PRESSURE TOOL HEATING EQUIPMENT WELDING EQUIPMENT	INANIMATE OBJECT BOX, BARREL, ETC. PAPER METAL ITEM, MINERAL NEEDLE GLASS SCRAP, TRASH, WOOD FOOD CLOTHING, APPAREL, SHOES
VEHICLE AS DRIVER OF PRIVATELY OWNED, RENTAL VEH. AS PASSENGER OF PRIVATELY OWNED, RENTAL VEH. DRIVER OF GOVERNMENT VEHICLE PASSENGER OF GOVERNMENT VEHICLE COMMON CARRIER (AIRLINE, BUS, ETC.) AIRCRAFT (NOT COMMERCIAL) BOAT, SHIP, BARGE	ANIMATE OBJECT DOG OTHER ANIMAL PLANT INSECT HUMAN (VIOLENCE) HUMAN (COMMUNICABLE DISEASE) BACTERIA, VIRUS (NOT HUMAN CONTACT)
MATERIAL HANDLING EQUIPMENT EARTHMOVER (TRACTOR, BACKHOE, ETC.) CONVEYOR (FOR MATERIAL AND EQUIPMENT) ELEVATOR, ESCALATOR, PERSONNEL HOIST HOIST, SLING CHAIN, JACK CRANE FORKLIFT HANDTRUCK , DOLLY	PERSONAL PROTECTIVE EQUIPMENT PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES RESPIRATOR, MASK DIVING EQUIPMENT SAFETY BELT, HARNESS PARACHUTE

SECTION 7 - CAUSAL FACTORS

Review thoroughly. Answer each question by marking the appropriate block. **NOTE!** If any answer is yes, explain in section 5 above.

(1) **DESIGN** - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) **INSPECTION/MAINTENANCE** - Did inadequately or improperly maintained equipment, tools, workplace, etc., create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?
(3) **PERSONS PHYSICAL CONDITION** - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was overexertion a factor?
(4) **OPERATION PROCEDURES** - Did lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?
(5) **JOB PRACTICES** - Were any of the provision of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?
(6) **HUMAN FACTORS** - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person: i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach strengths, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?
(7) **ENVIRONMENTAL FACTORS** - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun temperature changes, wind, tides, floods, currents, terrain; dust, mud, glare, pressure changes, lighting, etc., play a part in the accident?
(8) **CHEMICAL AND PHYSICAL AGENT FACTORS** - Did exposure to chemical agents (either single shift exposure or long-term exposure such as dusts, fibers, (asbestos, etc.), silica, gases (carbon, monoxide, chlorine, etc.), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, by-products of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?
(9) **OFFICE FACTORS** - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?
(10) **SUPPORT FACTORS** - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized and adequate to provide proper tools, equipment, personnel, site preparation, etc.
(11) **PERSONAL PROTECTIVE EQUIPMENT** - Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?
(12) **DRUGS/ALCOHOL** - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".
(13) **JOB/ACTIVITY HAZARD ANALYSIS** - Was a written Job/Activity Analysis completed for the task being performed at the time of the accident? If one was made, did it address the hazard adequately or does it need to be updated? If none made, will one be made? These may also need to be addressed in the Corrective Actions Taken section. Mark the appropriate box. If one was made, attach a copy of the analysis to the report.
(14) **MANAGEMENT** - Did the lack of supervisor or management support play a part in the mishap? Mark the appropriate box.

SECTION - 8 OSHA INFORMATION - Complete this section if applicable

SECTION 9 - REPORT PREPARER

Providing a completed CSIR to the Contracting Officer is the PRIME CONTRACTOR'S RESPONSIBILITY. Enter the name, date of report, title, employer, phone number and signature of person completing the accident report and provide it to the Contracting Officer, or his representative, responsible for oversight of that contractor activity. **NOTE!** If prepared by other than the Prime Contractor, a person employed by the Prime Contractor must sign that they have reviewed and concur with the report and it's findings (e.g. company owner, project supervisor/foreman, Safety Officer, etc.).

CONTRACTOR SITE SAFETY ASSESSMENT

O/A RATING: #DIV/0!

FEAD TEAM:	Outlying					**DATE:**		
CONTRACTOR:						**ENG TECH:**		
CONTR NO./TITLE:								
SSHO:						**% COMPLETE:**		
Contractor instructions:	**For each line item, put an X in a cell, under EITHER the YES or NO columns. The N/As are automatic. Use the "x" and arrow keys.**							
	YES	**NO**						
PREPARATORY			N/A	1) Activity Hazard Analysis performed and used on the site for each definable feature of work?				
PHASE (Planning)			N/A	2) Are weekly safety meetings and indoctrination held on site and documented for all workers?				
Comments/Notes:			N/A	3) Is the submitted safety plan on site and in use?				
			N/A	4) Is the Activity Hazard Analysis reviewed during the preparatory inspection?				
			N/A	5) Hazardous materials program in place with MSDS sheets on site and maintained?				
			N/A	6) EM 385-1-1 available on the site?				
			N/A	7) Other? Extra Credit?				
OFFICE TRAILER			N/A	8) Are office and storage trailers anchored?				
GENERAL			N/A	9) Are emergency phone numbers posted?				
Comments/Notes:			N/A	10) Is a phone available?				
			N/A	11) First aid log maintained (contractors must use OSHA Form 300)?				
			N/A	12) Toilet facilities available?				
			N/A	13) Site posted "HARD HAT AREA," "NOISE HAZARD," "CONSTRUCTION AREA," etc., as required?				
			N/A	14) Garbage cans and dumpsters available?				
			N/A	15) Jobsite cleaned daily?				
			N/A	16) Is traffic control around site adequate?				
			N/A	17) Other? Extra Credit?				
FIRE PREVENTION			N/A	18) Are fire extinguishers available, fully charged, and easily visible within 75 feet for low hazard areas?				
Comments/Notes:			N/A	19) Is fuel stored in proper containers?				
			N/A	20) Are hot work permits being obtained?				
			N/A	21) Are fire watches provided?				
			N/A	22) Are gas cylinders stored upright and secured with chain or rope?				
			N/A	23) Is Housekeeping acceptable?				
			N/A	24) Other? Extra Credit?				

SCAFFOLD			N/A	25) Are daily scaffold inspections performed by designated competent person?			
SAFETY			N/A	26) Planks overlapped not less than 6" or more than 12" over end supports with toe boards in place?			
Comments/Notes:			N/A	27) Tubing pinned properly and all cross bracing in place?			
			N/A	28) If scaffold height is 4X smallest base dimension, is system secured to structure?			
			N/A	29) All guardrails are in place?			
			N/A	30) Full work platform at each working level with no cracks/splits?			
			N/A	31) Safe access provided to each working level?			
			N/A	32) Scaffold and components not overloaded?			
			N/A	33) Is scaffold system plumb and level?			
			N/A	34) Suspended scaffold systems using independent personal fall arrest system?			
			N/A	35) Other? Extra Credit?			
FALL			N/A	36) Is a full body harness used where required?			
PROTECTION			N/A	37) Tied off at all times to structural element capable of supporting 5,000 lbs/person?			
Comments/Notes:			N/A	38) Is protection provided for all personnel working in areas where they could fall 6' or more?			
			N/A	39) Are employees trained for fall protection systems in use?			
			N/A	40) Does the contractor have a certified competent person?			
			N/A	41) Have standard guardrails been provided where required?			
			N/A	42) Have horizontal life lines been designed and installed under supervision of a qualified person?			
			N/A	43) Other? Extra Credit?			
LADDER SAFETY			N/A	44) Do ladders extend 3' above landing platform and tied to structure?			
Comments/Notes:			N/A	45) Are ladders used with hand tools only?			
			N/A	46) Are ladder base distances from structure 1/4 height?			
			N/A	47) Are floor openings either covered or surrounded by a guardrail?			
			N/A	48) Electricians not using portable "conductive" ladders?			
			N/A	49) Stairways provided on all structures over 20' during construction and supplied with guardrail?			
			N/A	50) Portable step ladders over 20' not used on the site?			
			N/A	51) Are ladders properly used?			
			N/A	52) Other? Extra Credit?			
EXCAVATIONS			N/A	53) Does excavation over 4' deep have a ladder within 25' and two means of egress?			
Comments/Notes:			N/A	54) Has proper slope or trench box/shoring been provided?			
			N/A	55) Is water controlled/removed?			
			N/A	56) Is excavated material at least 2' back from trench edge?			
			N/A	57) Is excavation barricaded, etc., to prevent workers and public from falling into trench/hole?			
			N/A	58) In locations of known or suspected contamination, is excavation atmosphere monitored?			
			N/A	59) Does contractor have certified competent person on site?			
			N/A	60) Other? Extra Credit?			

ELECTRICAL			N/A	61) Are temporary power panels and receptacles protected from weather?			
Comments/Notes:			N/A	62) Are GFCI's in use for site tools ?			
			N/A	63) Are temporary lights rigged and secured to supports properly, and with covers?			
			N/A	64) If overhead power lines are in area, are operations maintaining required distance or isolation?			
			N/A	65) Is lockout/tagout program in effect?			
			N/A	66) Has a sketch of proposed temporary power distribution been submitted/accepted before installing?			
			N/A	67) Other? Extra Credit?			
CRANES			N/A	69) Has periodic inspection been performed prior to use on site IAW EM 385-1-1, App. H?			
Comments/Notes:			N/A	70) Are App. H daily start up inspections performed by operator and submitted with DRI?			
			N/A	71) Is crane operator qualified IAW EM 385-1-1, App. G, and is crane certification posted in cab?			
			N/A	72) Are workers protected from the crane swing radius and prevented from passing under the load?			
			N/A	73) Are rigging cables and slings in good repair free of kinks and cracks?			
			N/A	74) Is the crane level and on firm ground and outriggers in use with appropriate cribbing?			
			N/A	75) Is crane side loading prohibited?			
			N/A	76) Near electric power sources, are rules followed for clearance/isolation in operating zone?			
			N/A	77) Is crane equipped with anti two-block device if required?			
			N/A	78) Other? Extra Credit?			
CONFINED			N/A	79) Has entry plan been submitted and accepted?			
SPACES			N/A	80) Is atmosphere being monitored?			
Comments/Notes:			N/A	81) Is space being ventilated?			
			N/A	82) Are entrants, attendants and entry supervisor properly trained?			
			N/A	83) Is rescue/retrieval system in place?			
			N/A	84) Are daily entry permits posted at point of entry and signed by entry supervisor?			
			N/A	85) Is point of entry posted "DANGER CONFINED SPACE"?			
			N/A	86) Has blanking or locking out of systems taken place?			
			N/A	87) Other? Extra Credit?			
ROOFING			N/A	88) Are kettles at least 25 feet away from buildings?			
Comments/Notes:			N/A	89) Has an employee fall protection system been implemented and in proper use?			
			N/A	90) Are skylights and roof penetrations covered or barricaded appropriately?			
			N/A	91) Has the roof been evaluated for its ability to support the intended construction loads?			
			N/A	92) Has the roof been surveyed for deterioration?			
			N/A	93) Are two fire extinguishers at the kettle?			
			N/A	94) Fuel cylinder a minimum of 10' from open flame?			
			N/A	95) Other? Extra Credit?			

EQUIPMENT			N/A	97) Are forklift operators qualified through training at the site (certificate included in Safety Plan)?			
Comments/Notes:			N/A	98) Does mobile equipment have rollover cages and backup alarms, with moving parts adequately guarded?			
			N/A	99) Are equipment operations maintaining safe clearance from electrical power lines?			
			N/A	100) Do modifications meet safety rating per manufacturer (i.e., lifting personnel with forklift)?			
			N/A	101) Are safety lashings provided for high pressure hose connections, i.e., air compressors?			
			N/A	102) Are workers clear of blind spots associated with mobile construction equipment?			
			N/A	103) Do aerial lifts have basket/platform with guardrail?			
			N/A	104) Are workers not extending over guardrail of aerial lifts?			
			N/A	105) Are articulating boom platforms (JLG type) used with Full Body Harness attached to boom or basket?			
			N/A	106) Other? Extra Credit?			
DEMOLITION			N/A	108) Has demolition plan been submitted and accepted?			
Comments/Notes:			N/A	109) If waste is being dropped > 6' is it in an enclosed chute and is area secured from traffic?			
			N/A	113) For building demolition, has notification been made to State having jurisdiction?			
			N/A	114) Are nails removed from scrap lumber/materials?			
			N/A	115) Other? Extra Credit?			
PPE			N/A	117) Workers wearing leather shoes (not tennis), long pants, sleeved shirts, and steel toes where required?			
Comments/Notes:			N/A	118) Are hard hats being worn?			
			N/A	119) Are safety glasses where appropriate?			
			N/A	120) Hearing protection where appropriate? (if you need to yell to converse)			
			N/A	121) Respirators where appropriate?			
			N/A	122) Impalement protection provided where personnel could work above vertical impalement?			
			N/A	123) Is lighting adequate?			
			N/A	124) Other? Extra Credit?			
ABATEMENT			N/A	125) Has abatement plan been submitted and accepted?			
			N/A	126) Is independent air monitoring being performed as required inside and outside barriers?			
Comments/Notes:			N/A	127) Is containment in place without integrity compromise?			
			N/A	128) Are employees utilizing appropriate PPE?			
			N/A	129) If negative air is used, are fans used continuously and monitored for pressure differential?			
			N/A	130) Has baseline been performed and necessary final clearance readings taken?			
			N/A	131) Are inspections by independent PQP performed prior to barrier removal?			
			N/A	132) Is waste material properly containerized and stored?			
			N/A	133) Are air monitoring results provided to ROICC?			
			N/A	134) Are waste shipment records provided to ROICC?			
			N/A	135) Other? Extra Credit?			

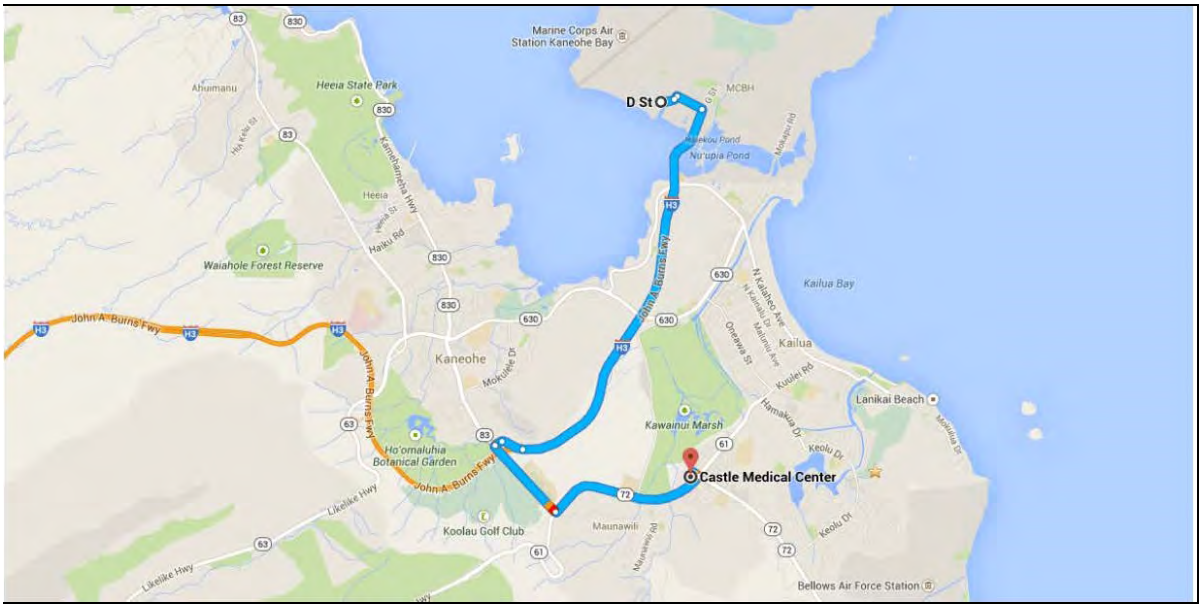
WATERFRONT			N/A	136) Are employees wearing appropriate flotation devices (PFDs)?				
ACTIVITIES			N/A	137) Is a rescue skiff available?				
Comments/Notes:			N/A	138) Are emergency life rings available?				
			N/A	139) If diving operations are taking place, has a dive plan been submitted and accepted?				
			N/A	140) Does dive team consist of proper number and qualifications for employees?				
			N/A	141) Other? Extra Credit?				
1. PREPARATORY PHASE:		N/A		**6. LADDER SAFETY:**	N/A		**12. EQUIPMENT:**	N/A
2. OFFICE TRAILER GENERAL:		N/A		**7. EXCAVATIONS:**	N/A		**13. DEMOLITION:**	N/A
3. FIRE PREVENTION:		N/A		**8. ELECTRICAL**	N/A		**14. PPE:**	N/A
4. SCAFFOLD SAFETY:		N/A		**9. CRANES:**	N/A		**15. ABATEMENT:**	N/A
5. FALL PROTECTION:		N/A		**10. CONFINED SPACES:**	N/A		**16. WATERFRONT ACTIVITIES:**	N/A
				OVERALL RATING = AVERAGE RATING FOR ALL CATEGORIES:				#DIV/0!

Attachment 2
Emergency Contact List and Emergency Hospital Route Map

EMERGENCY CONTACT LIST

Contact	Telephone Number
Ambulance/Paramedics/Fire/Police – Emergency	9-1-1
Emergency Hospital: Castle Medical Center 640 Ulukahiki Street, Kailua, HI, 96734	(808) 263-5164
National Poison Referral Service	(800) 222-1222
NAVFAC HAWAII RPM Eric Shigaki	Office: (808) 471-1171 x264
NAVFAC HAWAII Task Order COR Dennis Makabe	Office: (808) 474-3220 x285
CAPE (Corporate - Atlanta, GA) 500 Pinnacle Court, Suite 100, Norcross, GA 30071	Office: (770) 908-7200 FAX: (770) 908-7219
CAPE (Honolulu, HI) 155 Kapalulu Place, Suite 111, Honolulu, HI 96819	Office: (808) 791-6880 FAX: (808) 791-6888
CAPE Project Manager Jonathan Borr	Office: (808) 791-6885 Mobile: (808) 554-8015 Email: jborr@cape-inc.com
CAPE Site Superintendent Jamie White	Office: (808) 791-8879 Mobile: (808) 479-2324 Email: jwhite@cape-inc.com
CAPE Quality Control Officer (QCO)/ Site Safety and Health Officer (SSHO) Emily Molhoek	Office: (808) 791-6891 Mobile: (907) 223-9942 Email: emolhoek@cape-inc.com
CAPE Alternate SS or QCO/SSHO Alan Ahsing, STS	Mobile: (808) 292-0390 Email: aahsing@cape-inc.com
CAPE Alternate QCO/SSHO Carrie Plath	Office: (808) 791-6889 Mobile: (808) 349-5207 Email: cplath@cape-inc.com
CAPE Alternate QCO/SSHO Haley Miranda	Office: (808) 791-6891 Mobile: (808) 652-3884 Email: hmiranda@cape-inc.com
CAPE Safety and Health Manager Glen Mayekawa (CIH)	Office: (949) 236-3018 Mobile: (714) 920-7483 Email: gmayekawa@cape-inc.com
CAPE Corporate Risk Manager Chris Caviness (PE, CMQ/OE)	Office: (770) 908-7200 FAX: (770) 908-7219 Email: ccaviness@cape-inc.com
CAPE Corporate Human Resources Manager Elena Linnar	Office: (949) 236-3000 x252 FAX: (949) 231-1347 Email: elinnar@cape-inc.com

EMERGENCY HOSPITAL ROUTE MAP



Emergency Hospital:
Castle Medical Center
640 Ulukahiki Street, Kailua HI 96734
808-263-5164

Emergency Hospital Route:
1. From Site: Take 3rd Street to I-H-3/ John A. Burns Freeway (go 0.5 miles);
2. Follow I-H-3/ John A. Burns Freeway to HI-83 S/ Kamehameha Hwy in Kaneohe (go 5 miles);
3. Take exit 11 from I-H-3; follow HI-83 S and HI-61 N/ HI-72 to Ulukahiki Street in Maunawili (go 2.9 miles);
4. Turn LEFT onto HI-83 S/ Kamehameha Hwy (go 1.0 mile);
5. Turn LEFT onto HI-61 N/ HI-72 (go 1.8 miles);
6. Turn LEFT onto Ulukahiki Street. Destination will be on the left in 443 feet.

Note: SSHO must drive emergency hospital route before start of field work.

Attachment 3
Subcontractor List

SUBCONTRACTOR LIST

CAPE Subcontractor (Surveyor): Hawaii Engineering Group 1150 King Street, Suite 1200, Honolulu, HI 96814	POC: Ed Yeh Office: (808) 591-2022
CAPE Subcontractor (Laboratory Analytical Services): ACCUTEST Laboratories 197 Sand Island Access Road #203, Honolulu, HI 96819	POC: Tony Vega Office: (808) 843-0655
CAPE Subcontractor (Waste Transportation and Disposal): Enviroservices Training Center LLC 505 Ward Avenue, Suite 202 Honolulu, Hawaii 96814	POC: Greg Perry Office: (808) 837-7222
CAPE Subcontractor (Utility Toning) ULS Services Corporation 9061 Calle Del Verde, Santee CA 92071	POC: Mike Benedict Office: (800) 528-8206
CAPE Subcontractor (Fencing) David's Fending, Inc. 94-079 Leokane Street, Waipahu, HI 96797	POC: Joanne Abellanida Office: (808) 677-8060 Cell: (808) 306-0757

Attachment 4
Resumes, Designations and Certifications

JAMIE WHITE
SITE SUPERVISOR

PROFESSIONAL QUALIFICATIONS

Mr. White has over 25 years of experience in the environmental remediation and construction industry. He is qualified to perform site superintendent, quality control, and safety supervision roles. He is experienced supervising field crews, assisting in planning and implementing environmental soil remediation strategies, ordering necessary heavy equipment and materials, managing subcontractors, coordinating transportation and disposal of hazardous waste.

EDUCATION

- High School Diploma.

CERTIFICATIONS AND TRAINING

- 40-Hour HAZWOPER training (1989) and current refresher training (2014)
- 8-Hour HAZWOPER Manager and Supervisor training (2012)
- OSHA 10 Construction S&H Training (2006)
- 30-Hour OSHA Construction S&H Training (2008)
- First-aid/CPR/AED Training (2012) and Bloodborne pathogen Training (2013)
- 40-Hour Construction Safety Hazard Awareness Training for Contractors (2012)
- USACE Construction Quality Management for Contractors training (2011)
- Incident Command System for Emergency Response (1993)
- Emergency Response Technician Level "A" Certified (1993)
- Pesticide Emergency Response (1995);
- Confined Space Rescue and Emergency Response (1994)
- Hazardous Material Transportation (1993)
- Lead Health Hazard Training (2014).

EXPERIENCE AND BACKGROUND

- Provided SSHO support for hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Conducted daily safety meetings and monthly supervisor safety meetings
- Performed safety inspections/audits
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration and maintenance of monitoring instruments.

EMPLOYMENT HISTORY

CAPE, HI: Site Supervisor/SSHO/QCO (2012-present)
ERRG, HI: Site Supervisor (2010-2012)
ECC, HI: Site Supervisor (2006-2010)
RCCI, HI: Site Superintendent (2006)
Advanced Cleanup Technologies, Inc., HI: Project Manager (2006)
Global Environmental Services Group, LLC, HI: Project Manager (2000-2006)
All Star Industrial Construction, CA: Project Manager (1997-2000)
Industrial Technology, HI: Project Manager (1986-1996)
Advance Production Services, CA: Driller (1980-1986).

HIGHLIGHTED EXPERIENCE

- Superintendent for removal of pesticide-contaminated soil project. Activities included excavation, confirmation soil sampling by incremental sampling methodology, backfilling and compaction,

and re-vegetation of the site including installation of temporary erosion control matting and an irrigation system.

- Superintendent for demolition of an existing building and construction of a new facility including site work activities.
- Superintendent for remediation of air handling units, ducts, and vents to remove possible fungal colonies (i.e., mold); work included pre- and post-remedial tape and spore trap sampling.
- Superintendent for installing a concrete cap over soil potentially contaminated with asbestos and asbestos-containing materials, performing a metes and bounds survey, and installing land use controls.
- Superintendent for a retrofit project for USTs and ASTs at five gasoline stations, including the installation of pressure/vacuum vent caps and a stage I vapor recovery system.
- Superintendent for a pipeline pigging, pipeline demo, and equipment removal project in and around Red Hill Lower Tunnel.
- Site Supervisor for numerous UST cleaning, repairs, and removal projects.
- Supervisor for emergency response programs for PCB transformer cleanups as well as a PCB clean-up at Lualualei Naval Magazine where over 750 tons were excavated from various locations; placed into super sacks and shipped to the US mainland.
- Construction Manager/Site Superintendent for the second phase of a large environmental cleanup of various electrical utility sites for NAVFAC Pacific/Marianas on Guam.
- Construction Manager/Site Superintendent for this relatively large Thermal Desorption remediation project involving the treatment of > 20,000 tons of PCB-contaminated soils from various Navy electrical facilities on the Island of Guam. Oversaw the ECC field crews and subcontractors to ensure this cleanup project is completed safely and with high quality. The scope of this project involved assessing the presence of PCBs, excavating the impacted soils, thermally treating the contaminated soils, and restoring the site with clean soils.
- Extensive experience managing all phases of 5,300 bbl – 285,000 bbl storage tank cleaning, pipeline cleaning, leak detection, air monitoring, separator cleaning, centrifuging, carbon transfers, welding, coating, hydro testing, valve and piping replacement, vacuum truck and guzzler services, pressure washing, hydro blasting, and confined space entry storm drain cleaning.

EMILY MOLHOEK
SSHO/QCO RESUME

PROFESSIONAL QUALIFICATIONS

Ms. Molhoek is an environmental professional with over seven years of experience in safety and quality supervision of environmental projects. She is qualified to perform quality control, and safety supervision roles.

EDUCATION

- BS, Geology, Grand Valley State University (2002).
- MSc., Geology, University of Alaska Fairbanks (2007).

CERTIFICATIONS AND TRAINING

- USACE Construction Quality Management for Contractors (2014)
- 40-Hr NAVFAC Construction Safety Hazard Awareness Training for Contractors (2014)
- 30-Hr OSHA Construction S&H Training (2014)
- 40-Hr OSHA Hazardous Materials/Waste Health and Safety Training (2008)
- 8-Hr HAZWOPER Refresher Training (2014)
- 8-Hr HAZWOPER Supervisor Training (2012)
- 10-Hr OSHA Construction Safety and Health Training (2013)
- 8-Hr Permit Required Confined Space Entry (2014)
- Excavations Competent Person Training (2014)
- DOT/ HazMat Transport (2014)
- CPR/First Aid/AED (2014)
- Blood Borne Pathogens Training (2014)
- Skid Steer Loader Operator Training (2008)
- AHERA Asbestos Building Inspector Certification (2009).

EXPERIENCE AND BACKGROUND

- Responsible for oversight and direction of teams of subcontractors during site investigations, excavations and remediation system installation activities.
- Conducted daily safety meetings.
- Established required levels of protection for site personnel during site activities.
- Performed air monitoring during various field events, including drilling for environmental investigation, and remediation system installation.

EMPLOYMENT HISTORY

CAPE, Honolulu, HI: Project Scientist (2014 – Present)
Versar, Inc., Westminster, CO: Associate Geologist (2012 – 2014)
Sivuniq, Inc., Anchorage, AK: Environmental Geologist (2010 – 2012)
GeoTrans, Inc., Ann Arbor, MI: Staff Geologist (2008 – 2010)

ALAN AHSING, STS
ALTERNATE SSHO/QCO

PROFESSIONAL QUALIFICATIONS

Environmental and safety and health (S&H) professional with more than twenty years of experience in environmental remediation/construction and more than three years of Site Safety and Health Officer (SSHO) experience.

EDUCATION

- HS: Graduate, Kamehameha Schools (1986)
- College: Senior, Hawaiian Studies-Hawaiian Language, University of Hawaii at Manoa (1986-1992).

CERTIFICATIONS AND TRAINING

- Safety Trained Supervisor (STS), BCSP-CCHEST (2008)
- 40-Hr HAZWOPER training (1997) and current refresher training (2015)
- 8-Hr HAZWOPER Manager and Supervisor training (2013)
- First-aid/CPR/AED training (2013); Bloodborne pathogen training (2013)
- 30-Hr OSHA Construction S&H training (2008)
- 40-Hr NAVFAC Construction Safety Hazard Awareness Training for Contractors (2013)
- CAPE SSHO Training (2013)
- USACE Construction Quality Management for Contractors training (2014)
- Confined Space Requirements Competent Person (CP) training (1997; 2012)
- Safe Shoring Practices CP training (2012)
- Safe Scaffolding Practices CP training (2012)
- Safe Fall Protection Practices CP training (2012)
- Lead Health Hazard Training (2014).

EXPERIENCE AND BACKGROUND

- Acted as SSHO and operational supervisor for construction/hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Supervised excavation/trenching and elevated work location operations
- Conducted daily safety meetings and activity hazard analysis (AHA) reviews
- Performed safety inspections/audits and conducted incident investigations
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration and maintenance of air monitoring instruments.

EMPLOYMENT HISTORY

CAPE, Honolulu HI: SSHO/Foreman/Equipment Operator (EO) (2013-present)
Raising the Standard (RTS) Consulting, HI: STS/Safety Officer (2012)
Engineering/Remediation Resources Group (EERG), HI: SSHO/Foreman/EO (2011-2012)
Environmental Chemical Corporation (ECC), HI: Foreman/EO/Laborer (2003-2011; 1996-2000)

CARRIE PLATH
ALTERNATE SSHO/QCO

PROFESSIONAL QUALIFICATIONS

Safety and health (S&H) professional with more than ten years of experience in safety, supervision of safety, and environmental consulting.

EDUCATION

- BS, Geology and Geophysics, University of Hawaii at Manoa, 2004.

CERTIFICATIONS AND TRAINING

- 40-Hr HAZWOPER training (2005)
- 8-Hr HAZWOPER Refresher Training (2014)
- 8-Hr HAZWOPER Manager and Supervisor training (2008)
- OSHA 10 Construction S&H Training (2008)
- 30-Hr OSHA Construction S&H Training (2009)
- First-aid/CPR/AED training (2012)
- Bloodborne pathogen training (2012)
- 40-Hr Construction Safety Hazard Awareness Training for Contractors (2011)
- USACE Construction Quality Management for Contractors training (2011)
- Excavations Competent Person Training (2014)
- 8-Hr Permit-Required Confined Space Training (2014)
- DOT/ HazMat Transport (2012)
- Arsenic and Lead Awareness Training (2012).

EXPERIENCE AND BACKGROUND

- Provided SSHO support for hazardous waste projects
- Implemented Site Safety and Health Plans (SSHPs) for hazardous waste site operations
- Conducted daily safety meetings and quality control meetings
- Performed safety inspections/audits
- Established required levels of protection for site personnel for site activities
- Performed air monitoring and calibration and maintenance of monitoring instruments

EMPLOYMENT HISTORY

CAPE, Honolulu HI: Project Manager, Project Geologist (October 2011 – present);
Wil Chee Planning, Inc.: (2010 – 2011),
AECOM, Honolulu, HI: (2005 – 2010).

HALEY MIRANDA
ALTERNATE SSHO/QCO

PROFESSIONAL QUALIFICATIONS

Ms. Miranda is an environmental professional with experience in safety and quality supervision of environmental projects. She is qualified to perform quality control, and safety supervision roles.

EDUCATION

- BS, Chemical Engineering, University of Nevada – Reno (2013).

CERTIFICATIONS AND TRAINING

- 40-Hr OSHA HAZWOPER Training (2014) and current refresher training (TBD)
- 8-Hr HAZWOPER Supervisor Training (2014)
- First-Aid/CPR/AED training (2014) and Bloodborne Pathogens Training (2014)
- USACE Construction Quality Management for Contractors (2015)
- DOT Hazardous Materials Training (2014)
- Excavation Competent Person Training (2014)
- Confined Space Training (2014)
- Lead Hazard Awareness Training (2014).

EXPERIENCE AND BACKGROUND

- Provided S&H oversight during HAZWOPER project activities.
- Conducted daily safety meetings.
- Established required levels of protection for site personnel during site activities.
- Performed air monitoring for HAZWOPER site work.

EMPLOYMENT HISTORY

CAPE, Honolulu, HI: Staff Engineer (2014 – Present)
Newmont Mining Corporation, Elko, NV: Junior Metallurgist (2013).

DESIGNATED FIRST-AID RESPONDER LIST

Project Name:	Removal Action at salvage Yard
Project Location:	MCB Hawaii, Kaneohe, Hawaii

Designated personnel to act in the capacity of first-aid responders for medical emergencies on this project are indicated below.

Name	First-Aid Training	CPR Training	BBP Training
Carrie Plath	9/25/12[2yr]	9/25/12[2yr]	9/24/12
Emily Molhoek	7/11/14[2yr]	7/11/14[2yr]	7/22/14
Jamie White	11/2012[2yr]	11/2012[2yr]	11/16/13
Alan Ahsing	8/2013[2yr]	8/2013[2yr]	8/3/2013
Haley Miranda	3/25/14[2yr]	3/21/14	3/21/14
Jonathan Borr	1/2015[2yr]	1/2015[2yr]	11/16/12

LEGEND:

BBP: bloodborne pathogen
CPR: cardiopulmonary resuscitation

DESIGNATED COMPETENT PERSON LIST

Project Name:	Removal Action at Salvage Yard
Project Location:	MCB Hawaii, Kaneohe, Hawaii

The personnel indicated below have been designated to perform as competent persons on this project.

Competent Person Description and OSHA 29 CFR 1926 Reference	Applicable	Competent Person
General Safety and Health Provisions (1926 Subpart C)	YES	SSHO
Occupational Health and Environmental Controls (Subpart D)	YES	SSHO
Personal Protective and Life Saving Equipment (Subpart E)	YES	SSHO
Fire Protection and Prevention (Subpart F)	YES	SSHO
Signs, Signals, and Barricades (Subpart G)	YES	SSHO
Rigging (Subpart H)	NO	NA
Hand and Power Tools (Subpart I)	YES	SSHO
Welding and Cutting (Subpart J)	NO	NA
Electrical (Subpart K)	YES	SSHO
Scaffolding (Subpart L)	NO	NA
Fall Protection (Subpart M)	NO	NA
Cranes, Derricks, Hoists, Elevators, & Conveyors (Subpart N)	NO	NA
Motor Vehicles, Mechanized Equipment and Marine Operations (Subpart O)	YES	SSHO
Excavations (Subpart P)	YES	SSHO
Concrete and Masonry (Subpart Q)	NO	NA
Steel Erection (Subpart R)	NO	NA
Underground Construction, Caissons, Cofferdams, and Compressed Air (Subpart S)	NO	NA
Demolition (Subpart T)	NO	NA
Blasting and Use of Explosives (Subpart U)	NO	NA
Confined Spaces (29 CFR 1910.146)	NO	NA
Other (Specify):		

CERTIFICATIONS FOR PROJECT PERSONNEL

Will be provided at the project site

Attachment 5
Activity Hazard Analyses

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-01: Mobilization and Site Preparation	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**					
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity**	**Probability**				
Date Prepared: 4/3/2015		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Jonathan Borr / PM	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**
Notes: (Field Notes, Review Comments, etc.)	Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)					
	"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.	**RAC Chart**				
	"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible	**E = Extremely High Risk**				
		H = High Risk				
	Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.	**M = Moderate Risk**				
		L = Low Risk				

LIST OF COMPETENT PERSONS FOR THIS AHA:
-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Mobilize Personnel and Equipment: Coordinate/obtain security clearance for personnel. Conduct safety orientation briefing. Review SSHP/AHA. Establish equipment and supply storage.
Mobilize Heavy Equipment: Receive and inspect equipment.
Perform Site Reconnaissance: Walk the site.
Perform Site Surveying: Site surveying by subcontracted land surveyor. Survey the extent of excavation and confirmation sampling points using a licensed land surveyor. Present data in the Removal Verification Report.
Conduct Utility Clearance/Locate Previously Advanced Borings/Sample Locations: Identify subsurface structures or utilities within the excavation footprint prior to field activities. Review utility drawings. Verify utility locations. Perform utility locating. Identify locations of previously advanced borings and sample locations in order to set up excavation boundaries.
Set-up Work Zones: Delineate work zones. Install safety fence/signage.
Remove Chain-link Fence: Remove the chain-link fence separating the boat storage area from the salvage yard.
Install Erosion Controls: Install silt fence around the excavation and install orange construction fence to delineate working areas and areas of restricted entry.
Remove Vegetation: Remove vegetation in excavation and drilling/delineation areas.
Saw Cut Concrete: Saw cut concrete in affected areas for excavation.

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
Mobilize Personnel Description: Coordinate with base personnel for mobilization and site preparation. Obtain security clearance for personnel. Conduct safety orientation briefing. Review SSHP/AHA.	1. New Worker Hazards (unfamiliarity with site hazards, project safety rules, hazard control procedures, chain of command, and emergency procedures)	• All site personnel will attend a site safety orientation briefing and SSHP/AHA review conducted by the SSHO. • Site personnel will sign an SSHP Review form. • Provide certifications to the SSHO for review before start of field work.	**L**
	2. Vehicle and Mobile Equipment Traffic (struck by)	• Establish parking area for vehicles. • Establish entrance and exit routes for vehicles on site. • Do not walk in path of vehicles and equipment.	**L**
	3. Moving Supplies (cut, scrape, back strain)	• Watch for sharp edges or points on objects to be handled. Tape up or cushion as needed. • Use work gloves. • Use safe lifting and material handling techniques.	**L**
Mobilize Heavy Equipment Description: Receive delivery of heavy equipment. Conduct initial inspection of heavy equipment.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Fire Hazards (fire; burns)	• Allow smoking only in designated areas. • Maintain portable multi-purpose fire extinguishers on site, keep fully charged, inspect monthly, and service annually. • Place fire extinguishers within 75 feet of active work areas where flammable, combustible, or oxidizing materials are present. • Install a fire extinguisher on all heavy equipment. • Do not allow smoking and other sources of ignition within 50 feet of where flammable or combustible materials are stored or handled. • Provide fire lanes for access to areas where flammable or combustible materials are stored. • Use metal fire safety cans, red with a yellow stripe that have self-closing lids and flame arrestors to store small quantities of flammable liquids. • Have a spill kit with absorbent pads available for spill control/response.	**M**

Job Steps	Hazards	Controls	RAC
	3. Overhead Power Lines (electrocution)	• Check for overhead utilities before bringing equipment with high extensions (heavy equipment, drill rig, dump trucks, roll-off bin truck) into a work area. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 Section 11 and Table 11-1. • De-energize lines and/or use engineering controls for protection as needed.	**M**
	4. Off-Loading Heavy Equipment (struck by, crush)	• Keep all non-essential personnel out of the off-loading area. • Maintain proper distance from heavy equipment when off-loading from trailer. • Maintain eye contact with the equipment operator and indicate your movement with hand signals before approaching. • Keep hands and body away from equipment when removing securing chains.	**M**
	5. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	• Inspect heavy equipment before use. • Have heavy equipment operators complete and submit a Heavy Equipment Inspection Report form daily. • Ensure that manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, etc.) is functional at all times. • Check for properly functioning backup alarm. • Do not get on or off any equipment while it is in motion. • Maintain three points-of-contact when getting on or off equipment. • Use safety belts when heavy equipment is in use. • Use spotters for backing into tight work areas. • Set the parking brake and bucket on the ground when parking equipment. • Heavy equipment operators must notify the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	• Ground personnel must wear ANSI Class II high-visibility safety vests. • Maintain positive contact between operator and ground personnel. • Use hand signals for communication. • Do not cross the path of moving equipment. • Do not walk directly behind or to the side of heavy equipment. • Operators must look behind before backing. • Operators must continuously be aware of personnel and equipment in the work area. • Equipment operators must check the area before swinging a load. • Keep out of the heavy equipment swing radius/operating area when possible. • Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. • Do not stand below or walk underneath a suspended load.	**M**

Job Steps	Hazards	Controls	RAC
	7. Fuel Spills (spill; fire; exposure)	• Immediately report all spills touching the ground to the SSHO. • Place poly sheeting on the ground beneath repair locations when repairing hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. • Have a spill kit with absorbent pads available for spill control/response. • Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; implement measures to prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). • Immediately contain spills as long as it doesn't endanger personnel.	**M**
Perform Site Reconnaissance Description: Walk the site.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
Perform Site Surveying Description: Site surveying by subcontracted land surveyor. Survey the extent of excavation and confirmation sampling points using a licensed land surveyor. Present data in the Removal Verification Report.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
Conduct Utility Clearance/Locate Previously Advanced Borings/ Sample Locations Description: Identify subsurface structures or utilities within the excavation footprint prior to field activities. Review utility drawings. Verify utility locations. Perform utility locating. Identify locations of previously advanced borings and sample locations in order to set up excavation boundaries.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Underground Utilities (electrocution).	• Review utility locate information. • Verify dig permit is in place before any ground disturbance. • Review base utility map. Marked locations of utilities will be approximate. • Use a utility locator to mark-out underground utilities if needed. • Review and inspect utility mark-outs before subsurface disturbance. • Protect utility mark-outs from damage, deterioration, or covering up with soil. • If utilities are indicated in the area to be disturbed; hand dig two feet on either side of a marked utility to locate it. • Protect gas, sanitary sewer, storm drain, water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements if encountered and support, maintain and protect from injury or interruption of service until installation is complete. • Contact the NTR and RPM immediately if damage to underground utilities.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
Set-Up Work Zones Description: Delineate work zones. Install safety fence/signage. Post driver will be used to install safety fence.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use (struck by; cut; pinch; sharp wire; puncture)	• Use the proper tool for the job. Do not use damaged tools. • Wear work gloves (leather gloves) and use safety glasses. • Make sure your work area is clear of others who could be struck by tools. • Keep body out of the line-of-fire. • Properly secure materials when working on them.	**M**
	3. Utility Knife Use (cut)	• Use utility knife with blade that retracts and is covered when not in use. • Cut away from the body.	**M**
Remove Chain-Link Fence Description: Remove the chain-link fence separating the boat storage area from the salvage yard.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use (struck by; cut; pinch; puncture)	• Follow hand tool use safety procedures reviewed above.	**M**
	3. Ladder (step ladder) Use (fall)	• Always inspect ladders for defects before use. • Do not use metal ladders around electrical equipment. • Place ladder on a stable even flat surface. • Make sure stepladder stabilizing bar is fully extended. • Have someone hold the ladder for stability if the ground is not level. • Do not stand on top two rungs of a ladder. • Do not lean outward from ladder. • Always maintain 3 point contact on the ladder when climbing up and down.	**M**
Install Erosion Controls Description: Install silt fence around the excavation and install orange construction fence to delineate working areas and areas of restricted entry.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use	• Follow hand tool use safety procedures reviewed above.	**M**
	3. Utility Knife Use (cut)	• Follow utility knife use safety procedures reviewed above.	**M**
Remove Vegetation Description: Remove vegetation in excavation and drilling/delineation areas.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use	• Follow hand tool use safety procedures reviewed above.	**M**
	3. Fire Hazards	• Follow fire hazards safety procedures reviewed above.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	4. Chain Saw Operation (cuts; punctures; flying debris; pinch points; fuel; fire)	• Only trained and authorized personnel shall operate equipment. • Operator to wear hardhat, face shield, safety glasses, earplugs, and chaps. • Secure loose fitting clothing with duct tape. • Take precautions to avoid contact with poison ivy and poison oak. • Train personnel on cutting technique. Always cut away from the body. Do not cut with the tip (nose) of the bar. Hold chain saw with both hands during cutting. Do not overreach with chain saw. Do not operate saw above shoulder height. • Shut off chain saw when walking between work areas. • Shut off engine before freeing pinched chains. • Be alert to kickback hazard. Keep firm, proper grip on chain saw at all times. • Use wedges to prevent chain binding.	**M**
	5. Chain Saw Equipment (improper inspection and maintenance)	• Inspect chain saw before each use. • Chain saws must have an automatic chain brake and anti-kickback device. • Do not use saws in which any safety feature is not functioning. • Frequently check and adjust tension on chain. • Do not use saws with dull chains. • Do not increase force used as cutters become dull. Change the chain. • Adjust idle speed to prevent the chain from moving during engine idling. • Keep bar groove clean. Use only new or professionally sharpened chains.	**M**
	6. Fueling of Chain Saws (fire; spill)	• Smoking is not permitted near fueling areas. • Shut off engine before refueling. • Have a 20-B:C fire extinguisher readily available when refueling. • Store mixed-gas in metal safety cans with self-closing lid and flash arrestor. • Use a metal safety fuel can with a nozzle or a funnel during fueling.	**M**
	7. String Trimmer Use (flying particles; fire; cut; puncture; noise)	• Follow manufacturer instructions for trimmer (e.g. Weed Eater®) operation. • Operator must be knowledgeable in the proper operation of the trimmer. • Inspect trimmer before each use • Use only approved trimming line (no metal wire) in weed trimmers. • Wear gloves, safety glasses and mesh face shield when operating trimmer. • Use ear plugs when using fuel-operated weed trimmers. • Keep work areas clear of unnecessary personnel. • Check for poison oak/poison ivy and take precautions. • Avoid running string into the ground that could create flying particles. • Do not place hands in moving part areas. • Do not fuel string trimmer while running, while hot, or near an open flame.	**M**
Saw Cut Concrete Description: Saw cut concrete in affected areas for excavation.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	2. Concrete Cutting (noise exposure; flying particles; exposure to airborne dust/silica)	• Concrete cutting is a noisy operation. Wear ear plugs for protection. • Wear safety glasses to protect from flying particles. • Concrete contains silica which is a respiratory hazard. • Use concrete saw cutter that is equipped with water injection or use wet methods (water spray to wet down concrete) during concrete cutting. • Use air-purifying respirator (APR) with P100 cartridge if working in an area where there is visible airborne dust.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Excavator; Loader; Water truck; Hand tools; Construction fence; Fence posts; Shovels; Post pounder; Silt fence; Sledge hammer; Safety signs; Utility knife; Cable ties; String trimmer; Chain saw; Mixed-fuel safety can; Concrete cutter; Fire extinguisher; Spill kit; Safety tote; PPE.	Site safety orientation briefing and SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS/SDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-01: Mobilization and Site Preparation					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-02: Soil Sampling	Overall Risk Assessment Code (RAC) (Use highest code)					**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**					
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity**	**Probability**				
Date Prepared: 4/3/2015		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM	Catastrophic	**E**	**E**	**H**	**H**	**M**
	Critical	**E**	**H**	**H**	**M**	**L**
Reviewed by (Name/Title): Jonathan Borr / PM	Marginal	**H**	**M**	**M**	**L**	**L**
	Negligible	**M**	**L**	**L**	**L**	**L**

Notes: (Field Notes, Review Comments, etc.)

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:

-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:

All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.

Waste Characterization Sampling: Based on previous investigations at the site, locations where PCB concentrations in soil exceed 50 mg/kg will be characterized as TSCA-regulated waste and disposed of off-island at a TSDF. Soil with PCB concentrations between 10 and 50 mg/kg will be characterized as CERCLA waste, and disposed of in an on-island approved landfill. Prior to excavation of these soils, collect waste characterization soil samples from excavation areas as composite samples. Collect nine samples from the locations with concentrations below 50 mg/kg and collect one sample from the locations with concentrations exceeding 50 mg/kg. Collect samples using a hand auger whenever possible. Use direct-push drilling when hand auger techniques are deemed inadequate. Use this waste characterization data to meet non-hazardous waste characterization transportation and disposal requirements. Decontaminate sampling equipment following sampling. Analyze samples for PCBs as Aroclors.

Delineation Sampling: Prior to excavation, collect additional delineation samples in the northeastern impacted area in the Salvage yard near the wetland. Use the results from samples collected in this area to confirm excavation depths and characterize the soil for disposal. Perform sampling using a direct-push drill rig, except in portions bordering the adjacent wetland where the ground may be too soft to facilitate rig access. In these cases, perform sampling by hand and restrict to the surface (0-0.5 feet bgs). Decontaminate sampling equipment following sampling. Analyze samples for PCBs as Aroclors.

Confirmation Sampling: Discrete sampling will be used in order to minimize the need for over-excavation. Collect confirmation samples from floors and sidewalls after initial excavations are completed to confirm that all TSCA-regulated soil has been removed. Remove additional soil if initial confirmation samples indicate that PCB concentrations in the remaining soil exceed 50 mg/kg and repeat confirmation sampling. Once confirmation sampling results indicate that all soils with concentrations >50 mg/kg have been removed, commence excavation of CERCLA soils. Following excavation of soils to predetermined depths in each DU, collect confirmation samples again to ensure that the concentrations of PCBs in excavation floors and sidewalls across the excavated area are less than the cleanup goal of 10 mg/kg. The combined proposed excavation areas equal approximately 75,500 square feet (this area is subject to change based on actual field conditions and the outcome of delineation sampling). Analyze samples for PCBs as Aroclors. Decontaminate sampling equipment following sampling.

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
Waste Characterization Sampling Description: Based on previous investigations at the site, locations where PCB concentrations in soil exceed 50 mg/kg will be characterized as TSCA-regulated waste and disposed of off-island at a TSDF. Soil with PCB concentrations between 10 and 50 mg/kg will be characterized as CERCLA waste, and disposed of in an on-island approved landfill. Prior to excavation of these soils, collect waste characterization soil samples from excavation areas as composite samples. Collect samples using a hand auger or slide hammer sampler. Use this waste characterization data to meet non-hazardous waste characterization transportation and disposal requirements. Decontaminate sampling equipment following sampling. Analyze samples for PCBs as Aroclors.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	• PCB concentrations have been detected at a maximum of 220 mg/kg in surface soil and a maximum of 1,800 mg/kg in subsurface soil. • Review MSDS/SDS information for site contaminants. • Apply water spray to control dust generation. • Wear PPE as defined in the SSHP and as directed by the SSHO. • Follow personnel decontamination measures when exiting exclusion zone. • Perform equipment decontamination before it exits the exclusion zone. • Place used PPE in a separate container that is properly labeled.	**L**
	3. Fire Hazards (fire; burns)	• Allow smoking only in designated areas. • Maintain portable multi-purpose fire extinguishers on site, keep fully charged, inspect monthly, and service annually. • Place fire extinguishers within 75 feet of active work areas where flammable, combustible, or oxidizing materials are present. • Install a fire extinguisher on all heavy equipment. • Do not allow smoking and other sources of ignition within 50 feet of where flammable or combustible materials are stored or handled. • Provide fire lanes for access to areas where flammable or combustible materials are stored. • Use metal fire safety cans, red with a yellow stripe that have self-closing lids and flame arrestors to store small quantities of flammable liquids. • Have a spill kit with absorbent pads available for spill control/response.	**M**
	4. Overhead Power Lines (electrocution)	• Check for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks, roll-off bin truck) into a work area. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 Section 11 and Table 11-1. • De-energize lines and/or use engineering controls for protection as needed.	**M**

Job Steps	Hazards	Controls	RAC
	5. Underground Utilities (electrocution).	• Review utility locate information. • Verify dig permit is in place before any ground disturbance. • Review base utility map. Marked locations of utilities will be approximate. • Use a utility locator to mark-out underground utilities if needed. • Review and inspect utility mark-outs before subsurface disturbance. • Protect utility mark-outs from damage, deterioration, or covering up with soil. • If utilities are indicated in the area to be disturbed; hand dig two feet on either side of a marked utility to locate it. • Protect gas, sanitary sewer, storm drain, water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements if encountered and support, maintain and protect from injury or interruption of service until installation is complete. • Contact the NTR and RPM immediately if damage to underground utilities.	**M**
	6. Drill Rig Travel Hazards (if used) (drill rig damage; electrocution)	• Check for overhead utilities before bringing drill rig into a work area. • Inspect travel routes for the presence of overhead power lines, subsurface utilities, uneven terrain, rocks, trees, soil erosion, steep grades, etc. • Lower drill rig mast and secure loads when moving rig. • Use safety belts while driving rig. • Use a spotter to assist in directing drill rig into tight areas. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1. • Getting off or on any equipment while it is in motion is prohibited. • Maintain three points-of-contact when getting on or off equipment. • Set the parking brake when parking equipment. • Block drill rig.	**M**
	7. Drill Rig and Equipment Set-up (if used) (struck by; caught-in-between; crush; noise)	• Inspect drill rig before use. • Drill rig operators to complete and submit an inspection report form daily. • Inspect wire ropes, swivels, hooks, bearings, sheaves, guides, rollers, etc., for damage or deterioration before use. • Manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, etc.) must be functional at all times. • Check for properly functioning backup alarm.	**M**

Job Steps	Hazards	Controls	RAC
	8. Drilling Hazards (if used) (improper procedures; unmaintained equipment; equipment failure)	• Only trained and authorized personnel shall operate equipment. • Establish a restricted area around the drill rig to control entry. • Check for the drill rig “kill switch” (may be a handle, button, or cable). • Test the drill rig "kill switch" before drilling. • Establish communication system between drill rig operator and others. • Wear gloves, ear plugs, safety glasses, and other PPE. • Do not wear loose clothing or jewelry around drill rig. • Barricade off potential crush points (equipment-equipment or equipment structure or object). • Do not walk between equipment. • Avoid placing hands or feet in pinch point/line-of-fire areas in case of sudden shifting of drill rig. • Do not distract driller during operation of rig. • Provide plenty of room for driller to work (don’t get in the way). • Use proper technique to lift and handle drill equipment and materials. • Maintain good housekeeping by drill rig (remove slip, trip and fall hazards). • Shut down drill rig operations during adverse weather conditions involving high winds, heavy rain, or lightning storms.	**M**
	9. Fuel Spills (spill; fire; exposure)	• Immediately report all spills touching the ground to the SSHO. • Place poly sheeting on the ground beneath repair locations when repairing hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. • Have a spill kit with absorbent pads available for spill control/response. • Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; Prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). • Immediately contain spills as long as it doesn’t endanger personnel.	**M**
	10. Hand Tool Use (struck by; cut; pinch; sharp wire; puncture)	• Use the proper tool for the job. Do <u>not</u> use damaged tools. • Wear work gloves (leather gloves) and use safety glasses. • Make sure your work area is clear of others who could be struck by tools. • Keep body out of the line-of-fire. • Properly secure materials when working on them.	**M**
Delineation Sampling <u>Description</u>: Prior to excavation, collect additional delineation samples as per the UFP-SAP. Use the results from samples collected in this area to confirm excavation depths and characterize the soil for	1. All Site Activity Hazards	• Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants	• Follow the Site Contaminant safety procedures reviewed above.	**L**
	3. Fire Hazards	• Follow Fire Hazards safety procedures reviewed above.	**M**
	4. Overhead Power Lines	• Follow Overhead Power Line safety procedures reviewed above.	**M**
	5. Underground Utilities	• Follow Underground Utility safety procedures reviewed above.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
disposal. Perform sampling by hand methods such as hand auger or slide hammer sampler. Decontaminate sampling equipment following sampling. Analyze samples for PCBs as Aroclors.	6. Drill Rig Travel Hazards	• Follow Drill Rig Travel Hazards safety procedures reviewed above.	**M**
	7. Drilling Hazards	• Follow Drilling Hazards safety procedures reviewed above.	**M**
	8. Fuel Spills	• Follow Fuel Spill safety procedures reviewed above.	**M**
	9. Hand Tool Use	• Follow Hand Tool Use safety procedures reviewed above.	**M**
Confirmation Sampling Description: Discrete sampling will be used in order to minimize the need for over-excavation. Collect confirmation samples from floors and sidewalls after initial excavations are completed to confirm that all soil above the project action limit has been removed. Analyze samples for PCBs as Aroclors. Decontaminate sampling equipment following sampling.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions	**M**
	2. Site Contaminants	• Follow the Site Contaminant safety procedures reviewed above.	**L**
	3. Fire Hazards	• Follow Fire Hazards safety procedures reviewed above.	**M**
	4. Overhead Power Lines	• Follow Overhead Power Line safety procedures reviewed above.	**M**
	5. Underground Utilities	• Follow Underground Utility safety procedures reviewed above.	**M**
	6. Drill Rig Travel Hazards	• Follow Drill Rig Travel Hazards safety procedures reviewed above.	**M**
	7. Drilling Hazards	• Follow Drilling Hazards safety procedures reviewed above.	**M**
	8. Fuel Spills	• Follow Fuel Spill safety procedures reviewed above.	**M**
	9. Hand Tool Use	• Follow Hand Tool Use safety procedures reviewed above.	**M**
	10. Open Excavated Areas (uneven ground, step-down hazard)	• Watch for uneven ground • Watch your step when stepping down from one elevation to another.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Direct-push drill rig; Hand auger; Soil sampling equipment; Hand tools; Non-phosphate detergent; Distilled/deionized water; Sheet poly; Disposal bag; Sample containers and labels; Sample shipping containers; Fire extinguisher; Safety tote; PPE; Decontamination supplies.	Site safety orientation briefing and SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication and MSDS/SDS training (site personnel); Daily safety meeting (site personnel); Drill rig training (operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Drill rig inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-02: Soil Sampling					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-03: Contaminated Soil Excavation and Loading	Overall Risk Assessment Code (RAC) (Use highest code)	**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**	
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity** / **Probability**	
Date Prepared: 4/3/2015		
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM		
Reviewed by (Name/Title): Jonathan Borr / PM		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

LIST OF COMPETENT PERSONS FOR THIS AHA:
-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Excavate PCB-Impacted Soil: Use heavy equipment to excavate PCB-impacted soil. Excavation will take place in phases; TSCA-regulated soil will be removed first, then CERCLA-non-hazardous regulated soil. TSCA regulated waste will be excavated and direct loaded into supersacks. CERLA non-hazardous regulated soil will be excavated and loaded into roll off bins or dump trucks.
Load Non-Hazardous PCB-Impacted Soil: Use heavy equipment to load non-hazardous PCB-impacted soil into dump trucks or roll-off bins.
Load PCB-Impacted Soil into Supersacks: Use heavy equipment used to load PCB-impacted soil classified as TSCA hazardous waste into Supersacks. Place soil into 1-cubic yard bulk sacks using a hopper system. Place each sack on a dedicated wooden pallet, assign a unique identifier, and mark. Weight and stage the sacks onsite and cover with plastic sheeting to protect from the elements.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
Excavate PCB-Impacted Soil Description: Use heavy equipment to excavate PCB-impacted soil. Excavation will take place in phases; TSCA-regulated soil will be removed first, then CERCLA-non-hazardous regulated soil. TSCA regulated waste will be excavated and direct loaded into supersacks. CERLA non-hazardous regulated soil will be excavated and loaded into roll off bins or dump trucks.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	• PCB concentrations have been detected at a maximum of 220 mg/kg in surface soil and a maximum of 1,800 mg/kg in subsurface soil. • Review MSDS/SDS information for site contaminants. • Apply water spray to control dust generation. • Wear PPE as defined in the SSHP and as directed by the SSHO. • Follow personnel decontamination measures when exiting exclusion zone. • Perform equipment decontamination before it exits the exclusion zone. • Place used PPE in a separate container that is properly labeled.	**L**
	3. Fire Hazards (fire; burns)	• Allow smoking only in designated areas. • Maintain portable multi-purpose fire extinguishers on site, keep fully charged, inspect monthly, and service annually. • Place fire extinguishers within 75 feet of active work areas where flammable, combustible, or oxidizing materials are present. • Install a fire extinguisher on all heavy equipment. • Do not allow smoking and other sources of ignition within 50 feet of where flammable or combustible materials are stored or handled. • Provide fire lanes for access to areas where flammable or combustible materials are stored. • Use metal fire safety cans, red with a yellow stripe that have self-closing lids and flame arrestors to store small quantities of flammable liquids. • Have a spill kit with absorbent pads available for spill control/response.	**M**

Job Steps	Hazards	Controls	RAC
	4. Underground Utilities (electrocution).	• Review utility locate information. • Verify dig permit is in place before any ground disturbance. • Review base utility map. Marked locations of utilities will be approximate. • Use a utility locator to mark-out underground utilities if needed. • Review and inspect utility mark-outs before subsurface disturbance. • Protect utility mark-outs from damage, deterioration, or covering up with soil. • If utilities are indicated in the area to be disturbed; hand dig two feet on either side of a marked utility to locate it. • Protect gas, sanitary sewer, storm drain, water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements if encountered and support, maintain and protect from injury or interruption of service until installation is complete. • Contact the NTR and RPM immediately if damage to underground utilities.	**M**
	5. Overhead Power Lines (electrocution)	• Check for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks, roll-off bin truck) into a work area. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 Section 11 and Table 11-1. • De-energize lines and/or use engineering controls for protection as needed.	**M**
	6. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	• Inspect heavy equipment before use. • Have heavy equipment operators complete and submit a Heavy Equipment Inspection Report form daily. • Ensure that manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, etc.) is functional at all times. • Check for properly functioning backup alarm. • Do not get on or off any equipment while it is in motion. • Maintain three points-of-contact when getting on or off equipment. • Use safety belts when heavy equipment is in use. • Use spotters for backing into tight work areas. • Set the parking brake and bucket on the ground when parking equipment. • Heavy equipment operators must notify the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	7. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	• Ground personnel must wear ANSI Class II high-visibility safety vests. • Maintain positive contact between operator and ground personnel. • Use hand signals for communication. • Do not cross the path of moving equipment. • Do not walk directly behind or to the side of heavy equipment. • Operators must look behind before backing. • Operators must continuously be aware of personnel/equipment in the area. • Equipment operators must check the area before swinging a load. • Keep out of the heavy equipment swing radius/operating area when possible. • Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should "signal" the equipment operator when they are exiting the area. • Do not stand below or walk underneath a suspended load.	**M**
	8. Fuel Spills (spill; fire; exposure)	• Immediately report all spills touching the ground to the SSHO. • Place poly sheeting on the ground beneath repair locations when repairing hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. • Have a spill kit with absorbent pads available for spill control/response. • Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; Prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). • Immediately contain spills as long as it doesn't endanger personnel.	**M**
Load Non-Hazardous PCB-Impacted Soil Description: Use heavy equipment to load non-hazardous PCB-impacted soil into dump trucks or roll-off bins.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants	• Follow Site Contaminant safety procedures reviewed above.	**L**
	3. Fire Hazards	• Follow Fire Hazards safety procedures reviewed above.	**M**
	4. Overhead Power Lines	• Follow Overhead Power Line safety procedures reviewed above.	**M**
	5. Heavy Equipment – Equipment Operation	• Follow Heavy Equipment-Equipment Operation safety procedures reviewed above.	**M**
	6. Heavy Equipment – Ground Personnel	• Follow Heavy Equipment-Ground Personnel safety procedures reviewed above.	**M**
	7. Fuel Spills	• Follow Fuel Spill safety procedures reviewed above.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	8. Traffic Hazards (vehicle accident)	• Use a spotter when backing a vehicle into tight area or when visibility is limited. • Check load and tarp to make sure it is secure. • Perform DOT pre-trip safety inspections. • Ensure vehicle safety equipment (i.e., lights, guards, brakes, horn, etc.) is functional at all times. • Have bill of lading readily available. • Follow all traffic rules. Use safety belt. Obey speed limits and traffic signs. • Drive defensively. • Set the parking brake when the truck is parked.	**M**
Load PCB-Impacted Soil into Supersacks Description: Use heavy equipment used to load PCB-impacted soil classified as TSCA hazardous waste into Supersacks. Place soil into 1-cubic yard bulk sacks using a hopper system. Place each sack on a dedicated wooden pallet, assign a unique identifier, and mark. Stage the sacks onsite and cover with plastic sheeting to protect from the elements.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants	• Follow the Site Contaminant safety procedures reviewed above.	**L**
	3. Fire Hazards	• Follow Fire Hazards safety procedures reviewed above.	**M**
	4. Overhead Power Lines	• Follow Overhead Power Line safety procedures reviewed above.	**M**
	5. Heavy Equipment – Equipment Operation	• Follow Heavy Equipment-Equipment Operation safety procedures reviewed above.	**M**
	6. Heavy Equipment – Ground Personnel	• Follow Heavy Equipment-Ground Personnel safety procedures reviewed above.	**M**
	7. Fuel Spills	• Follow Fuel Spill safety procedures reviewed above.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Site vehicles; Excavator; Loader; Water truck; Water hose with spray nozzle; Grade checker equipment; Ladders; Caution tape; Fence t-posts; Hand tools (post-driver; shovels); Fire extinguisher; Spill kit; Safety tote; PPE; Decontamination supplies.	Site safety orientation briefing and SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS/SDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-03: Contaminated Soil Excavation and Loading					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-04: Waste Transportation and Disposal	Overall Risk Assessment Code (RAC) (Use highest code)	**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**	
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity** / **Probability**	
Date Prepared: 4/3/2015		
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM		
Reviewed by (Name/Title): Jonathan Borr / PM		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

E = Extremely High Risk
H = High Risk
M = Moderate Risk
L = Low Risk

LIST OF COMPETENT PERSONS FOR THIS AHA:
-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Transport Non Hazardous Soil to Landfill: Transport non-hazardous PCB-impacted soil to PVT landfill.
Off-Load Soil at Landfill: Off-load non-hazardous PCB-impacted soil at PVT landfill.
Transport Supersacks for Disposal at Off- Island TSCA-approved Facility: Transport pallets of Supersacks of PCB-impacted soil classified as hazardous waste for disposal at an off-island TSCA-approved facility.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
Transport Non-Hazardous Soil to Landfill Description: Transport non-hazardous PCB-impacted soil to PVT landfill.	1. Traffic Hazards (vehicle accident)	• Check load and tarp to make sure it is secure. • Perform DOT pre-trip safety inspections. • Vehicle safety equipment (i.e., lights, guards, brakes, horn, etc.) must be functional at all times. • Have waste disposal manifest readily available. • Follow all traffic rules. • Use safety belt. • Obey speed limits and traffic signs. • Drive defensively. • Set the parking brake when the truck is parked. • Maintain three points-of-contact when getting on or off equipment.	**M**
Off-Load Soil at Landfill Description: Off-load non-hazardous PCB-impacted soil at PVT landfill.	1. Struck-By Debris (struck-by)	• Driver to remain inside of truck during unloading. • No personnel in off-loading area during off-loading (within 25 feet). • Watch for other vehicles and heavy equipment. • Follow instructions of landfill personnel. • Set the parking brake when the truck is parked. • Use spotter for backing into tight work areas. • Situate truck on level and stable surface before when dumping. • When dumping a load from a bed equipped with a tailgate; position a spotter a safe distance from the vehicle and such that the spotter can observe the bed and notify the operator if an obstruction occurs. The spotter and driver must be in agreement on the proper positioning. • Spotter must have suitable means of communication with driver. • Do not drive truck until dump body is in the full down position. • If the load fails to exit the bed properly or becomes stuck; then lower the bed the correct the problem if it can be done safely. • Keep personnel out of blind spots. Have personnel stay outside of a buffer zone on the sides of the truck equal to the length of the bed times 1.5 during dumping.	**M**
Transport Supersacks for Disposal at Off-Island TSCA-Approved Facility Description: Transport pallets of Supersacks of PCB-impacted soil classified as hazardous waste for disposal at an off-island TSCA-approved facility.	1. Traffic Hazards (vehicle accident)	• Follow Traffic Hazards safety procedures reviewed above.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Waste hauling dump trucks; Fire extinguisher; PPE.	Commercial Driver License with required training and testing; Hazardous waste driver certification.	Vehicle inspection (daily); Fire extinguisher inspection (monthly).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-04: Waste Transportation and Disposal					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-05: Heavy Equipment Decontamination	Overall Risk Assessment Code (RAC) (Use highest code)	**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**	
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity** / **Probability**	
Date Prepared: 4/3/2015		
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM		
Reviewed by (Name/Title): Jonathan Borr / PM		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	**E**	**E**	**H**	**H**	**M**
Critical	**E**	**H**	**H**	**M**	**L**
Marginal	**H**	**M**	**M**	**L**	**L**
Negligible	**M**	**L**	**L**	**L**	**L**

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Decontaminate Heavy Equipment: Conduct dry decontamination on heavy equipment exterior (brooms, shovels).

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
Decontaminate Heavy Equipment Description: Conduct dry decontamination on heavy equipment exterior (brooms, shovels).	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	• PCB concentrations have been detected at a maximum of 220 mg/kg in surface soil and a maximum of 1,800 mg/kg in subsurface soil. • Review MSDS/SDS information for site contaminants. • Apply water spray to control dust generation. • Wear PPE as defined in the SSHP and as directed by the SSHO. • Follow personnel decontamination measures when exiting exclusion zone. • Perform equipment decontamination before it exits the exclusion zone. • Place used PPE in a separate container that is properly labeled.	**L**
	3. Fire Hazards (fire; burns)	• Allow smoking only in designated areas. • Maintain portable multi-purpose fire extinguishers on site, keep fully charged, inspect monthly, and service annually. • Place fire extinguishers within 75 feet of active work areas where flammable, combustible, or oxidizing materials are present. • Install a fire extinguisher on all heavy equipment. • Do not allow smoking and other sources of ignition within 50 feet of where flammable or combustible materials are stored or handled. • Provide fire lanes for access to areas where flammable or combustible materials are stored. • Use metal fire safety cans, red with a yellow stripe that have self-closing lids and flame arrestors to store small quantities of flammable liquids. • Have a spill kit with absorbent pads available for spill control/response.	**M**
	4. Overhead Power Lines (electrocution)	• Check for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks, roll-off bin truck) into a work area. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 Section 11 and Table 11-1. • De-energize lines and/or use engineering controls for protection as needed.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	5. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	• Inspect heavy equipment before use. • Have heavy equipment operators complete and submit a Heavy Equipment Inspection Report form daily. • Ensure that manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, etc.) is functional at all times. • Check for properly functioning backup alarm. • Do not get on or off any equipment while it is in motion. • Maintain three points-of-contact when getting on or off equipment. • Use safety belts when heavy equipment is in use. • Use spotters for backing into tight work areas. • Set the parking brake and bucket on the ground when parking equipment. • Heavy equipment operators must notify the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	• Ground personnel must wear ANSI Class II high-visibility safety vests. • Maintain positive contact between operator and ground personnel. • Use hand signals for communication. • Do not cross the path of moving equipment. • Do not walk directly behind or to the side of heavy equipment. • Operators must look behind before backing. • Operators must continuously be aware of personnel/equipment in the area. • Equipment operators must check the area before swinging a load. • Keep out of the heavy equipment swing radius/operating area when possible. • Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. • Do not stand below or walk underneath a suspended load.	**M**
	7. Fuel Spills (spill; fire; exposure)	• Immediately report all spills touching the ground to the SSHO. • Place poly sheeting on the ground beneath repair locations when repairing hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. • Have a spill kit with absorbent pads available for spill control/response. • Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; Maintain positive control of the fuel nozzle while refueling operations are in progress; Prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). • Immediately contain spills as long as it doesn’t endanger personnel.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
	8. Hand Tool Use (struck by; cut; pinch; sharp wire; puncture)	• Use the proper tool for the job. Do not use damaged tools. • Wear work gloves (leather gloves) and use safety glasses. • Make sure your work area is clear of others who could be struck by tools. • Keep body out of the line-of-fire. • Properly secure materials when working on them.	**M**

Equipment to be Used	Training Requirements	Inspection Requirements
Heavy equipment; Water truck; Hand tools (shovels, broom, gong brushes); Fire extinguisher; Spill kit; Safety tote; PPE.	Site safety orientation briefing and SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS/SDS training (site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-05: Heavy Equipment Decontamination					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

ACTIVITY HAZARD ANALYSIS

Activity / Work Task: AHA-06: Site Restoration and Demobilization	Overall Risk Assessment Code (RAC) (Use highest code)	**M**
Project Name / Location: Removal Action at Salvage Yard, MCB Hawaii, Kaneohe, Hawaii	**Risk Assessment Code (RAC) Matrix**	
Contract / Task Order Number: N62742-10-D-1804; CTO 0025	**Severity** / **Probability**	
Date Prepared: 4/3/2015		
Prepared by (Name/Title): Glen Mayekawa, CIH / SHM		
Reviewed by (Name/Title): Jonathan Borr / PM		
Notes: (Field Notes, Review Comments, etc.)		

Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Catastrophic	E	E	H	H	M
Critical	E	H	H	M	L
Marginal	H	M	M	L	L
Negligible	M	L	L	L	L

Step 1: Review each **"Hazard"** with identified safety **"Controls"** and determine RAC (See above)

"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.

"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible

Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.

RAC Chart

- **E = Extremely High Risk**
- **H = High Risk**
- **M = Moderate Risk**
- **L = Low Risk**

LIST OF COMPETENT PERSONS FOR THIS AHA:
-General S&H: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-HAZWOPER: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).
-Fire Protection: SSHO (Jamie White; Emily Molhoek; Alan Ahsing, Carrie Plath, Jonathan Borr, Haley Miranda).

LIST OF JOB STEPS:
All Site Activities: Personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, inclement weather.
Backfill and Grade: Restoration will occur as confirmation of removal action is received per DU, as possible, to keep access closure to a minimum. Once confirmation sampling indicates cleanup goals have been met, the excavated areas will be backfilled and graded. A demarcation liner will be installed at the base of excavations, to mark the separation of clean backfill from existing native soil. The imported backfill will be free of organics and construction materials.
Site Restoration: Place topsoil and seed in disturbed grass areas and restore to match existing site conditions.
Perform Site Cleanup: Clean up debris. Place debris in waste bin. Remove safety fence where it is no longer needed Remove signs. Demobilize supplies.
Decontaminate Equipment: Use dry decontamination methods to clean off heavy equipment and other equipment.
Demobilize Personnel and Equipment: Demobilize equipment and temporary facilities from the site. Demobilize personnel from the site.

Job Steps	Hazards	Controls	RAC
All Site Activities Description: These hazards may potentially be present during all site activities.	1. Personal Protection (struck by, caught in between, overhead obstructions, flying objects, falls, noise exposure)	• Minimum protective equipment includes: Hardhat, safety glasses, safety-toed boots; and ANSI Class II safety vest. • Use face shield for grinding, cutting, and pressure washing • Use earplugs if noise hazard present. • Use protective clothing for body protection as required by work activity.	**M**
	2. Slip, Trip, and Fall (cut, puncture, pinch, crush)	• Check walking areas for slip/ trip/fall hazards (holes, uneven or wet ground). • Use short steps when walking on slippery surfaces. • Be aware of terrain conditions such as holes and rocks. • Keep ground areas clear of trip hazards such as hoses, cords, and debris.	**M**

Job Steps	Hazards	Controls	RAC
	3. Lifting/Material Handling (back strain, cut, puncture, pinch, crush)	• Material handling (lifting and carrying) will occur. • Wear work gloves when handling materials. • Watch for items that can cut, puncture, pinch, or crush. • Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. • Use material handling equipment (e.g., dolly, hand cart, forklift) for movement of heavy or awkwardly shaped items.	**M**
	4. Noise Exposure (noise exposure)	• Noise exposure above 85 dBA should be expected when working near heavy equipment or operating machinery (e.g., pressure washer, power saws). • Wear ear plugs to protect from exposure.	**M**
	5. Heat Stress (heat exhaustion, heat stroke)	• Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. • Wear light colored clothing (cotton). • Know the signs and symptoms of heat stress and treatment. • Work at a steady pace and do not over exert yourself. • Drink plenty of water or electrolyte replacement fluids throughout the day (minimize carbonated and caffeine-containing drinks). • Have personnel take breaks to cool down in a shaded rest area. • Take frequent rest breaks in shaded areas. • Adjust work-rest schedules as needed to prevent heat strain. • Monitor for heat strain (heart rate, body temperature) as needed.	**M**
	6. Biological Hazards (bites, allergic reactions; infection; disease)	• Avoid poisonous plants, snakes, spiders, insects, rodents, and mosquitoes. • Use insect repellent with DEET as needed. • Wear protective clothing if contact with poisonous plants will occur. • Have poison oak/ivy protective cream and cleanser on hand. • Avoid walking in areas known to be populated with snakes. • Be alert if moving debris as snakes and spiders seek shelter in shaded areas.	**M**
	7. Inclement Weather Conditions (wet and slippery surfaces, electrocution, falling objects)	• Suspend outdoor work if inclement weather conditions such as strong winds, heavy rain, lightning, or other adverse environmental condition exists. • Stop work where strong winds may create excessive dust and the safe operation of equipment is affected. • Stop work if heavy rain creates hazards (limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.). • Stop work for lightning due to the increased hazard of electrocution (heavy equipment operation). • In case of lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. • Do not resume work until an all-clear signal has been issued by the SSHO.	**L**
Backfill and Grade Description: Restoration will occur as confirmation of removal action is	1. All Site Activity Hazards	• Use safety procedures under the “All Site Activities” job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**

Job Steps	Hazards	Controls	RAC
received per DU, as possible, to keep access closure to a minimum. Once confirmation sampling indicates cleanup goals have been met, the excavated areas will be backfilled and graded. A demarcation liner will be installed at the base of excavations, to mark the separation of clean backfill from existing native soil. The imported backfill will be free of organics and construction materials.	2. Fire Hazards (fire; burns)	• Allow smoking only in designated areas. • Maintain portable multi-purpose fire extinguishers on site, keep fully charged, inspect monthly, and service annually. • Place fire extinguishers within 75 feet of active work areas where flammable, combustible, or oxidizing materials are present. • Install a fire extinguisher on all heavy equipment. • Do not allow smoking and other sources of ignition within 50 feet of where flammable or combustible materials are stored or handled. • Provide fire lanes for access to areas where flammable or combustible materials are stored. • Use metal fire safety cans, red with a yellow stripe that have self-closing lids and flame arrestors to store small quantities of flammable liquids. • Have a spill kit with absorbent pads available for spill control/response.	**M**
	3. Underground Utilities (electrocution).	• Review utility locate information. • Verify dig permit is in place before any ground disturbance. • Review base utility map. Marked locations of utilities will be approximate. • Use a utility locator to mark-out underground utilities if needed. • Review and inspect utility mark-outs before subsurface disturbance. • Protect utility mark-outs from damage, deterioration, or covering up with soil. • If utilities are indicated in the area to be disturbed; hand dig two feet on either side of a marked utility to locate it. • Protect gas, sanitary sewer, storm drain, water and other pipelines, flumes and ditches of metal, wood or concrete, underground electrical conduits and telephone cable, and all walks, curbs, and other improvements if encountered and support, maintain and protect from injury or interruption of service until installation is complete. • Contact the NTR and RPM immediately if damage to underground utilities.	**M**
	4. Overhead Power Lines (electrocution)	• Check for overhead utilities before bringing equipment with high extensions (heavy equipment, dump trucks, roll-off bin truck) into a work area. • Do not operate equipment within 10-feet of overhead lines. • Determine/comply with the required distance from energized overhead electric lines per EM 385-1-1 Section 11 and Table 11-1. • De-energize lines and/or use engineering controls for protection as needed.	**M**

Job Steps	Hazards	Controls	RAC
	5. Heavy Equipment – Equipment Operation (struck by equipment hazard; noise exposure)	• Inspect heavy equipment before use. • Have heavy equipment operators complete and submit a Heavy Equipment Inspection Report form daily. • Ensure that manufacturer-installed safety equipment (i.e., lights, guards, brakes, horn, etc.) is functional at all times. • Check for properly functioning backup alarm. • Do not get on or off any equipment while it is in motion. • Maintain three points-of-contact when getting on or off equipment. • Use safety belts when heavy equipment is in use. • Use spotters for backing into tight work areas. • Set the parking brake and bucket on the ground when parking equipment. • Heavy equipment operators must notify the SSHO if they are using a prescribed medication that could impair their judgment and/or vision.	**M**
	6. Heavy Equipment – Ground Personnel (struck by, caught in between; crush; noise exposure)	• Ground personnel must wear ANSI Class II high-visibility safety vests. • Maintain positive contact between operator and ground personnel. • Use hand signals for communication. • Do not cross the path of moving equipment. • Do not walk directly behind or to the side of heavy equipment. • Operators must look behind before backing. • Operators must continuously be aware of personnel/equipment in the area. • Equipment operators must check the area before swinging a load. • Keep out of the heavy equipment swing radius/operating area when possible. • Before entering the swing radius of operated heavy equipment, ground personnel must gain unobstructed eye contact with the equipment operator. Positive contact with the equipment operator must be maintained at all times while working in this area. As a courtesy, ground personnel should “signal” the equipment operator when they are exiting the area. • Do not stand below or walk underneath a suspended load.	**M**
	7. Fuel Spills (spill; fire; exposure)	• Immediately report all spills touching the ground to the SSHO. • Place poly sheeting on the ground beneath repair locations when repairing hoses or other parts that may result in the loss or release of fluids, oils, or grease to prevent the ground from becoming contaminated from spills. • Have a spill kit with absorbent pads available for spill control/response. • Fueling personnel shall: Use a spill pan during all fueling operations; Place the refueling nozzle inside a bucket to transfer nozzle from the fueling truck to the equipment; Use a grounding cable when refueling flammable liquids; have a fire extinguisher readily available during refueling operations; maintain positive control of the fuel nozzle while refueling operations are in progress; Prevent overfilling of fuel tanks (e.g., automatic shut-off, constant observation). • Immediately contain spills as long as it doesn’t endanger personnel.	**M**

ACTIVITY HAZARD ANALYSIS

Job Steps	Hazards	Controls	RAC
Site Restoration Description: Place topsoil and seed in disturbed grass areas and restore to match existing site conditions.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Fire Hazards	• Follow Fire Hazards safety procedures reviewed above.	**M**
	3. Overhead Power Lines	• Follow Overhead Power Line safety procedures reviewed above.	**M**
	4. Heavy Equipment – Equipment Operation	• Follow Heavy Equipment-Equipment Operation safety procedures reviewed above.	**M**
	5. Heavy Equipment – Ground Personnel	• Follow Heavy Equipment-Ground Personnel safety procedures reviewed above.	**M**
	6. Fuel Spills	• Follow Fuel Spill safety procedures reviewed above.	**M**
Perform Site Cleanup Description: Clean up debris. Place debris in waste bin. Remove safety fence where it is no longer needed. Remove signs. Demobilize supplies.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Hand Tool Use	• Follow hand tool use safety procedures reviewed above.	**M**
Decontaminate Equipment Description: Use dry decontamination methods to clean off heavy equipment and other equipment.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Site Contaminants (contaminant exposure)	• PCB concentrations have been detected at a maximum of 220 mg/kg in surface soil and a maximum of 1,800 mg/kg in subsurface soil. • Review MSDS/SDS information for site contaminants. • Apply water spray to control dust generation. • Wear PPE as defined in the SSHP and as directed by the SSHO. • Follow personnel decontamination measures when exiting exclusion zone. • Perform equipment decontamination before it exits the exclusion zone. • Place used PPE in a separate container that is properly labeled.	**L**
	3. Hand Tool Use	• Follow hand tool use safety procedures reviewed above.	**M**
Demobilize Personnel and Equipment Description: Demobilize equipment and temporary facilities from the site. Demobilize personnel from the site.	1. All Site Activity Hazards	• Use safety procedures under the "All Site Activities" job step for personal protection; slip, trip and fall; safe lifting and material handling; noise exposure; heat stress; biological hazards, and inclement weather conditions.	**M**
	2. Moving Supplies (cut, scrape, back strain)	• Watch for sharp edges or points on objects to be handled. Tape up or cushion as needed. Use work gloves. • Use safe lifting and material handling techniques.	**M**

ACTIVITY HAZARD ANALYSIS

Equipment to be Used	Training Requirements	Inspection Requirements
Heavy equipment; Hand tools (shovels, hammer, screwdriver); Fire extinguisher; Spill kit; Safety tote; PPE.	Site safety orientation briefing and SSHP/AHA review (site personnel); HAZWOPER training (site personnel); First-aid/CPR training (minimum 2 persons on site); Bloodborne pathogen training (first-aid responders); Hazard communication/MSDS/SDS training(site personnel); Daily safety meeting (site personnel); Heavy equipment training (operator).	Site safety inspection (daily); Fire extinguisher inspection (monthly); First-aid kit inspection (weekly); Eyewash inspection (monthly); Tool inspection (daily); PPE inspection (daily); Heavy equipment inspection (daily).

ACTIVITY HAZARD ANALYSIS

ACTIVITY HAZARD ANALYSIS: AHA-06: Site Restoration and Demobilization					
AHA Discussed with Crew at Preparatory Meeting Held On:					
1.	Print: Sign:	11.	Print: Sign:	21.	Print: Sign:
2.	Print: Sign:	12.	Print: Sign:	22.	Print: Sign:
3.	Print: Sign:	13.	Print: Sign:	23.	Print: Sign:
4.	Print: Sign:	14.	Print: Sign:	24	Print: Sign:
5.	Print: Sign:	15.	Print: Sign:	25.	Print: Sign:
6.	Print: Sign:	16.	Print: Sign:	26.	Print: Sign:
7.	Print: Sign:	17.	Print: Sign:	27.	Print: Sign:
8.	Print: Sign:	18.	Print: Sign:	28.	Print: Sign:
9.	Print: Sign:	19.	Print: Sign:	29.	Print: Sign:
10.	Print: Sign:	20.	Print: Sign:	30.	Print: Sign:

AHA Review Conducted By:

Print Name:

Signature:

Appendix E
Response to Comments

REVIEW COMMENTS	CONTRACT NO. N62742-10-D-1804, CTO 025
Draft SAP	Document Date: November April 2015
Removal Action at Salvage Yard MCB Hawaii	Review Date: 27 May 2015
Kaneohe, Oahu, Hawaii	Reviewer: Eric Sadoyama

No.	Page	Section	Comment	Action
1.	-	6 and Appendix C (SAP)	In our 1/28/2015 comments on the Draft Removal Site Evaluation Report (October 2014) for this site, we offered detailed comments on the sampling errors in assessing PCB contamination sites that can result from over-reliance on discrete soil sampling and the consequent underestimation of contaminant spatial variability. It appears that our previous comments on this topic remain just as applicable to the Sampling and Analysis Plan in Appendix C of this Draft Work Plan. All decisions and conclusions to be made in the Draft Work Plan, including determination that the action has been successfully completed, rely only on data collected using discrete soil sampling methods. We reiterate our previous concerns regarding the high variability that can be expected of discrete soil sampling data at PCB contamination sites.	Concerns regarding the spatial variability of contamination concentrations are noted. While removal actions based on discrete sampling data may not be completely representative of the spatial heterogeneity of contaminants at the site, discrete sampling was performed at a regular interval and was used to identify areas with elevated PCB concentrations. Interim removal actions will focus on these areas, removing the soil with the highest concentrations of PCBs to immediately reduce exposure to PCB contaminated soils.
2.	-	-	The Removal Site Evaluation for the site recommended that a full remedial investigation and feasibility study (RI/FS) be conducted for the site. Your 4/27/2015 transmittal letter for the Draft Work Plan (5090 Ser EV3/0498) states that the actions proposed in the Draft Work Plan are intended as an interim removal action. We concur with the intent of the Draft Work Plan's proposed actions, i.e., to reduce exposure by removal of soils contaminated with high levels of PCBs. We do not concur with the Draft Work Plan's reliance on discrete soil sampling methods to direct and to assess the effectiveness of this action, as we do not have sufficient confidence in the reliability of PCB contaminant data collected using these methods. However, in light of your stated intent to follow this interim removal action with a full RI/FS, we do not object to implementation of this interim removal action providing that the data used for confirmation sampling in the subsequent RI/FS is of acceptable quality.	As stated in the reviewers comment, this removal action is an interim solution, to be followed up with a RI/FS. If data collected during this interim removal action is not sufficient to complete a RI/FS, additional field sampling and sampling methods may be employed during the RI/FS to characterize the contamination present following the initial removal. The goal of the interim removal action is to remove the highest PCB contaminated soil at the site, and do so in an aggressive manner by excavating to re-surveyed discrete investigation sampling locations or pre-excavation delineation sampling locations with PCB concentrations below the project action level. Post excavation confirmation samples will be collected as needed to meet the confirmation sampling coverage requirements. All pre-excavation delineation and post excavation confirmation samples will be validated and a quality assurance report completed of the data to ensure it is of acceptable quality to be used in the subsequent RI/FS.

No.	Page	Section	Comment	Action
3.	10-5	10.6	We note that the Hawaii State Emergency Response Commission has not used the address given ("5 Waterfront Plaza, Suite 250C, 500 Ala Moana Blvd, Honolulu HI 96813") since HDOH moved its environmental programs from that address in 1994. Correspondence with HSERC should use the HDOH HEER Office's current mailing address. Please correct this error.	The error will be corrected. The address will be changed to the Hawaii DOH HEER Office's current mailing address; 919 Ala Moana Boulevard, Room 206 Honolulu, Hawai'i 96814