Work Plan and Sampling and Analysis Plan

Removal Site Evaluation
Golf Course Maintenance Shop
Former Naval Air Station Barbers Point, Kalaeloa, Hawaii

April 2009

Department of the Navy
NAVFAC Hawaii
Pearl Harbor, HI 96860-3139

Contract Number N62742-06-D-1891, CTO HC07

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Removal Site Evaluation Golf Course Maintenance Shop Former Naval Air Station Barbers Point, Kalaeloa, Hawaii

April 2009

Prepared for:

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

Prepared by:

Environmental Science International
56 Oneawa Street, Suite 103
Kailua, HI 96734

Prepared under:

Contract Number N62742-06-D-1891, CTO HC07

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SAP Worksheet #1 – Title and Approval Page

WORK PLAN AND SAMPLING AND ANALYSIS PLAN
(Field Sampling Plan and Quality Assurance Project Plan)
09 April 2009

Removal Site Evaluation
Golf Course Maintenance Shop
Former Naval Air Station Barbers Point, Kalaeloa, Hawaii

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

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Prepared under:
Contract Number: N62742-06-D-1891
Contract Task Order: HC07

Investigative Organization's Project Manager:

Scott E. Simmons, CHMM, April 2009
Environmental Science International, Inc

Investigative Organization's QA Manager:

Iris van der Zander, PhD., April 2009
Environmental Science International, Inc

Lead Organization's Project Manager:

Jan Kotoshirodo, April 2009
Remedial Project Manager
NAVFAC Hawaii

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EXECUTIVE SUMMARY

This Project-Specific Work Plan (WP) and Sampling and Analysis Plan (SAP) has been developed to describe the work which will be completed to perform the Removal Site Evaluation (RSE) activities for the Golf Course Maintenance Shop of the former Naval Air Station Barbers Point (NASBP), Kalaeloa, Hawaii, hereafter referred to as the "site." Environmental Science International, Inc. (ESI) has prepared these documents for the Naval Facilities Engineering Command, Hawaii (NAVFAC Hawaii) under Contract Task Order (CTO) HC07 of NAVFAC Hawaii, Contract Number N62742-06-D-1891.

The primary objective of this project is to conduct the RSE under the Navy's Installation Restoration Program (IRP) by identifying the nature, and delineating the extent of impacts from historical activities at the site. Previous Site Investigation (SI) soil lead and arsenic data indicate a possible release at the site, but are insufficient to define the nature and extent of the suspect release. Additional data on soil lead and arsenic concentrations are needed to enable decisions regarding the suspect release at the site. A removal action may be required to eliminate risk to human health if impacts are isolated and can be delimited by this RSE.

Soil chemical data for total lead and arsenic of sufficient quality are required to meet project objectives and to enable decision making for the site. The task of the RSE is the delineation of site lead and arsenic concentrations to project screening criteria.

The lateral boundary of the RSE area of interest is a roughly 30 by 40 foot area of the exterior grounds of the Golf Course Maintenance Shop east of Building 1089; and a vertical boundary depth of approximately 2 feet below ground surface (bgs).

For a *No Further Action* (NFA) determination of the suspect release at the site, the *null hypothesis* (H_0) must be conclusively supported. The *null hypothesis* states that the mean contaminant concentration in soil samples from the area of interest is less than or equal to the 95th percentile background concentration for the contaminants of concern. Alternatively, if evidence of a release, exists a NFA determination may be reached by removing discretionary hot spots or by 'pot-holing' individual exceedances. In this case individual sample results are screened against Tier 1 risk criteria or State of Hawaii Department of Health (DOH) Environmental Action Levels (EALs).

To meet the primary project objective, the following general activities will be performed.

- **Project Planning** – Prepare a draft and final RSE WP/SAP; prepare a site-specific Health and Safety Plan (HASP); attend pre-work meetings; communicate with stakeholders, and coordinate fieldwork efforts.
- **Removal Site Evaluation** – Collect samples of surface and subsurface soils for laboratory analysis.
- **Investigation Derived Waste Sampling, Profiling, and Disposal** – Collect samples of Investigation Derived Waste (IDW) generated during the field investigation and transport samples to the laboratory for analysis. Upon receipt of analytical results, coordinate disposal with NAVFAC Hawaii.
- **Reporting** – Prepare an RSE report which documents the results of the field activities and the screening for human health risk; and provides recommendations for the removal action as appropriate.

The sampling program consists of the following: One surface composite sample and eight near-surface, discrete samples will be collected from depths ranging between 0.5 to 2 feet bgs. The samples will be collected using either a hand auger, drive sampler, or a direct-push (DP) drilling rig.

Soil samples will be collected and analyzed in accordance with the 2007 Navy Environmental Restoration Program (ERP) *Project Procedures Manual* and this WP/SAP.

Sample Analyses: Soil samples will be analyzed for total lead and arsenic. Samples will be analyzed by a Naval Facilities Engineering Service Center-certified laboratory using Environmental Protection Agency (EPA) SW-846 Method 6020.

All project analytical data will be validated by a third-party validation firm. Both laboratory sample data and QC data will be reported in the printed and Electronic Data Deliverable (EDD) Full Validation Quality Control (QC) deliverables.

Only non-rejected data will be used to make decisions. Validated data with detected concentrations exceeding screening levels will result in further evaluation for the specific analyte in that specific location, or a recommendation for removal action and confirmatory sampling. The primary screening levels for the project include Hawaii DOH EALs. The U.S. EPA Regional Screening levels for industrial land uses and regional background levels established by the Department of the Navy (DoN) may be used as secondary screening criteria (DoN 2000b).

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Attachment	Description
1	Laboratory SOPs (CAS Kelso)
2	Response to Comments

Acronyms

AST	Aboveground Storage Tank
°C	Degrees Celsius
°F	Degrees Fahrenheit
BERA	Baseline Ecological Risk Assessment
Bgs	below ground surface
BRAC	Base Realignment and Closure Act
CA	Corrective Action
CAS	Columbia Analytical Services
CCB	Continuing Calibration Blank
CCV	Continuing Calibration Verification
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHMM	Certified Hazardous Materials Manager
COC	Chain of Custody
COPC	Chemicals of Potential Concern
CTO	Contract Task Order
DLNR	Department of Land and Natural Resources
DOD	Department of Defense
DOH	Department of Health
DoN	Department of the Navy
DP	Direct Push
DQI	Data Quality Indicator
DQO	Data Quality Objective
DRO	diesel range organics
EAL	Environmental Action Level
EBS	Environmental Baseline Survey
EDD	Electronic Data Deliverable
EPA	Environmental Protection Agency
ERP	Environmental Restoration Program
ESI	Environmental Science International, Inc.
FTL	Field Team Leader
GRO	gasoline range organics
GCMS	Golf Course Maintenance Shop or gas chromatography mass spectroscopy
HASP	Health and Safety Plan
HEER	Hazard Evaluation and Emergency Response
HQ	Hazard Quotient
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma
ICP-AES	Inductively Coupled Plasma Atomic Emission Spectrometer
ICV	Initial Calibration Verification
IDW	Investigation-derived waste
IR CDQM	Installation Restoration Chemical Data Quality Manual
IRP	Installation Restoration Program
LCS	Laboratory Control Sample
LRO	Lubricant oil range organics
MCAS	Marine Corps Air Station
mg/kg	milligrams per kilogram
ml	milliliters
MRL	Method Reporting Limit
Msl	mean sea level

Acronyms (continued)

MDLs	Method Detection Limit
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MWR	Morale, Welfare, Recreation
NASBP	Naval Air Station Barbers Point
NAVFAC	Naval Facilities Engineering Command
NEESA	Naval Energy and Environmental Support Activity
NERP	Navy Environmental Restoration Program
NFA	No Further Action
NFESC	Naval Facilities Engineering Service Center
NELAP	National Environmental Laboratory Accreditation Program
NTR	Navy Technical Representative
PAL	Project Action Limit
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability
PCBs	Polychlorinated Biphenyls
PG	Professional Geologist
PHNC	Pearl Harbor Naval Complex
PM	Project Manager
POI	Point of Interest
PPE	personal protective equipment
PQOs	Project Quality Objectives
PRG	Preliminary Remediation Goal
PT	Proficiency Testing (previously known as performance evaluation (PE) sample)
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QL	Quantitation Limit
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
RPM	Remedial Project Manager
RSE	Removal Site Evaluation
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SCR	Sample Condition upon Receipt
SDG	Sample Delivery Group
SI	Site Inspection
SOP	Standard Operating Procedure
SSEBS	Site-specific Environmental Baseline Survey
SSHO	site safety and health officer
SVOC	Semi-volatile Organic Compounds
TPH	total petroleum hydrocarbons
UCL	Upper Confidence Limit
UFP	Uniform Federal Policy
UIC	Underground Injection Control
USDA	United States Department of Agriculture
USGS	United States Geologic Survey
VOCs	Volatile Organic Compounds
WP	Work Plan

SAP Worksheet #2 – SAP Identifying Information

Site Name/Number: **Golf Course Maintenance Shop, Former Naval Air Station Barbers Point, Kalaeloa, Hawaii**
Operable Unit: **Not Applicable**
Contractor Name: **Environmental Science International, Inc.**
Contract Number: **N62742-06-D-1891**
Contract Title: **Environmental Technical Services for Environmental Sites at Navy Installations and Facilities Located on Oahu, Hawaii and NAVFAC Area of Operation**
Work Assignment Number (optional): **Contract Task Order (CTO) HC07**

1. This SAP was prepared in accordance with the requirements of the *Uniform Federal Policy for Quality Assurance Plans (UFP-QAPP)* (EPA 2005a) and *EPA Guidance for Quality Assurance Project Plans, EPA QA/G-5, QAMS* (EPA 2002a). Other policy and guidance information used to develop the work plan include: *Project Procedures Manual*, U.S. Navy Environmental Restoration Program (ERP), NAVFAC Pacific (DoN 2007b); *Navy ERP* (NERP) *Manual* (DoN 2006); *Quality Assurance Program Plan Pearl Harbor Naval Complex* (DoN 2000a); and Department of Defense (DoD) *Quality Systems Manual for Environmental Laboratories, Version 3* (DoD 2006).

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

3. This is a project-specific SAP.

4. List dates of scoping sessions that were held:

Scoping Session	Date
Preliminary scoping session held with NAVFAC RPM, State of Hawaii Department of Health (DOH), and Environmental Science International, Inc. (ESI) personnel.	15 May 2008

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

Title	Date
Work Plan, Sampling and Analysis Plan, Quality Assurance Project Plan, and Health and Safety Plan, Site Investigation, Housing and Golf Course Areas, Former NAS Barbers Point, Oahu, Hawaii (Earth Tech 2000)	May 2000
Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, Oahu Hawai'i: NAVFAC Pacific. (Earth Tech 2006)	June 2006

6. List organizational partners (stakeholders) and connection with lead organization:
   - State of Hawaii DOH, Hazard Evaluation and Emergency Response (HEER) Office.
   - United States Department of the Navy (Navy); and Navy Morale, Welfare, and Recreation (MWR) organization.

7. Lead organization: United States Department of the Navy
8. If any required SAP elements or required information are not applicable to the project or are provided elsewhere, then note the omitted SAP elements and provide an explanation for their exclusion below: Worksheet 22. Field Equipment Calibration, Maintenance, Testing, and Inspection Table has been omitted as no field equipment other than hand tools is required for the project.

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

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

SOP Standard Operating Procedure
QA Quality Assurance

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SAP Worksheet #3 – Distribution List

Name of SAP Recipients	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address
Dr. Keith Kawaoka	Program Manager, Hazard Evaluation and Emergency Response Office/Regulator	State of Hawaii, Department of Health	808-586-4249	Hazard Evaluation and Emergency Response Office
Ms. Kris Saboda	QA Manager	Naval Facilities Engineering Command, Pacific	472-1409	Kristine.saboda@navy.mil
Ms. Jan Kotoshirodo	Remedial Project Manager / Navy Technical Representative (RPM/NTR)	Naval Facilities Engineering Command, Hawaii	808-471-1171, ext. 341	Jan.kotoshirodo@navy.mil
Mr. Terence Tengan	Navy Region Hawaii Storefront.	Naval Facilities Engineering Command, Hawaii	471-1111 x320	terence.tengan@navy.mil
Mr. Jeff Newman		U.S. Department of the Interior, Fish and Wildlife Service, Pacific Islands Office		300 Ala Moana Blvd. Suite 3-122, Honolulu, HI 96850
Ms. Laurie Sullivan		National Oceanic and Atmospheric Administration, Office of Response and Restoration		USEPA SFB-8, 75 Hawthorne St., San Francisco CA, 94105
Ms. Dawn Kawano	Librarian	University of Hawaii, Manoa Library		2550 McCarthy Mall, Honolulu, HI 96822
Mr. Jerry Goff	Librarian	Ewa Beach Public and School Library,		91-950 North Road, Ewa Beach, HI 96706
Ms. Iris van der Zander	QA /QC Manager/Document preparation	Environmental Science International, Inc.	808-261-0740	56 Oneawa Street, Suite 103, Kailua, Hawaii 96734

Name of SAP Recipients	Title/Role	Organization	Telephone Number (Optional)	E-mail Address or Mailing Address
Mr. Scott Simmons	Operations Manager/Document preparation	Environmental Science International, Inc.	808-261-0740	56 Oneawa Street, Suite 103, Kailua, Hawaii 96734
Ms. Sara Thomas	Health & Safety Coordinator/ Document preparation	Environmental Science International, Inc.	808-261-0740	56 Oneawa Street, Suite 103, Kailua, Hawaii 96734
Mr. Howard West	Senior Technical Advisor/Draft document preparation	Environmental Science International, Inc.	808-261-0740	56 Oneawa Street, Suite 103, Kailua, Hawaii 96734
Ms. Traci Sylva	Archivist	Environmental Science International, Inc.	808-261-0740	56 Oneawa Street, Suite 103, Kailua, Hawaii 96734
Mr. Pradeep Divvela	Laboratory Project Manager	Columbia Analytical Services, Kelso	360-577-7222 x3281	1317 S. 13th Ave Kelso, WA 98626
Ms. Stella Cuenco	Chemist/Data Validator	LDC	760- 634-0437	scuenco@lab-data.com

RPM = Remedial Project Manager NTR = Navy Technical Representative
QA = Quality Assurance QC = Quality Control

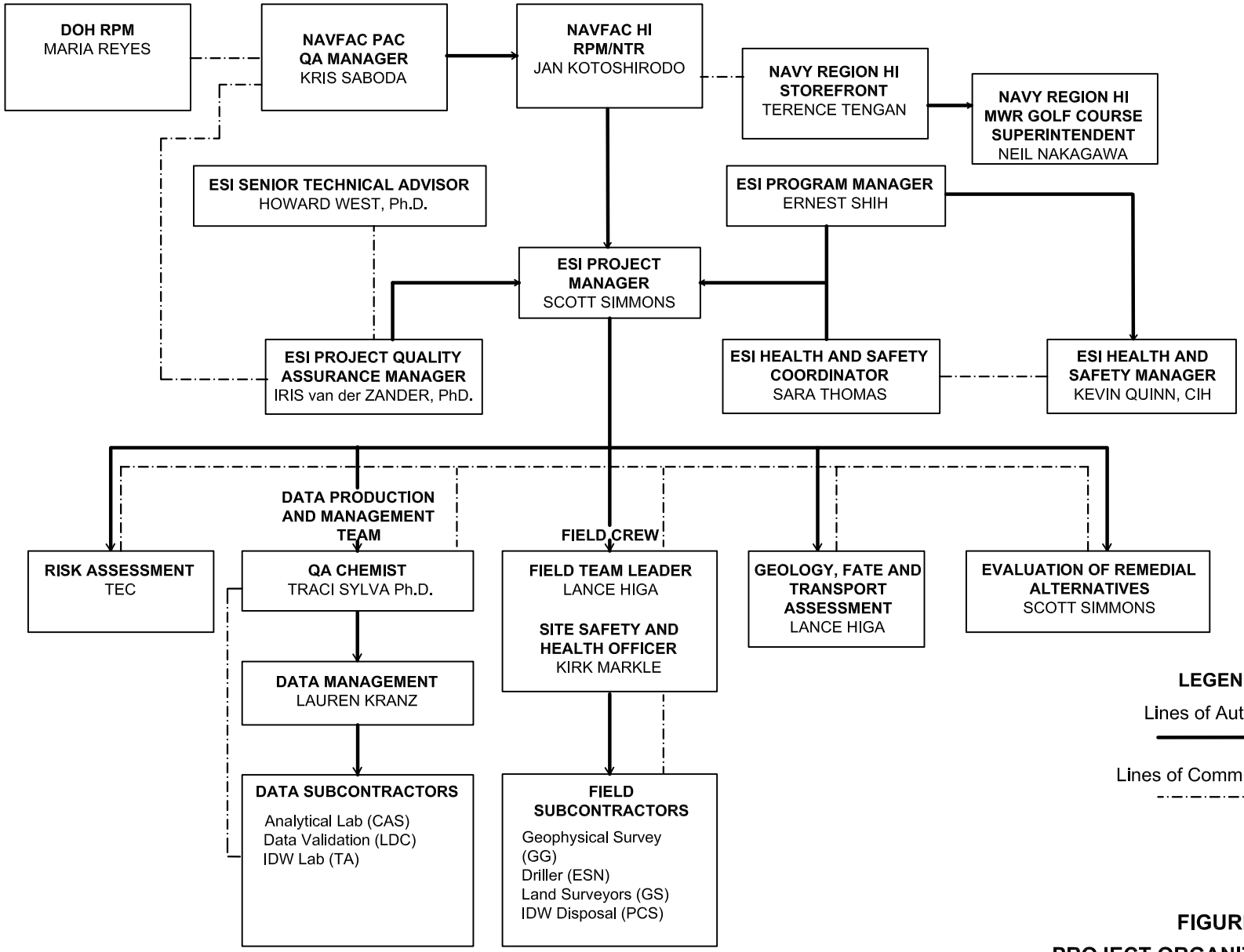
SAP Worksheet #4 – Project Personnel Sign-Off Sheet

Applicable reviews and tests will be conducted in accordance with a written, approved procedure, consistent with recognized standards and regulations. Documentation of reviews will be maintained in the project files, and will include the following log and other documentation, as appropriate.

Name	Organization/Title/Role	Telephone Number (optional)	Signature/email receipt	SAP Section Reviewed	Date SAP Reviewed
Kris Saboda	NAVFAC Pacific / QA Manager	472-1409			
Jan Kotoshirodo	NAVFAC Hawaii / RPM/NTR	471-1171 x 341			
Scott Simmons[1]	ESI / Project Manager	261-0740 x 133			
Iris van der Zander[1]	ESI / QA/QC Manager	261-0740 x 134			
Howard West[1]	ESI / Senior Technical Advisor	261-0740 x 112			
Sara Thomas[1]	ESI / Health & Safety Coordinator	261-0740 x 137			
Traci Sylva[1]	ESI / QA Chemist	261-0740 x 122			
Stella Cuenco	LDC / Third Party Validator	(760) 634-0437			
Pradeep Divvela	Analytical Lab Representative	(360) 577-7222 x3281			

[1] ESI Project Team member.

RPM = Remedial Project Manager NTR = Navy Technical Representative
QA = Quality Assurance QC = Quality Control



CAS = Columbia nalaytical Services; GG = Global Geophysics; GS = Gils Surveying;
LDC= Laboratory Data Consultants; PCS = Pacific Commercial Services; TA = TestAmerica

FIGURE 1

PROJECT ORGANIZATION CHART

REMOVAL SITE EVALUATION - WP/SAP
GOLF COURSE MAINT. SHOP
FORMER NASBP, KALEALOA, HAWAII

SAP Worksheet #6 – Communication Pathways

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
Notice to Proceed with field work	NAVFAC HI	Jan Kotoshirodo	(808) 471-1171 x 341	E-mail or verbal from Navy RPM to ESI PM, within 15 days from approval of Final WP and SAP
Stop work due to safety issues	ESI Site Safety Officer	Kirk Markle	(808) 261-0740 x 118 Cell 228-2964 kmarkle@esciencei.com	Verbal communication from ESI field personnel to Navy RPM as soon as possible
Manage project phases	ESI Project Manager	Scott Simmons	(808) 261-0740 x 133 ssimmons@esciencei.com	ESI's liaison to the NAVFAC Hawaii RPM. Shall have the authority for stopping work, and shall notify the Team Leader directly if stopping work is necessary. Will serve as the point of contact for ESI.
Change in site conditions requiring change in work to be performed	ESI / NAVFAC HI	Scott Simmons	(808) 261-0740 x 133 ssimmons@esciencei.com	Email or verbal from ESI PM to Navy PM as soon as possible
Work Plan Changes in the Field	ESI Field Team leader	Scott Simmons / Lance Higa	(808) 261-0740 x 133 ssimmons@esciencei.com (808) 261-0740 x 132 lhiga@esciencei.com	Will carryout project tasks in the field. Responsible for notifying the PM of any change to the Work Plan made in the field. Will serve as the field operations point of contact.
Reporting Lab Data Quality/Usability Issues, Conduct an Assessment/Evaluation of the Validated Data	ESI QA Chemist	Traci Sylva	(808) 261-0740 x 122 / tsylva@esciencei.com	Procure reports and coordinate with the analytical laboratory. Communicate and ensure adherence to the analytical plan; respond to data failures. Coordinate with data validators. Review and summarize data validation reports.

Communication Drivers	Responsible Affiliation	Name	Phone Number and/or e-mail	Procedure
WP/SAP Amendments	NAVFAC HI	Jan Kotoshirodo	808-471-1171 x 341	The RPM/NTR will send all amendments to DOH.

SAP Worksheet #7 – Personnel Responsibilities and Qualifications Table

Name	Title/Role	Organizational Affiliation	Responsibilities
Ms. Jan Kotoshirodo	RPM/NTR	NAVFAC Hawaii	Oversees project and responds to State of Hawaii DOH.
Mr. Terence Tengan	Navy Region HI Storefront	NAVFAC Hawaii	Provides environmental oversight for Navy Region Hawaii; Coordinates project requirements with on the site activity (golf course).
Mr. Neil Nakagawa	Golf Course Superintendent	Navy Region Hawaii MWR	Manages onsite activity (golf course maintenance shop). Point of contact for scheduling field work and access to the site.
Mr. Ernest Shih, PG	Program Manager	ESI	The Program Manager has overall management of the project contract. His duties include ensuring compliance with contract terms and conditions; review of CTO project documents to ensure product consistency; assigning personnel consistent with contract requirements; understanding and ensuring compliance with CERCLA, RCRA, NPDES, and SDWA regulations, their state counterparts, and other applicable or relevant and appropriate requirements. He has the authority to act on behalf of the Project Quality Control Officer on site-related issues affecting the quality of the work performed.
Ms. Iris van der Zander, PhD	Project Quality Control Officer	ESI	Implement and maintain the QC program; monitor QC activities to ensure conformance with authorized policies, procedures, and sound practices; conduct meetings with site personnel covering the QC procedures and requirements, as appropriate; identify and resolve non-conformances in accordance with the requirements of applicable procedures and policies; monitor corrective action documentation for conditions adverse to quality; track and verify implementation of corrective actions; provide closeout documentation upon completion of corrective action; ensure that records, logs, permits, regulatory-required documentation, manufacturers' instructions, warrantees, standard procedures, and project plans are maintained and stored in a retrievable manner and that controlled copies of standard procedures and project plans are available to appropriate personnel.
Mr. Scott Simmons, CHMM	Project Manager / Field Team Leader	ESI	The Project Manager (PM) is responsible for the management of all aspects of the project for ESI. The PM will provide management of, and direction to, the project personnel assigned to the project. The PM is

			also responsible for coordination with the Navy RPM, as applicable. The PM may serve as the Field Team Lead (described below)
Ms. Traci Sylva, PhD	Project QA Chemist	ESI	The Project QA Chemist or her designated staff are responsible for reviewing laboratory results to ensure that the data meet the data quality indicators set for the project. Upon receipt of each laboratory's deliverables, the chemist, or designated alternate, will perform a check to verify that that contract deliverables have been delivered; will perform a review of sample custody, receipt conditions, and holding times; and will perform a review of sample results (including reporting limits and results for field duplicates). The chemist or designated alternate will also review validation reports provided by the third party validator that will be performing a review of laboratory and field QC data.
Mr. Lance Higa	Field Team Leader (alternate)	ESI	The Field Team Leader (FTL) reports to the PM and will be responsible for the management of ESI site activities and personnel. The FTL is responsible for the following: supervising the site personnel, coordinating with office personnel, subcontractors, and vendors, ensuring completion of the project in accordance with the contract documents, applicable codes and standards, ensuring compliance with environmental, health, and safety requirements, including corporate, OSHA, and any client-specific requirements, and ensuring compliance with ESI corporate policies, programs, and procedures applicable to the project.
Mr. Kirk Markle	Site Safety and Health Officer (SSHO)	ESI	The SSHO has responsibility and authority to implement the HASP and to verify compliance. The SSHO has the authority to halt site work if unsafe conditions are detected. The specific responsibilities of the SSHO are: managing the safety and health functions on this project site; serving as the project's POC for safety and health matters; ensuring site monitoring, worker training, and effective selection and use of Personal Protective Equipment (PPE); assessing site conditions for unsafe acts and conditions and providing corrective action; maintaining effective safety and health records as described in the Site-Specific Health and safety Plan (HASP); coordinating with the Team Leader(s) and others as necessary for safety and health efforts.
Ms. Kathrin Huelck	Project Scientist	ESI	Project Scientists will be responsible for implementing the SAP, including but not limited to performing and overlooking field sampling activities, recording observations, and documenting field activities.

			Project Scientists will comply with environmental, health, and safety requirements, including corporate, OSHA, and any client-specific requirements and with ESI corporate policies, programs and procedures applicable to the project.
Stella Cuenco	Third Party Data Validation Project Manager	LDC	The third party data validator will validate all data according to SOPs II-A through II-O of the NAVFAC Pacific Environmental Restoration Program *Project Procedures Manual* (DoN 2007b). Qualifiers and qualification codes will be assigned to each data point that is qualified according to the SOPs, and a report that explains why specific qualifiers were applied will be generated. A full list of qualification codes can be found in the ERP manual procedure II-A. The report will be provided in both hardcopy and electronic forms.
Pradeep Divvela	Laboratory Director/ Project Manager	Columbia Analytical Laboratory, Kelso	The analytical laboratory will have current National Environmental Laboratory Accreditation Program (NELAP) accreditation and have been approved by the Naval Facilities Engineering Service Center (NFESC) for the analyses required for this project. The laboratory analyses shall be compliant with the DoD Quality Systems Manual (QSM) for Environmental Laboratories, Final Version 3 (DOD Environmental Data Quality Workgroup) and requirements specified in the analytical methods of the SAP. The laboratory will provide fully documented data packages that include a cover page, case narrative, results for field samples, results for associated quality assurance/quality control data, and raw data for samples analyzed by Method 6020. For the waste characterization samples, a summary data package (Level II data package) containing results for field samples and QA/QC data will be provided. An EDD is also required using a template provided by NAVFAC.
Julie Gish	Laboratory QA Manager	Columbia Analytical Laboratory, Kelso	The QA Manager. The laboratory analyses shall be compliant with the DoD QSM for Environmental Laboratories, Final Version 3 (DOD Environmental Data Quality Workgroup) and requirements specified in the analytical methods of the SAP. The laboratory will provide fully documented data packages that include a cover page, case narrative, results for field samples, results for associated quality assurance/quality control data, raw data for samples analyzed by Method 6020.

RCRA Resource Conservation and Recovery Act
OSHA Occupational Safety and Health Administration
NPDES National Pollution Elimination System
SDWA Safe Drinking Water Act

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
Field data collection	40-hour HAZWOPER; Current 8-hour Refresher; 8-hour HAZWOPER Supervisor Training; Current First Aid/CPR Certification	Occupational Training Inc. or Sara Thomas	Various	ESI employees	ESI, Inc.	ESI Hawaii Office
Analytical Analysis	Successful completion of an assessment under the QA program managed by NFESC	Various	Various	Laboratory employees	Columbia Analytical Laboratory, Kelso	CAS Kelso, Washington Office
Third party data validation	Knowledge of EPA SW-846 method requirements, Navy ERP *Project Procedures Manual* - Section II (DoN 2007b), Data validation Procedures	Various	Various	Validator employees	LDC Inc.	LDC Inc.
Geophysical Survey	Knowledge of specific equipment method requirements, Navy ERP *Project Procedures Manua*l - Section I-A-5 (DoN 2007b).	Various	Various	employees	John Liu, PhD., R.G., Principal Geophysicist Global Geophysics	16651 White Mountain Road SE Monroe, WA 98272
Mobile Drill Rig Operation	Knowledge of Navy ERP *Project Procedures Manual* - Section I-I-B and I-I-C (DoN 2007b)	Various	Various	employees	Karen Carvallo, Manager	ESN Hawaii Offices
IDW treatment and disposal	40-hour HAZWOPER; Current 8-hour Refresher, Commercial Drivers License with Haz Mat Endorsement	Unknown	Unknown			

SAP Worksheet #9 – Project Scoping Session Participants Sheet

Project Name: Removal Site Evaluation (RSE) Golf Course Maintenance Shop (GCMS) Projected Date(s) of Sampling: May 2009 Project Manager: Scott Simmons	Site Name: Golf Course Maintenance Shop Site Location: MWR Golf Course, Former NASBP, Kalaeloa, Hawaii

Date of Session: 15 May 2008
Scoping Session Purpose: Outline site tasks based on results of SI and removal action

Name	Title / Role	Affiliation	Phone #	E-mail Address
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Comments/Decisions:

a. UFP-QAPP Process new to DOH; Sheets 10 and 11 done first (similar to Data Quality Objectives (DQO) process). Begin session to address the UFP-QAPP process to familiarize DOH.

b. Previous total lead result for sample MS-SB-20-01 may be anomalous.

c. Frequency of previous sampling low, judgmental bias.

d. RSE to include 2 decision units – upper surface and sub-surface.

e. MI sampling area 5K sq.-ft. is typical and is derived from the average size residential lot; proposed area for the RSE was 6,200 sq.-ft. and represents an industrial land use exposure scenario.

f. Depth of previous samples was discussed. < 2 feet bgs; Depth to Hard rock varies 1-2 feet bgs.

g. DOH (Steven Mow) Comments on WS 10 & 11:

   * The environmental questions being asked paragraph- Are we certain that contamination is limited to the surface? If not, shouldn't we evaluate the subsurface?

   * SAP Worksheet #11 - Why are we doing both multi-increment and discrete samples? Normally, we choose one or the other.

   * SAP Worksheet #11 - "Good analytical data is defined as data that meets the established criteria in this WP/SAP..." Is it wise to claim that data is "good" based off of a site-specific work plan/SAP's criteria? Wouldn't an established criteria from a broader QAPP be more appropriate?

   * General- The actual work plan better have more specifics than these worksheets are giving. They are painfully thin on specifics, especially Worksheet #11.

h. UFP-QAPP work Plan to reference Pearl Harbor QAPP and NAVFAC Pacific Project Procedures Manual.

i. Navy training on UFP-QAPP Work Plans available to DOH personnel.

Action Items:

a. Proceed with draft Work Plan based on DOH concurrence regarding sampling approach to RSE, isolating and confirming SI result for Pb and As, and possible *hot-spot* removal. Navy would like to proceed with the approach that was agreed upon during the meeting (i.e., re-sample at MS-SB-20-01; and evaluation of loose surface soil for the area surrounding MS-SB-20-01). 'Hot spot' removal will be proposed for the MS-SB-20-01 location if the sample result for lead and/or arsenic is greater than DOH EAL.

b. Forward background documentation and upcoming training on UFP-QAPP Work Plans to DOH.

Consensus Decisions:

Isolate suspect hot-spot at SI sample location MS-SB-20-01 and screen surface material at the same location for human health risk based on DOH screening levels (i.e., EALs), pending confirmation of revised sampling regiment with DOH.

SAP Worksheet #10 – Problem Definition

The problem to be addressed by the project:

The Golf Course Maintenance Shop (GCMS) area of the former NASBP is known to be impacted from historical activities. During the 2001 Site Inspection (SI) investigation, surface soil samples were collected from around the four sides of Building 1927 and analyzed for total petroleum (TPH) as gasoline range organics (GRO), diesel range organics (DRO), and lubricate range organics (LRO), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs) and metals. Results showed elevated concentrations of lead, arsenic, iron, manganese, and TPH as oil-range hydrocarbons were detected at a concentration above the screening criteria. Lead and arsenic concentrations were above the screening criteria in one sample on the west side of Building 1927, just in front of Building 1089 (Refer to Figure 4. *Site Plan*). The detected concentrations of lead and arsenic above their respective screening criteria were the contaminants of concern. However, insufficient data from soil sampling and laboratory analyses were available to make decisions regarding future use of the Site. Further evaluation was recommended to confirm the presence or absence of lead and arsenic in soils of the site, and characterize the lateral and vertical extent of arsenic and lead in the soils adjacent to Building 1089. The aerial distribution and extent of impacts from releases of arsenic and lead at the area of interest is unknown. Further evaluation and representative sampling was recommended to assess the extent of impacts to the area of interest (approximately 30 by 40 feet in area) at the site to allow decisions regarding future use of the site.

The environmental questions being asked:

- Have releases of heavy metals occurred at the site?
- Do concentrations of arsenic and lead in soils of the site area of interest exceed screening levels?
- Do the estimated mean concentrations of arsenic and lead in soils of the site area of interest exceed the 95th percentile regional background concentration?
- What is the magnitude and distribution of impacts from arsenic and lead to soils of the site area of interest?
- What is the lateral/vertical extent of the impacts from releases or contamination in the soil of the site?
- Is removal required and practical as a means to reduce the risks associated with arsenic and lead impacts to soils of the site area of interest?
- Is further remedial action warranted to address impacts to the site area of interest from heavy metals?

Site Description

The site is located within the former NASBP of Kalaeloa, Oahu, Hawaii. Kalaeloa is situated on the southwestern portion of the island of Oahu, about 16 miles west of downtown Honolulu. The former NASBP property is bordered on the north by former agricultural land and the City of Kapolei; on the east by the residential communities of Ewa Beach and Ocean Pointe and the Honouliuli Treatment Plant; on the south by the

Pacific Ocean; and on the west by the Campbell Industrial Park. The site location at the former NASBP Kalaeloa is illustrated on Figure 3.

The NASBP base was closed on 02 July 1999, pursuant to the Base Realignment and Closure (BRAC) Act of 1990 and the DoN BRAC Program. The site was formerly used as part of the NASBP property and is currently included as part of actively used, Navy-retained properties of NASBP.

The majority of the former NASBP was used primarily for industrial or air base purposes. However, military housing and recreational facilities are scattered across the northern-most extent of the NASBP (Figure 3).

The site is located within the golf course and south of Bismark Sea Road and an industrial land use situated within a MWR recreational facility. The surrounding area includes equipment and material storage areas, large, flat and regularly maintained grassy lawns, and densely overgrown areas. The site is bordered by a chain-link fence (Figure 4). The area of interest within the site is shown on Figure 5 and includes the immediate area of the isolated impacts identified at the site in the 2001 SI.

Site History

U.S. military aviation operations began at the NASBP area during the 1930s when the Navy leased a parcel of land from the Estate of James Campbell (DoN 2001). When the lease expired in late 1939 or early 1940, the Navy acquired more than 3,500 acres, and in 1940, when the need for operational airfields in Hawaii became urgent, the emergency landing field was developed as an interim runway until the planned naval air station could be completed (DoN 2002).

Former NASBP and the nearby Marine Corps Air Station (MCAS) Ewa were constructed between 1941 and 1943. MCAS Ewa was absorbed by NASBP in the late 1940s. Since the 1940s, the mission of former NASBP was to maintain and operate facilities that provide services and material to support operations of various Navy units (DoN 2002).

During the Korean War in the early 1950s, former NASBP played a key logistic and support role for forward deploying squadrons. It also served as a home base for United Nations forces and associated cargo and personnel. Following the Korean War, former NASBP was expanded to become the primary support facility for aviation units of the fleet operating force (DoN 2002).

In 1956, the Airborne Early Warning Squadron was transferred to former NASBP, extending the Continental Distant Early Warning line across the Pacific. During the next 20 years, former NASBP became home to the Commander Fleet Air Hawaii and Fleet Air Wing Two; was modernized and expanded; and provided increased support for military activities in Southeast Asia, serving as a major training area for aircraft carrier readiness exercises (DoN 2002).

After the Vietnam War, NASBP became an operational shore command under the Commander, Naval Air Forces Pacific, headquartered in San Diego, California. Until it was closed in 1999, the base was the largest naval air station in the Pacific and home port to several maritime surveillance and antisubmarine warfare aircraft squadrons and the U.S. Coast Guard. The facility employed and serviced approximately 3,145 military members (including all commands and tenants), their dependants, and approximately

514 civilian employees. It also housed a sizable on-base military residential community (DoN 2002).

Following the closure of NASBP at Kalaeloa, the Navy retained about 1,055 acres for community support, storage and industrial uses that included the Site.

According to site personnel, prior to its current use, the site was used as an auto repair facility. According to the 2001 SI, the area of interest at the site was used as a container wash down area and contained some discoloration (DoN 2001).

Site Physical Characteristics

The following are a summary of the physical characteristics of the site, including climate, topography, geology, hydrogeology, vegetation, and wildlife. Additional information is located in documentation for previously completed environmental actions at the Site.

Climate

Kalaeloa experiences northeast trade winds that blow approximately nine months of the year. During the balance of the year, south-southeast winds and mild offshore breezes prevail. Winds up to 40 miles per hour occasionally occur from the north or northwest.

The median rainfall for the region is approximately 20 inches, depending on the incidence of the occasional heavy rains. These heavy rains occur principally from November to April. Temperatures typically range from 72 to 89 degrees Fahrenheit (°F) during the summer and from 60 to 78°F in the winter season.

Site Topography, Elevation, and Surface

Based on U.S. Geological Survey (USGS) topographical map Ewa Quadrangle (USGS 1983); the general ground surface elevation at the NASBP is approximately 20-45 feet above mean sea level. The land surface is predominantly flat with very little discernible relief over the entire NASBP.

The land surface at the Site consists of unpaved, silty sandy gravel and asphaltic concrete-paved surfaces surrounded by regularly mowed and maintained lawn area of the golf course. The immediate Site area consists of weathered asphaltic concrete around Buildings 1927 and 1089. The area of the Site between Buildings 1450 and 1089 is primarily gravel and silty sandy soil.

Geology

Kalaeloa is situated within the Coastal Plain geomorphic province. Regionally, the Honolulu Coastal Plain is composed primarily of fill that is underlain by bedrock consisting of coral-reef limestones and volcanically-derived alluvial sediments (United States Department of Agriculture [USDA] 1972).

The Waianae Volcano makes up the western half of Oahu, and the Koolau Volcano includes the Koolau Range and the Schofield Plateau. Coral reef limestone and alluvial volcanic sediments comprise the northern and southern edges of the Schofield Plateau. Fluctuations in sea level have resulted in alternating layers of marine and terrestrial sedimentary rock types in the coastal plain areas (Naval Energy and Environmental Support Activity [NEESA] 1983).

The geology of Kalaeloa has been identified on the basis of deep borings drilled in the vicinity of the base (NEESA 1983). The rock units fall into three primary categories:

recent-age unconsolidated sediments consisting of beach sand and alluvium; Pleistocene-aged caprock composed of marine sediment, mainly coralline reef limestone; and Tertiary- to early Pleistocene-age volcanic rock formed from basaltic lava flows (DoN 2002).

Kalaeloa generally has little to no significant soil cover. Much of the former NASBP is coral outcrop, the surface expression of the uppermost caprock unit at Kalaeloa. The Mamala soil and sandy beach areas (derived from coral and seashells) cover about 20 percent of the areas of Kalaeloa (DoN 2002). The Mamala series soils, formed in shallow alluvial deposits over the coralline limestone, and are present along the western and northern edges of the former NASBP (USDA 1972). The soil is a dark reddish brown, silty, clay loam, neutral to mildly alkaline, with moderate permeability and slight to moderate erosion potential (USDA 1972).

Boring logs from prior investigations indicate that the subsurface directly beneath the NASBP consists of coralline limestone. The Site is characterized in prior investigations as relatively homogeneous.

The naturally occurring or background levels for lead and arsenic for the site area's Coralline Limestone parent material, based on the Navy's evaluation of natural background levels at various facilities on Oahu, is estimated to range from 0.34 to 11 milligrams per kilogram (mg/kg) for arsenic, and 0.036 to 32 mg/kg for lead (Earth Tech 2006).

Hydrogeology and Groundwater Classification

The shallow groundwater beneath Kalaeloa is perched and occurs within the caprock. The caprock consists of alternating layers of permeable marine sedimentary rock and alluvial deposits that overlie the basal volcanic aquifer. Caprock water is largely separate from the deeper basal groundwater, occurring above and frequently within caprock sediments and extending from the ocean edge to approximately one mile inland (DoN 2002). This type of groundwater is usually interconnected with the ocean and therefore has high concentrations of total dissolved solids. Depth to groundwater within the limestone aquifer ranges from about 52 feet bgs along the northern base boundary to 0 feet bgs (sea level) at the coast.

Kalaeloa is located in the vicinity of the Honouliuli and Ewa Beach watersheds. The Honouliuli watershed consists primarily of agricultural and forested land that drains to the Honouliuli Stream and ultimately discharges to the West Loch of Pearl Harbor; surface water in the Ewa Beach Watershed similarly drains to Pearl Harbor (DoN 2002).

Based on the groundwater index for the State of Hawaii, there are no drinking water supply wells within one mile of the Site (Ogden 1994). The Site lies mauka or inland of the Underground Injection Control (UIC) Line (DOH 1999). However, shallow groundwater of the Site is not suitable as a drinking water source.

DLNR Report on Ewa Plain Caprock Aquifer

The following is an excerpt from the 1996 Department of Land and Natural Resources (DLNR) Commission on Water Resource Management report *Reevaluation of the Ground-Water Resources and Sustainable Yield of the Ewa Caprock Aquifer,* by Glenn R. Bauer:

Background

The ground-water flow system in the Ewa Plain area is composed of a freshwater lens overlying a brackish zone transitioning to a saltwater body. Ground water moves generally toward the ocean through volcanic rocks but is impeded by a wedge of sediments (caprock) that overlie the volcanic rock near the coast. The Ewa Plain caprock is a thick wedge of interbedded marine and terrestrial sediments that were deposited on the flanks of the Koolau and Waianae volcanoes during sea level changes and isostatic subsidence of Oahu during the Pleistocene ice ages. At the coast this sequence is greater than 1,000 feet thick (Stearns and Chamberlain, 1967). Inland, the sediments thin and pinch out against weathered lava flows...

The caprock contains multiple sedimentary layers representing both low and high permeability (Stearns and Vaksvik, 1935). Water from the inland basaltic aquifers is relatively fresh (less than one percent seawater), but as it moves toward the ocean it mixes with seawater forming a brackish transition zone within the upper caprock sediments. Ground water in the upper layers of the caprock flow system are unconfined, but water in the lower caprock layers and in the underlying basalt near the coast is confined or semi-confined by overlying geologic units.

Traditionally, major sources of water to the caprock aquifer in the Ewa area are recharge from irrigation, rainfall infiltrating the land surface, and lateral and upward subsurface flow from the volcanic or basal aquifer. Infiltration from irrigation water is derived from pumped wells within the caprock area, and water pumped from wells outside the area that was imported and distributed for cane cultivation.

Pertinent federal, state, and local regulations and guidance preclude the use of shallow groundwater under the NASBP for drinking purposes. Although the Site lies mauka of the State of Hawaii DOH UIC line, the overall information indicates that shallow groundwater directly beneath the Site does not represent a current or potential future drinking water source under the DOH groundwater classification system and the EPA groundwater protection standard guidelines. Based on this information, the caprock groundwater beneath the NASBP is appropriately categorized as Federal Groundwater Classification Class III.

There are no surface water features on the Site. Storm water runoff from the Site drains to an eight-inch diameter drywell located between Buildings 1089 and 1927 (Figure 4).

Vegetation and Wildlife

The vegetative communities represented at Kalaeloa include kiawe and lowland scrub, coastal strand, coastal salt flat, mangrove *(Rhizophora sp.)* swamp, and marine wetland. One-hundred-seventy plant species have been identified at Kalaeloa. Kiawe and lowland scrub is the vegetative community primarily found in the areas evaluated by the Navy for transfer (DoN 2002).

Kiawe and lowland scrub is a community that occurs in locations that have an annual rainfall of less than 20 inches and an elevation less than 1,000 feet above mean sea level (msl). This community is dominated by nonnative vegetation made up of koa haole

(*Leucaena leucocephala*), kiawe (*Prosopis pallida*), and an understory of various introduced grasses and forbes (DoN 2002). Although the understory is comprised primarily of introduced species, there are native species such as ilima (*Sida fallax*) present (ESI 2008).

The majority of the vegetation in developed areas, including the Site, is nonnative and ornamental, providing little habitat (DoN 2002).

During surveys conducted at Kalaeloa, 23 species of birds were identified (DoN 2002). Five of the bird species identified at former NASBP are considered indigenous, including the aukuu or black-crowned night heron (*Nycticorax nycticorax hoactli*), the iwa or great frigatebird (*Fregata minor palmerstoni*), kolea or Pacific golden-plover (*Pluvialis fulva*), the Hunakai or sanderling (*Calidris alba*), and the akekeke or ruddy turnstone (*Arenaria interpres*). The remaining species of birds identified at Kalaeloa are ubiquitous, introduced species. The species most often reported include the zebra dove (*Geopelia striata*), the Japanese white-eye (*Zosterops japonicus*), the northern cardinal (*Cardinalis cardinalis*), the common myna (*Acridotheres tristis*), the red-crested cardinal (*Paroaria coronata*), and the red-vented bulbul (*Pycnonotus cafer*). The species are found in both natural and manmade habitats at Kalaeloa (DoN 2002).

Additional bird surveys were conducted in 2006 for the Navy-retained lands at Kalaeloa. The sites surveyed included: the golf course and stables, the Nimitz Beach Park and Cottages, White Plains Beach Park and Cottages, and Biosolids Treatment Facility. The most commonly observed species at the golf course and stables during the 2006 survey were red-crested cardinals, zebra doves, and red-vented bulbuls. During a timed species count at Nimitz and White Plains Beach Parks and Cottages, a total of 15 species were recorded. A notable observation from the study was a large flock of jungle fowl (chickens) observed in the area. During a timed species count at the Biosolids Treatment Facility, a total of 16 species were recorded. Birds that were observed while traversing the area were red-vented bulbuls, Japanese white-eyes, northern cardinals, spotted doves, and zebra doves (DoN 2007c). Additional information about each species and other birds identified during the surveys can be located in the Survey of Birds for the Integrated Natural Resources Management Plan for the Oahu Complex. Introduced mammals that occur at Kalaeloa include feral dogs and cats, rodents, and mongooses. Only one fish species, the mosquito fish (*Gambusia* sp.), was reported at Kalaeloa. Mosquito fish were introduced to Ordy Pond and provide food for the black-crowned night heron (DoN 2002).

Sensitive Plants: No federal- or state-listed, threatened or endangered plant species (nor any proposed for the lists) were identified at the time of the site inspection on the property evaluated in 2002 (DoN 2002). Field observations made during the site inspection confirmed that the area has been subject to human activities and disturbances for many years, and native vegetation has been partially replaced by introduced species.

Sensitive Wildlife: Hawaii has the largest number of threatened and endangered species in the United States. The pressures on indigenous flora and fauna are intense. Several of these species are limited in their distribution to wetland and estuarine habitat. No federally endangered, threatened, or candidate species of mammals, reptiles, or amphibians nor federal- or state-listed, threatened or endangered plant species (nor any proposed for the lists) were identified at the time of the site inspection on the property evaluated in 2002 (DoN 2002).

There is a limited potential for the following federally endangered water birds and federally protected migratory birds to come into contact with standing water on the property: aeo or Hawaiian stilt (*Himantopus mexicanus knudseni*), Alaeula or Hawaiian moorhen (*Gallinula chloropus sandvicensis*), alae keokeo or Hawaiian coot (*Fulica alai*), koloa or Hawaiian duck (*Anas wyvilliana*), black-crowned night heron, Pacific golden plover, ulili or wandering tattler (*Heteroscelus incanus*), ruddy turnstone, and sanderling (DoN 2002)

Previous Environmental Actions

Environmental Baseline Study

The 1994 Environmental Baseline Study (EBS) for the former NASBP reported that 47 potentially contaminated sites were identified. The sites were then designated as "Points of Interest," or POIs (Ogden 1994). The subject Site is included within the larger Golf Course, POI 43 area.

Site-Specific Environmental Baseline Study

A site-specific Environmental Baseline Survey (SSEBS) was prepared in 2002 to document the environmental condition of real property on the northern portion of Navy-retained property at the former NASBP, and to update and expand on the findings of the 1994 basewide EBS for NASBP. The base closed on July 2, 1999, under the BRAC program. The SSEBS addressed property at former NASBP that is currently retained by the Navy, but is not managed under the BRAC program. Of the 3,723 acres of property that make up former NASBP, approximately 870 acres originally retained by the Navy after base closure were evaluated in the SSEBS (DoN 2002).

Prepared in accordance with CERCLA, DoD policy on the implementation of the Community Environmental Response Facilitation Act, dated 19 May 1993; DoD Environmental Procedures Applicable to Non-BRAC Real Estate Action, dated January 1994; the NAVFAC Environmental Baseline Survey Guidance, dated March 1995, and the DoD Memorandum for Clarification of "Uncontaminated" Environmental Condition of Property at BRAC Installations, dated October 1996, the SSEBS presented available information related to past and present storage, release, or disposal of hazardous substances and petroleum products on the NASBP. The report identified arsenic, lead, and manganese as POI 43 Chemicals of Potential Concern (COPCs). According to the SSEBS, the GCMS building does not contain LBP.

The SSEBS assigned a Navy Installation Restoration Program (IRP) ranking of Category 5 (release site where response actions have commenced), due to the detection of possible Site COPCs in the surface and subsurface (DoN 2002).

Site Inspection Investigation

A SI investigation conducted in 2000 involved collection of building materials, surface soil, subsurface soil, and groundwater samples. Soil and groundwater samples were analyzed for TPH, VOCs, SVOCs, PCBs and metals. In addition, selected samples from the GCMS were analyzed for pesticides and herbicides (DoN 2001).

The SI investigation report of 2001 (DoN 2001) described sampling activities at the Site that included surface soil and subsurface soil sample collection and laboratory analyses. Analytical results of soil samples were compared to EPA regional screening criteria (Region IX Preliminary Remediation Goals [PRGs]) and State of Hawaii DOH Tier 1 Action Levels, among others, to assess the potential for impacts to Site.

According to the report, arsenic was detected in ten of the 23 surface samples. Results for the ten samples exceeded the residential PRG (0.39 mg/kg). The maximum reported concentration of 55.9 mg/kg was detected in sample MS-SB-20-01/TJ-076. All but one arsenic concentration were within the background range.

Lead was detected in all of the surface soil samples. The maximum concentration of 2,080 mg/kg exceeded the industrial PRG of 750 mg/kg, and was collected between buildings 1089 and 1927 from 2 feet bgs (DoN 2001).

Aside from arsenic and lead, the SI report indicated that MCPP, aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, mercury, nickel, potassium, selenium, sodium, vanadium, zinc, DTT, DDE, 2-butanone, acetone, toluene, 10 SVOCs, PCBs and TPH were detected in surface soils of the GCMS (DoN 2001). However, only iron, manganese and TPH as oil-range hydrocarbons were detected at a concentration above the screening criteria. As stated in the 2001 SI, “The Navy understands that EPA Region IX is not recommending further action for iron detected at levels that exceed the PRG (Earth Tech 1999).”

Groundwater of the well adjacent to the GCMS and constructed in May of 2000 was found to have no detects of COPC above screening levels. Therefore, the SI recommended no further action for groundwater of the site.

Further action was recommended for the Site due to concentrations of COPC that exceeded background soil concentrations and resulted in Hazard Quotient (HQ) greater than 1.

Baseline Ecological Risk Assessment

The NASBP was the subject of a Baseline Ecological Risk Assessment (BERA) performed for seven POI areas, the results of which were documented in a 2005 BERA report (DoN 2005). The BERA includes descriptions of the location, physical setting, and historical usage of the NASBP and an assessment of whether an acceptable level of ecological risk exists at the Site.

The report presented Tier 2 Step 3a of the Navy BERA process which involved refining the conservative exposure assumptions used in the Tier 1 Step 2 and recalculating HQ risk estimates. Other lines of evidence are also considered in the assessment such as detection frequency, spatial distribution, and a comparison of high and low toxicity reference values and their corresponding HQs.

Results of Tier 2 Step 3a were used to support a determination of whether the Site should proceed further in the ecological risk assessment process, or what is referred to as scientific management decision points. A risk management decision was made regarding further action at the Site based on HQs and other lines of evidence stated above.

HQs less than 1 indicate the chemical is unlikely to cause adverse effects to ecological receptors; HQs greater than 1 indicate a potential for ecological risk may exist, and further evaluation of the site may be required.

Site-specific HQs were not calculated for the GCMS, and according to the report, the spatial distribution of COPCs was inconclusive to support that a release has occurred or a hot spot was present. The Step 3a evaluation indicated that sample locations with COPC that exceed the 95 percent upper confidence limit (UCL) of the arithmetic mean contribute the most to HQs that exceed 1. Lead was detected in 39.1 percent of samples; however, just one location exceeded the 95 UCL. Arsenic, a potential human carcinogen, was not evaluated using the HQ.

Finally, the evaluation of site-specific factors resulted in the conclusion that COPC do not pose an unacceptable ecological risk, and that because the level of ecological risk at the Site was acceptable, the Site should be eliminated from further concern. Therefore, the Step 3a SMDP recommended no further action for eco-receptors of the site.

Observations from site reconnaissance:

On 17 April, 2008, ESI personnel visited the Site. During the Site visit, both the interior and exterior of Buildings 1089 and 1927 were viewed and questions about the building's use were addressed to onsite personnel. Site personnel indicated that the building was used previously as an automobile repair facility. ESI personnel observed three pad-mounted storage shed for pesticides, an above ground storage tank (AST), and a large repair bay for golf course equipment, a small utility shed, outside equipment storage, and other miscellaneous storage. The Site drains storm water via a drywell, which was observed between Buildings 1927 and 1089, at the central area of the Site. Standing water was observed in the dry well at approximately 18-20 feet below grade. Electric and water utility lines were observed around the exterior of the Site buildings.

The concrete slab of the Building 1089 interior was observed to be in fairly good condition. Building 1927 is an open-sided shop currently used to repair golf course maintenance equipment. Most of the exterior surface between Buildings 1089 and 1927 is paved with asphaltic concrete in poor condition with loose material covering most of the Site.

The possible classes of contaminants and the affected matrices:

Heavy metals are included as the only class of contaminants at the Site. The affected matrices are shallow soils (0-2 feet below grade).

The rationale for inclusion of chemical and nonchemical analyses:

Rationale for inclusion of chemical analyses was based on current and historical use of the Site, and information regarding previous investigations at the Site. The previous investigations indicate a possible isolated release of lead to shallow soils. The presence of arsenic in soils of the site was also shown to be elevated and isolated in the previous investigation. However, the source or sources of arsenic beyond naturally occurring or background levels is unknown.

Information concerning various environmental indicators:

Human health risks associated with exposure to impacted surface soils and the conservative EALs, based on direct exposure concerns, shall direct the need for further action at the Site. The Site is not suited to wildlife habitat due primarily to its small size and disturbed condition.

Based on the results of the SI, no further action is required for groundwater (all COPCs were below screening criteria). Further, due to the distance to groundwater and the nearest surface water body, it is unlikely surface deposited lead and/or arsenic could significantly impact such media.

Project decision conditions

- If releases of lead have occurred and delineation out to 400 mg/kg is completed by the RSE, a removal action may then be appropriate.
- If constituents of concern (i.e., lead or arsenic) present in soil above screening levels extend below the competent hard rock interface or below 2 feet bgs, then further action, including removal, capping and/or land use controls may be evaluated for suitability as final remedial actions.
- If the lateral and vertical extent of impacts from heavy metals at the site are not defined by the RSE, a removal action may be suitable provided confirmation soil samples are used to delineate the extent of releases prior to the completion of removal activities.
- If the results of the 2001 SI are not confirmed or shown to be anomalous based on the RSE, and no evidence of a release of lead is observed, No Further Action status will be recommended for the Site.

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

Who will use the data?

NAVFAC Hawaii

What are the Project Action Limits (PAL's)? (specific detailed list should be provided in WS#15)

The State of Hawaii DOH has established COPC thresholds or PAL for total lead and arsenic in soil based on proximity to surface waters and drinking water sources. The Hawaii DOH 2008 guidance entitled *Evaluation of Environmental Hazards at Sites with Contaminated Soil and Groundwater* (DOH 2008a)*, w*hich includes EALs for sites above groundwater not suitable for drinking water and more than 150 meters from surface waters shall be used as PALs.

In addition, the results of the RSE will be compared to background concentrations of lead and arsenic to assess potential releases at the site. The Navy has conducted an evaluation of natural background levels at various facilities on Oahu (Earth Tech 2005). Several soil/geologic types were represented in the study, ranging from coralline platform characteristic of southwest Oahu around NASBP to Sites on the slopes of the Koolau mountains. The sites soils are included in the Coralline Limestone grouping described in the Navy Background evaluation (Earth Tech 2005).

According to the Navy's background evaluation the estimated, naturally occurring background ranges are as follows:

- Total arsenic: the estimated minimum background concentration is 0.34 mg/kg, and the estimated maximum background concentration is 11 mg/kg. The resultant 95th percentile concentration is 7.2 mg/kg.
- Total lead: the estimated minimum background concentration is 0.036 mg/kg, and the estimated maximum background concentration is 32 mg/kg. The resultant 95th percentile concentration is 24 mg/kg.

What will the data be used for?

The activities described in this WP/SAP will be used to collect additional soil data between Buildings 1089 and 1927. Additional soil data is needed to evaluate the concentrations of lead and arsenic identified in soils during previous investigations and to determine the vertical and lateral extent of the lead and arsenic concentrations. The data will be used to evaluate the need for further action at the Site to allow unrestricted use of the Site.

What type of data are needed?

The target analytes for all surface and near surface soil samples for Building 1927 are lead and arsenic. All Site samples will be analyzed for lead and arsenic using EPA Method SW-846 6020 by an NFESC-certified laboratory.

Near-surface samples will be collected using either hand auger, drive sampler, or Direct-Push (DP) method drilling. Soil samples will be collected and handled in accordance with ERP SOPs I-B-1, *Soil Sampling,* and I-H *Direct Push Sampling Techniques* (DoN 2007b). Stainless steel sample liners are loaded into the drive sampler, split-spoon

sampler, or hand auger prior to sampling for sample collection and may also serve as the sample container for all analytes. Sample may also be transferred to 8-oz., wide-mouth glass jars.

Surface composite samples of loose sediment and soil will be collected by hand trowel and placed into a stainless steel bowl, homogenized, and a sub-sample placed into a pre-cleaned, wide-mouth glass jar.

All multiple-use sampling equipment shall be decontaminated in accordance with ERP SOPs I-F, *Equipment Decontamination*, prior to each use (DoN 2007b).

How "good" do the data need to be in order to support the environmental decision?

The term "good" data for this investigation means that the data is acceptable for its intended use and that it meets the established measurement performance criteria with respect to Data Quality Indicator (DQI) parameters as stated in this WP/SAP. Good analytical data is defined as data that meets the established criteria in this WP/SAP, such as precision, accuracy/bias, data comparability, representativeness, completeness, and sensitivity.

Validated analytical data that are qualified as non-rejected (R-flagged) are considered good. Field data are considered good when proper field sampling methods and record keeping are followed.

All project analytical data will be validated by a third-party validation firm. Only non-rejected data will be used to make decisions. Validated data with detected concentrations exceeding action levels will result in further evaluation for the associated location. Conversely, validated data with concentrations below action levels will result in associated location being recommended for no further action.

How much data should be collected?

One composite surface (0-0.5 feet below grade) and 8 discrete, near surface (0.5-2) soil samples shall be collected and analyzed for arsenic and lead. A summary of the laboratory analytical samples is as follows:

			QA Samples		QC Samples			
Composite Field Samples	Discrete Field Samples	Sample Depth (feet bgs)	Duplicates (10% total field)	PT Samples	MS/MSD (10% total field)	Field Blanks	Rinsate	Total No. of Samples
0	8	0.5 - 2	1	1	1	0	2	13
1	0	0 - 0.5	2	0	1	0	0	4

MS/MSD Matrix Spike/Matrix Spike Duplicate

Where, when, and how should the data be collected/generated?

The data will be generated from laboratory analysis of composite and discrete soil samples collected from the *area of interest* illustrated on Figure 5, *Proposed RSE Sample Locations*. The sample collection activities are schedule for spring 2009.

Discrete samples will be collected in accordance with NAVFAC Pacific ERP SOP I-B-1 *Soil Sampling* (DoN 2007b). Composite surface samples will be collected in accordance with State of Hawai'i DOH and EPA guidance as follows: *Draft Technical Guidance Manual for the Implementation of the Hawai'i State Contingency Plan* (DOH 2008), *RCRA Waste Sampling, Draft Technical Guidance, SW-846 Chapter Nine* (EPA 1999b), and *Guidance for Obtaining Representative Laboratory Analytical Subsamples from Particulate Laboratory Samples* (EPA 2003).

All soil or rock samples collected by DP will be logged and described according to the NAVFAC Pacific ERP SOP I-E *Soil and Rock Classification* (DoN 2007b). Soil descriptions will be recorded on standard boring logs. Upon removal from the sampler, near-surface soil samples shall be transferred to 8-oz., wide-mouth glass jars and sealed with Teflon-lined caps for laboratory analysis.

Who will collect and generate the data?

The project Field Team Leader will be responsible for collection and generation of all project data.

How will the data be reported?

Soil samples will be collected from each prescribed location by trained ESI personnel in accordance with NAVFAC Hawaii ERP SOPs (ERP Procedure Number I-B-1 *Soil Sampling)*. Sample containers will be properly sealed; assigned and labeled with a sample number; placed into a sealable plastic bag (i.e., Ziplock®); sealed; and tagged with a custody seal placed over the bag opening. Sample logs, labeling, shipping, and the Chain of Custody (COC) procedures will be consistent with Section 2.4 of the PHNC QAPP (DoN 2000a) and SOPs III-D, *Logbooks*, and III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures* (DoN 2007b).

Following laboratory analysis, the laboratory will provide EDD files and hard copies of project data. Reduced data (e.g., data summary tables) will be presented in the main portion of the report.

Data deliverables will be required from both the laboratory and data validator, as specified in Section 5, Data Management, of the PHNC QAPP (DoN 2000a). The laboratory will verify, reduce, and report data according to the guidelines stated in the laboratory's NFESC-evaluated QA plan. Level IV data deliverables will be provided by the laboratory. The Level IV data deliverable includes sample results, COC forms, case narrative, all QC and calibration results, and all raw data.

The format of SW-846 methods data reported are those of the CLP-equivalent forms. A standard EDD format, Automated Data Processing Tool, will be generated. Formats for both printed deliverables and EDDs are specified in Attachment C of the PHNC QAPP, in accordance with Appendix D, Section 5.12, Records of the Installation Restoration Chemical Data Quality Manual (IR CDQM) (NFESC 1999).

Both laboratory sample data and QC data will be reported in the printed and EDD Full Validation (formerly Level D) QC deliverables. Turnaround time for deliverables will typically be 30 days from date of sample receipt.

Data validator deliverables will include validated data and validation reports. Validated data will consist of Contract Laboratory Program-equivalent forms with associated qualifiers and qualification codes. Validation reports will include a case narrative describing discrepancies or anomalies in the data and the validated data themselves.

Sample Delivery Groups (SDGs) containing data entry exceedances are evaluated prior to inclusion into the project database. SDG data entry exceedances that are due to an incorrect or incomplete laboratory submittal are returned to the laboratory for correction and resubmittal.

How will the data be archived?

Field data will be recorded onto field logs or entered into a field logbook. The field logbook will be maintained in accordance with SOP III-D, *Logbooks* (DoN 2007b). The logbook will be clearly identified with the name of the activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries. Data forms with predetermined formats for logging field data will be incorporated into the logbook. Entries in chronological order and in sufficient detail will enable a reviewer to reconstruct pertinent events. The logbook will serve as the primary record of field activities. Logbooks will be maintained in good condition in a clean area and will be used only when outer gloves have been removed. Entries on preprinted data forms will meet the same requirements as for the logbook.

The logbook will contain a record of general field activities and will reference data maintained in other logs. If corrections are made to any entries, a single line will be drawn through the incorrect entry, then initialed and dated by the person making the change. An explanation is to be included if more than a simple mistake was made. Entries will be signed or initialed by the individual making the entries at the end of each day. Page numbers will be entered on each logbook page. The Team Leader will review the logbook on a regular basis.

Field data entered onto field logs will be converted into electronic format at the completion of field activities. After the completion of field activities, field data will be kept on file in the ESI office.

Data will be entered into a Microsoft® Access (or equivalent) relational database. Analytical data will be transferred directly using electronic versions of the data obtained from the analytical laboratory. Data will be stored, organized, sorted, and queried using the database.

Records, including logs, field notes, corrective actions, and lab reports will be retained for 50 years in accordance with the IR CDQM (NFESC 1999, Section 1.4, Records Retention).

List the PQOs in the form of if/then qualitative and quantitative statements.

The following Project Quality Objectives (PQOs) have been developed for the project:

- If the COPC concentration for the surface composite samples and discrete subsurface samples are below the State of Hawaii DOH EALs, then the Site shall be recommended for no further action.
- If the COPC concentration for the surface composite samples are below the State of Hawaii DOH EALs and discrete subsurface samples contain COPCs above DOH EALs and exceedances are delineated, then a screening human health risk assessment shall be conducted.

- If subsurface exceedances pose unacceptable risks to humans, then perform a removal action and confirmatory sampling.
- If delineation of subsurface COPCs has not been completed by the RSE sampling, then a removal action may be recommended along with confirmatory sampling.
- If the concentrations of lead and arsenic in soil present in surface composite samples are greater than their respective HDOH EAL then perform a removal action along with confirmatory sampling.

Concentrations of COPCs will be compared to project-specific screening criteria. Appropriate screening human health risk evaluation may be performed based on the RSE analytical results. A flow chart of the PQOs is illustrated in Figure 2.

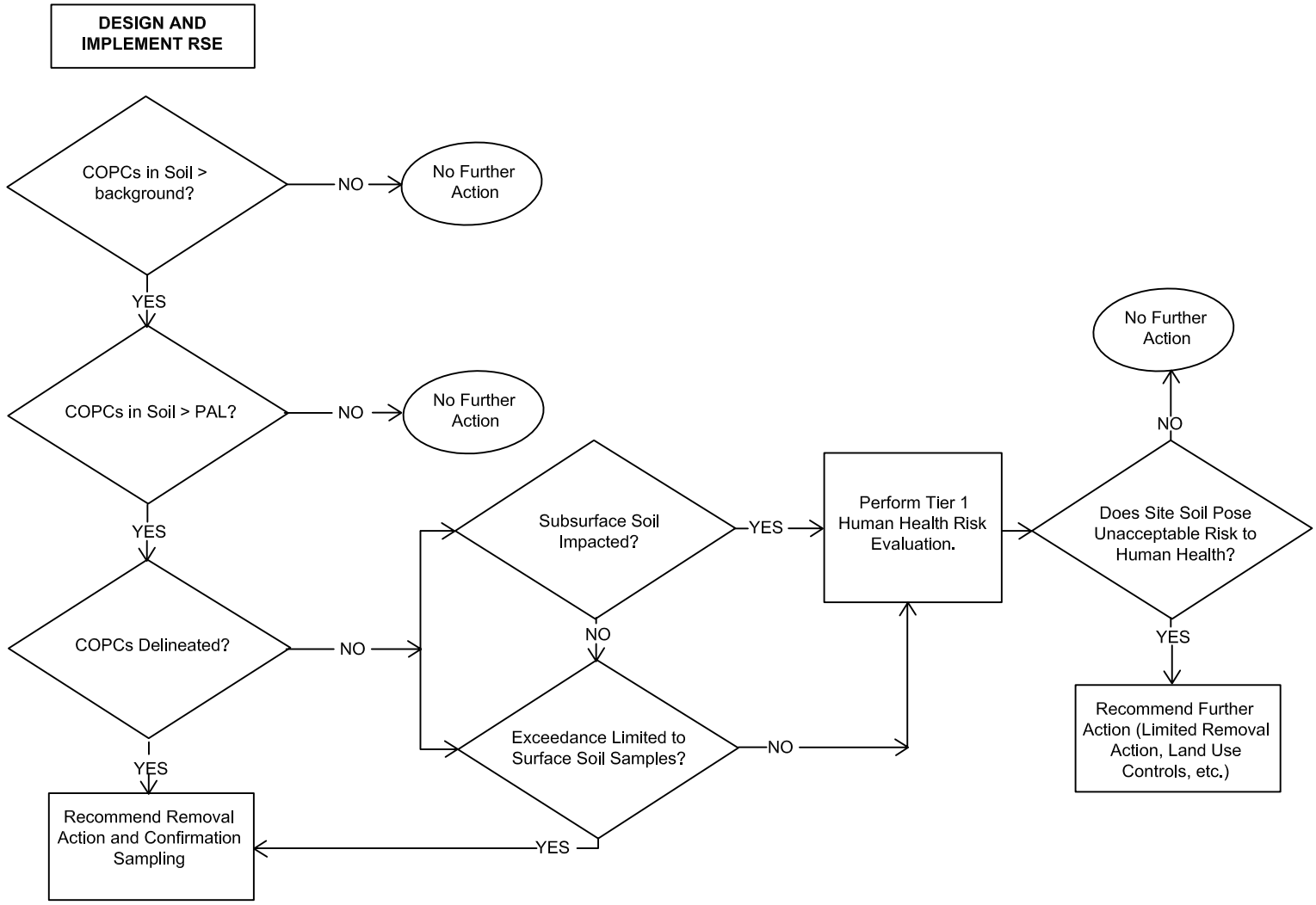

FIGURE 2

PROJECT QUALITY OBJECTIVES

REMOVAL SITE EVALUATION - WP/SAP
GOLF COURSE MAINTENANCE SHOP
FORMER NASBP, KALEALOA, OAHU

SAP Worksheet #12 – Measurement Performance Criteria Table

12.1 Measurement Performance Criteria Table – QC Samples - Soil

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Field Duplicates	As and Pb	1 for every 10 primary samples	Precision-Overall	Relative Percent Difference (RPD) ≤100% for soil	S&A
Field Triplicates	As and Pb	1 per composite samples	Precision-Overall	Relative Percent Difference (RPD) ≤100% for soil	S&A
Proficiency Testing (PT) Samples	As and Pb	1 for each analytical group per sampling event	Accuracy/Bias	80-120% of vendor certified value	A
Matrix Spike/Matrix Spike Duplicates and Laboratory Duplicates	As and Pb	1 for every 10-20 primary samples	Accuracy/Bias and Precision	See Worksheet #28	S&A

12.2 Measurement Performance Criteria Table – QC Samples - Water

QC Sample	Analytical Group	Frequency	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Field Blanks	As and Pb	1 for each source water per sampling event	Accuracy/Bias	Target compounds ≤1/2 Method Reporting Limit (MRL)	S&A
Equipment Rinsate Blanks	As and Pb	1 for each non-disposable sampling equipment per day / event	Accuracy/Bias	Target compounds ≤1/2 Method Reporting Limit	S&A
Method Blanks and Instrument Blanks	As and Pb	Laboratory Specific	Accuracy/Bias, Contamination	Target compounds ≤1/10 least sample detect	A
Laboratory Control Spike/Duplicate	As and Pb	Laboratory Specific	Accuracy/Precision	See Worksheet #28	A
Inductively Coupled Plasma (ICP) Serial Dilution	As and Pb	Laboratory Specific	Accuracy/Bias	5-fold dilution must agree within 10%	A

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**
Previous site investigation data	Department of the Navy *Site Investigation Report (SI),* 2001	Department of the Navy, laboratory analytical data, chemical data for soil and groundwater, 2000-2001.	Background information and previous site data	Limited data availability
Previous investigation data	Department of the Navy *Site Specific Environmental Baseline Survey Northern Portion of Navy-Retained Property.* 2002	Department of the Navy, presents baseline survey results and site summary, 2001-2002	Background information	No samples collected, no information on releases at the site.
Previous regional investigation data	Department of the Navy *Draft Environmental Background Analysis of Metals in Soil at Navy Oahu Facilities, Oahu Hawai'i:2005*	Department of the Navy, presents results of multi-site laboratory analytical background soil metals analysis, June 2005	Background information	Not site-specific chemical data
Previous site investigation data	Department of the Navy *Baseline Ecological Risk Assessment Step 3a Scientific Management Decision Point, 2005*	Department of the Navy, presents results of ecological risk evaluation, 2005	Background information	Limited sample collection, quality of data
Previous site investigation data	Department of the Navy *Environmental Baseline Survey For Naval Air Station Barbers Point Oahu,* 1994	Department of the Navy, presents results from the baseline survey of 1994 and site summary.	Background information	Limited sample collection

SAP Worksheet #14 – Summary of Project Tasks

This section describes the activities that will be performed during the field work portions of the project to collect data for analysis.

Pre-Work Meeting

Prior to mobilizing the field crew, ESI personnel will meet with the Navy to address the following items:

- Key points of contact from the NAVFAC Hawaii, Navy Region Hawaii, ESI, project subcontractors, and individual sites.
- Field activities.
- Schedule of field operations.
- Sampling and sample handling.
- Logistics, including access to individual sites, site areas, and the availability of field storage areas
- Site-specific safety issues.
- Staging of IDW.

Prior to the meeting with Navy representatives, ESI will informally deliver to the Navy RPM an agenda and updated schedule of the field activities.

Mobilization

ESI will mobilize field equipment and consumable and non-consumable field supplies to respective onsite storage locations identified by the Navy prior to the start of field activities. A Team Leader and SSHO will be mobilized to the Site for each phase of fieldwork. It is anticipated that a project staging area will be available within the former NASBP for temporary staging of supplies and equipment.

Health and Safety Kick-Off Briefing

On the first day of field activities for each phase of work, the SSHO will review the HASP with onsite project personnel and subcontractor personnel. Special attention will be paid to emergency response procedures and site-specific protocol to ensure that personnel are aware of the applicable precautions and procedures. The SSHO will also verify that field personnel have evidence of proper and current training (i.e., 29 CFR 1910.120 OSHA 40-hour and 8-hour annual refresher training) prior to the start of fieldwork. In addition, brief health and safety meetings will be held at the beginning of each workday throughout the duration of the fieldwork. The SSHO will monitor field activities of project and subcontractor personnel.

Site Preparation

The field crew will prepare a secure area for temporary storage (e.g., temporary fencing) and field work support areas (e.g. IDW staging area) based on locations selected during the pre-work meeting, and will mark the proposed location(s) of field sample and areas to undergo utility clearance. Access permits, drilling permits, or other pre-fieldwork approvals will be obtained prior to the start of field activities.

Decontamination

Sample collection equipment that will be reused will be decontaminated prior to each use in accordance with NAVFAC Hawaii ERP SOP I-F, *Equipment Decontamination* (DoN 2007b) to minimize the potential for cross-contamination among sample locations.

The field team will decontaminate non-disposable sampling equipment with the following five-step wash process:

Step No	Wash/Rinse Solution	Wash/Rinse Device
1	Liquinox detergent in distilled water	Plastic 5-gallon bucket with nylon brush
2	Distilled water	Plastic 5-gallon bucket with nylon brush
3	Isopropyl alcohol	Plastic spray bottle
4	Distilled water	Plastic 5-gallon bucket
5	Distilled water	Plastic spray bottle

The ground surface beneath the decontamination area will be covered with plastic sheeting to contain any decontamination water spills and excess soil removed from sampling equipment. The decontaminated equipment will then be placed on a clean surface for drying, in plastic bags, or in clean 5-gallon buckets, and covered with plastic until used. Plastic sheeting and decontamination water or debris will be placed in 55-gallon, U.S. Department of Transportation-approved drums.

Investigation-Derived Waste

IDW consists of all materials generated during the sampling that may be contaminated with COPCs. It is anticipated that field investigation activities may generate wastes including but not limited to the following:

- Decontamination water.
- Soil cuttings.
- Plastic sheeting.
- Disposable PPE and sampling equipment.

IDW will be properly classified, labeled, managed, and disposed of in accordance with RCRA criteria as specified in 40 CFR Part 261 (EPA 2008b) and ERP SOP I-A-7, *IDW Management*. If the IDW is determined to be regulated under RCRA, then RCRA storage, transportation, and disposal requirements may apply. Correct implementation of IDW procedures requires CTO managers, Team Leaders, and their designees to perform the following tasks:

- Minimize IDW generation.
- Segregate IDW by matrix and source location.
- Follow proper procedures for IDW drum handling and labeling.
- Prepare an IDW drum inventory.
- Update and report changes to the IDW drum inventory.

Demobilization

The field crew will remove decontamination bins and buckets, IDW staging area, sanitary facilities, field equipment, and supplies from the Site upon completion of field activities. The Site will be restored to the original state prior to fieldwork as much as practicable.

Quality Control Tasks

The field crew will implement NAVFAC Hawaii ERP Procedures for soil sample collection and documentation of site-specific activities. Project NAVFAC Hawaii ERP Procedures are listed on Worksheet #21. Field QC samples include field duplicates/triplicates, matrix spikes, matrix spike duplicates, field blanks, rinsate blanks, and PT samples. Performance criteria are described in Worksheet #12. Laboratory QC samples will include method and instrument blanks, laboratory duplicates, laboratory control spikes, laboratory control spike duplicates, and ICP serial dilutions. Performance criteria are described in Worksheet #28.

Data Management Tasks

Project analytical data will be validated by a third-party validation firm in accordance with data validation procedures II-A and II-Q (DoN 2007b). Data received from the validation firm will be entered into a Microsoft® Access (or equivalent) relational database.

Field data will be recorded onto field logs or entered into a field logbook. The field logbook will be maintained in accordance with SOP III-D, *Logbooks* (DoN 2007b). The logbook will be clearly identified with the name of the activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries. Data forms with predetermined formats for logging field data will be incorporated into the logbook. Entries in chronological order and in sufficient detail will enable a reviewer to reconstruct pertinent events. The logbook will serve as the primary record of field activities. Logbooks will be maintained in good condition in a clean area and will be used only when outer gloves have been removed. Entries on preprinted data forms will meet the same requirements as for the logbook.

The logbook will contain a record of general field activities and will reference data maintained in other logs. If corrections are made to any entries, a single line will be drawn through the incorrect entry, then initialed and dated by the person making the change. An explanation is to be included if more than a simple mistake was made. Entries will be signed or initialed by the individual making the entries at the end of each day. Page numbers will be entered on each logbook page. The Team Leader will review the logbook on a regular basis.

Field data entered onto field logs will be converted into electronic format at the completion of field activities. After the completion of field activities, field data will be kept on file in the ESI office.

Data will be entered into a Microsoft® Access (or equivalent) relational database. Analytical data will be transferred directly using electronic versions of the data obtained from the analytical laboratory. Data will be stored, organized, sorted, and queried using the database.

Documentation and Records

Field measurements and observations will be documented in field logbooks. See Worksheet #21 for the documentation and records SOPs.

Assessment / Audit Tasks

The project chemist, QA/QC manager, and Team Leader will be responsible for assessment and audit tasks (see Worksheet #7). The project manager will be responsible for coordinating a field audit. The laboratory will be responsible for meeting the reporting limits and method performance requirements agreed upon, and is subject to random IR audit inspections.

Data Review Tasks

The laboratory performing the analyses will be responsible for verifying that all data are complete for samples received. Upon receipt of the laboratory's deliverables, the chemist, or designated alternate, will perform a review of sample custody, receipt conditions, and holding times; and will perform a review of sample results (including reporting limits and results for field duplicates). The project chemist will verify that the third party validator receives all data. The project chemist will verify that electronic versions match hard copy reports. Data will be validated as described below by a third party validator. The chemist, or designated alternate will also review validation reports provided by the third party validator that will be performing a review of laboratory and field QC data.

Laboratory Data Packages, Data Usability Assessment and Data Validation

Level IV data deliverables will be provided by the laboratory. The Level IV data deliverable includes dry-weight sample results, signed COC forms, case narratives, all QC and calibration results, and raw data. The laboratory analytical results will be sent first in EDD files followed by hard copy reports. The QA Chemist and the Project Manager will review the EDD data for usability. Usable data deliverables will then be provided to the data validator.

A third party validator will validate all data according to SOPs II-A through II-Q of the NAVFAC Pacific ERP (DoN 2007b). Data validator deliverables will include validated data and validation reports. Validated data will consist of Contract Laboratory Program-equivalent forms with associated qualifiers and qualification codes. Validation reports will include a case narrative describing discrepancies or anomalies in the data and the validated data themselves.

Methods and reporting formats for data validation are presented in SOP II-A, *Data Validation Procedure*s (DoN 2007b). Method-specific validation protocols are presented in SOPs II-B through II-O. Within each SOP is a description of the steps

taken to validate data at specified levels of effort. SOP II-A describes the various levels. Analytical data will be validated at either the standard or full level, as described below.

Standard validation requires that the validators review the generated raw data and check calculations without having to recalculate any of the results. It is less labor-intensive and costly. Samples analyzed by a fixed-base laboratory will be subject to the following requirements:

- Full validation of the first SDG containing field samples for each method will be performed.
- Full validation of 10% of the remaining samples will also be performed throughout the duration of the project.

Other samples will undergo standard validation. If data are R flagged or rejected during the standard validation, the validators may increase the level of validation to full for the affected samples. The increase in validation level allows for a more thorough review of the standard level rejected data and may result in the data being revised as J flagged or estimated. The increased level of validation effort is performed at the discretion of the validator and is dependent on the rationale for data rejection at the standard level.

Full validation is an intensive review of the data that requires the validator to recalculate concentrations from the raw data generated by the laboratory. Deliverables for validation efforts include laboratory reports with applied data qualifiers and validation reports containing cover letter and data qualifier and qualification code reference tables.

These data validation procedures assign qualifiers to the data that give the end users a qualitative measure of data usability. Data may be assigned the following qualifiers:

- J – estimated concentration
- N – presumptive evidence of the identification of an analyte
- R – rejected data (unusable)
- U – not detected at the reporting limit

Qualification codes will be assigned to each data point that has been qualified. These codes, presented in Attachment II-A-5 of SOP II-A, *Data Validation Presentation* (DoN 2007b), indicate the rationale for the data qualification.

SAP Worksheet #15 – Reference Limits and Evaluation Table

Matrix: Soil
Analytical Group: Heavy Metals

Analyte	CAS Number	Project Action Limit (mg/kg)	Project Action Limit Reference	Project Quantitation Limit Goal (mg/kg)	Laboratory-specific	
					QLs	MDLs[2]
Lead	7439-92-1	400	[1]	20	20	3
Arsenic	7440-38-2	20	[1]	2	0.5	0.2

Matrix: Water
Analytical Group: Heavy Metals

Analyte	CAS Number	Project Action Limit (ug/L)	Project Action Limit Reference	Project Quantitation Limit Goal (ug/L)	Laboratory-specific	
					QLs	MDLs[2]
Lead	7439-92-1	NA		5	1	0.5
Arsenic	7440-38-2	NA		1	0.5	0.2

Notes
1. 2008 Department of Health EAL, Groundwater is NOT Current or Potential Source of Drinking Water, > 150m to Surface Water Body
2. Laboratory-specific method detection limits will be reported prior to that start of the sampling event

QL Quantitation Limit
MDL Method Detection Limit
ug/L Microgram per liter
NA Not Applicable

SAP Worksheet #16 – Project Schedule / Timeline Table

The project schedule has been prepared such that work is conducted in a logical and cost effective manner. This project has been divided into tasks in accordance with the NAVFAC, Hawaii Statement of Work for Contract No. N62742-06-D-1891, CTO HC07, RSE for the Golf Course Maintenance Shop at Former Naval Air Station Barbers Point, Oahu, HI, dated 05 March 2008. These tasks and their respective supporting activities are shown below.

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Submit Draft WP/SAP for Review	ESI	03/05/08	08/22/08	Draft WP/SAP	08/22/08
Submit Draft HASP	ESI	06/16/08	09/08/08	Draft HASP	09/08/08
Review WP/SAP	NAVFAC Hawaii	08/22/08	01/27/09		
Submit Final WP/SAP	ESI	09/19/08	04/09/09	WP/SAP	04/09/09
Submit Final HASP	ESI	11/30/08	04/20/08	HSP	04/20/09
Fieldwork Kickoff Meeting	ESI	04/17/09	04/17/09		
Fieldwork	ESI	05/05/09	06/01/09		
Data Usability	ESI	06/15/09	07/15/09		

Activities	Organization	Dates (MM/DD/YY)		Deliverable	Deliverable Due Date
		Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Data Validation	ESI	06/15/09	06/30/09		
IDW Disposal	ESI	07/15/09	07/30/09	IDW Disposal Plan	07/30/09
IDW Disposal Documentation	ESI	07/30/09	09/16/09	Waste Manifest	09/16/09
Draft EE/CA Report	ESI	06/30/09	08/29/09	Draft Report	08/29/09
Review EE/CA Report	NAVFAC Hawaii	08/29/09	09/11/09		
Draft Response to Comments (RTCs)	ESI	09/11/09	10/02/09	Draft RTCs	10/02/09
Review RTCs	NAVFAC Hawaii	10/02/09	10/16/09		
Final RTCs	ESI	10/16/09	10/23/09	Final RTCs	10/23/09
Final EE/CA Report	ESI	10/16/09	11/06/09	Final Report	11/06/09

SAP Worksheet #17 – Sampling Design and Rationale

The rationale for inclusion of chemical analyses was based on current and historical use of the Site, and information from the 2001 SI at the site. The previous investigation indicates a possible isolated release of lead to shallow soils. The SI results also indicate the presence of isolated arsenic in soils of the site. However, the source or sources of arsenic beyond naturally occurring or background levels is unknown.

Heavy metals are included as the only class of contaminants at the Site. Previous analytical results do not indicate widespread dispersal but rather isolated hot-spot type impacts to a localized area of interest at the Site proximal to sample number MS-SB-20 collected during the 2001 SI and shown on Figure 4. Judgmental samples shall be collected based on the result of the MS-SB-20 analyses and shall focus on isolating impacts identified adjacent to Building 1089 (Figure 5).

The affected matrix is shallow soils (0-2 feet below grade). Previous investigations indicate that hard rock was encountered at approximately 2 feet bgs. Surface soil and subsurface soil of the area of interest (approximately 30 by 40 feet in area) are the two decision units at the site. Most of the exterior surface between Buildings 1089 and 1927 is paved with asphaltic concrete in poor condition with loose material consisting of gravel and a mix of fine sediments. The area of interest has considerable loose surface material. Therefore, this loose material, a fairly non-homogeneous media of the area of interest at the site will be sampled using a composite sample, composite sample duplicate and triplicate, with 20 to 30 sample aliquots per sample, collected randomly over the entire area of interest (Figure 5.). This sampling method will minimize the sampling error and serve to represent potential actual exposure to site workers in the area of interest.

The approach for the subsurface sample collection is also judgmental; however, a systematic approach using discrete samples focused on the suspect impacts to the area of interest are necessary to confirm or disconfirm the presence of wastes or releases to the area of interest. This approach, known as adaptive cluster sampling, is useful in two-dimensional situations where hot spots are anticipated or where the boundary of a plume needs to be defined (EPA 2002c). Further, judgmental sampling is appropriate for small volumes of waste or a situation where the concentration is anticipated to be well above or below the regulatory threshold. Additionally, soil samples will be collected from site following any removal action.

Information about the sampling locations and methods is included on Worksheet #18. Additional information about the sampling design is included in Worksheet #10 and Worksheet #11.

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

Sampling Location / ID Number	Matrix	Depth (Feet)	Analytical Group	Number of Samples (identify field duplicates)	Sampling SOP Reference
NASBP-SSC-01-A to NASBP-SSC-03-A	Soil	0-0.5	Heavy Metals	2 total	I-B-1
NASBP-SSC-01-D (field duplicate)	Soil	0-0.5	Heavy Metals	2 per 10 field samples	III-B
NASBP-SB-04-A-##.# to NASBP-SB-11-A-##.#	Soil	0.5-2.0	Heavy Metals	8 total	I-B-1, I-E
NASBP-SB-11-D-##.# (field duplicate)	Soil	0.5-2.0	Heavy Metals	1 per 10 field samples	III-B
NASBP-R (equipment rinsate)	water	NA	Heavy Metals	1 per event, 2 total	III-B
NASBP-PT	Soil	NA	Heavy Metals	1 per event, 1 total	III-G
NASBP-F (field blank)	water	NA	Heavy Metals	1 per event, 1 total	III-B
NASBP-M (matrix spike, matrix spike duplicate)	Soil	NA	Heavy Metals	5-10% of field samples, 2 total	III-B

A = Field Sample D = Duplicate Field Sample PT = Proficiency Test

Sample Type / ID Number	Matrix	Analytical Group	Minimum Number of Representative Samples	Sampling SOP Reference
Soil_IDW-#	Soil	Heavy Metals	1	I-B-1
Rinsate_IDW-#	Water	Heavy Metals	1	I-A-7

SAP Worksheet #19 – Analytical SOP Requirements Table

Matrix	**Analytical Group**	**Analytical and Preparation Method / SOP Reference**[1]	**Containers**[2] (number, size, and type)	**Sample volume**	**Preservation Requirements** (chemical, temperature, light protected)	**Maximum Holding Time** (preparation / analysis)
Water	Arsenic and Lead	EPA 3010/6020 SOP MET-3010A.10/MET-6020.11	1 500-mL plastic container	500 mL	Cool 6°C HNO_3 to pH <2	6 months
Soil	Arsenic and Lead	EPA 3050B/6020 SOP MET-3050.10/MET-6020.11	1 100 g glass jar with Teflon lined lid	100 g	Cool 6°C	6 months

Notes:
1 Analytical SOP References table (Worksheet #23). SOP is lab specific and will be determined when lab is procured.
2 Containers that have certificates of cleanliness and contain the preservative will be obtained from the laboratory.
g gram
mL milliliter
°C degree Celsius
HNO_3 Nitric Acid

SAP Worksheet #20 – Field Quality Control Sample Summary Table

Matrix	Analytical Group	No. of Sampling Locations	No. of Field Duplicates	No. of MS/MSDs[1]	No. of Field Blanks	No. of Equip. Blanks	No. of VOA Trip Blanks	No. of Proficiency Testing (PT) Samples	Total No. of Samples to Lab
Soil	Heavy Metals	9	3	2	0	0	0[2]	1	15
Water	Heavy Metals	1*	0	0	0	2	0[2]	0	3

*No environmental media or locations. Aqueous samples are for QC and possibly for characterization of Investigation-Derived Waste (IDW may be characterized using generator information or other representative IDW samples).

Notes:

1 Although the MS/MSD is not typically considered a field QC it is included here because location determination is often established in the field.

2 No VOA are planned for the RSE

3 Equipment and field blanks are only required when non-disposable sampling equipment is used.

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)	Comments
I-A-7	Navy ERP Project Procedures Manual, *IDW Management* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
I-A-5	Navy ERP Project Procedures Manual, *Utility Clearance* (DoN 2007b)	NAVFAC Hawaii	Magnetometer	No	
I-A-9	Navy ERP Project Procedures Manual, *Sample Naming* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
I-B-1	Navy ERP Project Procedures Manual, *Soil Sampling* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
I-E	Navy ERP Project Procedures Manual, *Soil and Rock Classification* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
I-F	Navy ERP Project Procedures Manual, *Equipment Decontamination* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
I-H	Navy ERP Project Procedures Manual, *Direct Push Sampling Techniques* (DoN 2007b)	NAVFAC Hawaii	Geoprobe (or equivalent)	No	
I-I	Navy ERP Project Procedures Manual, *Land Surveying* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
III-A	Navy ERP Project Procedures Manual, *Laboratory QC Samples* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
III-B	Navy ERP Project Procedures Manual, *Field QC Samples* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
III-D	Navy ERP Project Procedures Manual, *Logbooks* (DoN2007b)	NAVFAC Hawaii	N/A	No	
III-E	Navy ERP Project Procedures Manual, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures* (DoN 2007b)	NAVFAC Hawaii	N/A	No	

Reference Number	Title, Revision Date and / or Number	Originating Organization of Sampling SOP	Equipment Type	Modified for Project Work? (Y/N)	Comments
III-F	Navy ERP Project Procedures Manual, *Sample Handling, Storage, and Shipping Procedures* (DoN 2007b)	NAVFAC Hawaii	N/A	No	
III-G	Navy ERP Project Procedures Manual, *Proficiency Testing* (DoN 2007b)	NAVFAC Hawaii	N/A	No	

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

Field Equipment	Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference	Comments
Direct-Push (DP) Drill Rig	Visual Inspection	Daily	If equipment is in normal working condition, proceed with use. If not, do not use unit.	Repair / replace parts as necessary.	Field Manager	Drill Rig Inspection Checklist	(Refer to HASP)
Split-Spoon Sampler	Rinsate Sample Collection	Daily	No visible signs of gross contamination that would prevent use	If equipment is in unacceptable condition, replace prior to use.	Field Manager	ERP SOP III-B	

SAP Worksheet #23 – Analytical SOP References Table

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?[2] (Y/N)
MET-6020.11	Determination of Metals and Trace Elements by Inductively Coupled Plasma-Mass Spectrometry (ICP-MS); EPA Method 6020; Rev. 11, May 1, 2007	Definitive	Soil and water; Arsenic and Lead	ICP-MS	CAS Kelso	N

1 If yes, then specify the modification that has been made. Note that any analytical SOP modification made relative to project specific needs must be reviewed and approved by the Navy Quality Assurance Officer.
ICP-MS Inductively coupled plasma Mass Spectrometry

SAP Worksheet #24 – Analytical Instrument Calibration Table

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA[2]	SOP Reference[1]
ICP-MS	Mass calibration	Once a day Every 10 samples Every 10 samples	ICV: %D ≤ 10% CCV: %D ≤ 10% CCB <2x MDL	See SOP # ADM-CA, Rev. 5, 9/12/07	Laboratory Manager/ Project Manager at CAS Kelso	MET-6020

Notes

ICP – Inductively Coupled Plasma
ICV – Initial Calibration Verification
ICB – Initial Calibration Blank
CCV – Continuing Calibration Verification
CCB – Continuing Calibration Blank

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

Instrument / Equipment	Maintenance Activity	Testing Activity	Inspection Activity	Frequency	Acceptance Criteria	Corrective Action	Responsible Person	SOP Reference
ICP-MS	Removal and cleaning (cone, ICP glassware and fittings, RF contact strips, extraction lens, ion lens stack)	-	Air and oil mist filters, rotary pump oil	As needed based on instrument performance or by visual inspection	-	Replenish, clean or replace as necessary	Laboratory/ Project Manager at CAS Kelso	MET-6020

Notes: Specify the appropriate reference letter or number from the Analytical SOP References table (Worksheet #23).

SAP Worksheet #26 – Sample Handling System

Sample Handling System

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (Personnel/Organization): Field Team Leader / ESI
Sample Packaging (Personnel/Organization): Field Team Leader / ESI
Coordination of Shipment (Personnel/Organization): Field Team Leader / ESI
Type of Shipment/Carrier: Sample coolers, overnight shipping / Commercial carrier (for example, FedEx, DHL, or similar)
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (Personnel/Organization): CAS Kelso
Sample Custody and Storage (Personnel/Organization): CAS Kelso
Sample Preparation (Personnel/Organization): CAS Kelso
Sample Determinative Analysis (Personnel/Organization): CAS Kelso
SAMPLE ARCHIVING
Field Sample Storage (No. of days from sample collection): None planned. However, if samples cannot ship and arrive at laboratory within temperature limits (i.e. if weekend shipping is required), and it is possible within holding time limits, samples will be stored in a designated sample holding refrigerator for up to 36 hours prior to shipping.
Sample Extract/Digestate Storage (No. of days from extraction/digestion): Reference hold times specified on Worksheet #19
Biological Sample Storage (No. of days from sample collection): Not Applicable
SAMPLE DISPOSAL
Personnel/Organization: CAS Kelso
Number of Days from Analysis: Subject to laboratory procedures, 30 days typical

SAP Worksheet #27 – Sample Custody Requirements Table

Sample logs, labeling, and the COC procedures will be consistent with Section 2.4 of the PHNC QAPP (DoN 2000a) and SOPs III-D, *Logbooks*, and III-E, *Record Keeping, Sample Labeling, and Chain-of-Custody Procedures* (DoN 2007b).

Sample Designation and Labeling

Sample containers will be labeled using indelible ink with the project name or identifier, EPA sample ID number, date and time of collection, initials of the person collecting the sample, sample preservatives, and analyses to be performed. The label will be covered with clear tape to further secure the label and to keep the ink from smearing.

Samples collected will be labeled with a descriptive sample identifier and a blind EPA number in accordance with SOP I-A-9, *Sample Naming* (DoN 2007b) and the procedures described in the following sections.

EPA Number. The EPA number will be used to facilitate data tracking and storage. The EPA number will be assigned as follows:

xyzzz

where:

x	Sampling Organization; use E for ESI
y	Site letter identification (ID); use M for Golf Course Maintenance Shop
zzz	Chronological number

QC samples will be included in chronological order. If a sample is lost during shipping, a replacement sample will be assigned a new EPA number. If different containers for the same sample are shipped on different days, a new EPA number must be assigned. The chronological number sequence will be specified in a range pertaining to the sample media.

Descriptive Sample Identifier. The descriptive sample identifier will be used to provide sample-specific information (e.g., location, sequence, matrix). The descriptive identifier will not be revealed to the analytical laboratory.

The descriptive sample identifier will be assigned as follows:

xxxxx-bbb-ccc-d-##.#

where:

xxxxx	Site investigated; may be 2 to 5 alpha-numeric characters (e.g., NASBP))
bbb	Sample type (e.g., SSC = Surface Composite or SB = Subsurface Soil)
ccc	Sampling location number, obtained from site figure or designated in the field (i.e. 01)
d	Field QC type (e.g., Field Analytical Sample = A, Field Duplicate = D, Equipment Rinsate = R, Trip Blank = T, Field Blank = F, Matrix Spike/Matrix Spike Duplicate = M)
##.#	Depth Below Grade

Field Documentation

A bound field notebook with consecutively numbered, water-repellent pages will be maintained in accordance with SOP III-D, *Logbooks* (DoN 2007b). The logbook will be clearly identified with the name of the activity, the person assigned responsibility for maintenance of the logbook, and the beginning and ending dates of the entries. Data forms with predetermined formats for logging field data will be incorporated into the logbook. Entries in chronological order and in sufficient detail will enable a reviewer to reconstruct pertinent events. The logbook will serve as the primary record of field activities. Logbooks will be maintained in good condition in a clean area and will be used only when outer gloves have been removed. Entries on preprinted data forms will meet the same requirements as for the logbook.

The logbook will contain a record of general field activities and will reference data maintained in other logs. If corrections are made to any entries, a single line will be drawn through the incorrect entry, then initialed and dated by the person making the change. An explanation is to be included if more than a simple mistake was made.

Entries will be signed or initialed by the individual making the entry at the end of each day. Page numbers will be entered on each logbook page. The Team Leader or designated field personnel will photocopy completed pages weekly. The Team Leader will review the logbook on a regular basis.

Sample Handling, Shipping, and Custody

Sample custody procedures to be followed will be those established in Section 2.7 of the PHNC QAPP (DoN 2000a), as well as SOP III-E, *Recordkeeping, Sample Labeling, and Chain-of-Custody Procedures*, and SOP III-F, *Sample Handling, Storage and Shipping Procedures* (DoN 2007b).

A list of analyses to be performed and a space to record sample condition upon receipt are located on the COC form. The sample custodian will sign the COC form and record the temperature of the samples or cooler on the COC form and on the Sample Condition upon Receipt (SCR) form. All samples requiring preservative will be checked for proper preservation by measuring pH and temperature.

In case of breakage or discrepancies between the COC form, sample labels, or requested analysis, the sample custodian will notify the laboratory project manager. A nonconformance report will be completed, and the project chemist will be notified within 24 hours. At the time of notification, the appropriate corrective action will be chosen. The sample custodian will enter sample information into the laboratory system, and a log-in confirmation sheet will be sent to the project chemist within 48 hours. The laboratory will send the project chemist a written declaration of the samples in each SDG.

Inspection and acceptance requirements are identified in Table 3-3, Section 3.1.4, *Inspection/Acceptance Requirements for Supplies and Consumables*, of the PHNC QAPP (DoN 2000a). The field team will be responsible for the inspection of supplies and consumables.

SAP Worksheet #28 – Laboratory QC Samples Table

Matrix	Soil
Analytical Group	Metals (Lead and Arsenic)
Analytical Method/ SOP Reference	SW-846 3050b/ 6010b/ MET-6020

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per analytical batch	< (1/2) MRL	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Sensitivity	< (1/2) MRL
LCS/LCSD	1 per analytical batch	80-120%; 20% RPD	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Precision – Analytical	80-120%; 20% RPD
Laboratory Duplicates	1 per analytical batch	30% RPD	See Lab SOP	Laboratory Manager	Precision – Analytical	30% RPD
MS/MSD	1 per analytical batch	80-120%; 20% RPD	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Precision	80-120%; 20% RPD
Post Digestion Spike	1 per analytical batch	75-125%	See Lab SOP	Laboratory Manager	Accuracy	75-125%

LCS = Laboratory control sample
LCSD = Laboratory control sample duplicate
MRL = Method reporting limit
RPD = Relative percent difference
QC = Quality control
SOP = Standard Operating Procedures
SW = Solid waste

Laboratory QC samples (Continued)

Matrix	Water
Analytical Group	Metals (Lead and Arsenic)
Analytical Method/ SOP Reference	SW-846 3010/6010b/ MET-6020

QC Sample	Frequency / Number	Method / SOP QC Acceptance Limits	Corrective Action	Person(s) Responsible for Corrective Action	Data Quality Indicator (DQI)	Measurement Performance Criteria
Method Blank	1 per analytical batch	< (1/2) MRL	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Sensitivity	< (1/2) MRL
LCS/LCSD	1 per analytical batch	80-120%; 20% RPD	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Precision – Analytical	80-120%; 20% RPD
Laboratory Duplicates	1 per analytical batch	30% RPD	See Lab SOP	Laboratory Manager	Precision – Analytical	30% RPD
MS/MSD	1 per analytical batch	80-120%; 20% RPD	See Lab SOP	Laboratory Manager	Accuracy/Bias/ Precision	80-120%; 20% RPD
Post Digestion Spike	1 per analytical batch	75-125%	See Lab SOP	Laboratory Manager	Accuracy	75-125%

SAP Worksheet #29 – Project Documents and Records Table

Document	Where Maintained
Field Documentation (Sample logs, calibration sheets, field log book)	ESI project files[1]
Chain of Custody Forms	ESI project files/ NAVFAC Hawaii [2]
NFESC Laboratory Assessment	NAVFAC Hawaii
Field Activity Assessment	ESI project files/ NAVFAC Hawaii
Field Document Assessment	ESI project files/ NAVFAC Hawaii
Analytical Data Packages	ESI project files/ NAVFAC Hawaii
Third-Party Validation Reports	ESI project files/ NAVFAC Hawaii

1. ESI project files are maintained at 56 Oneawa Street, Suite 103, Kailua, Hawaii 96734.
2. NAVFAC Hawaii project files are maintained at 400 Marshall Road, Pearl Harbor, Hawaii 96860-3139.

SAP Worksheet #30 – Analytical Services Table

Matrix	Analytical Group	Sample Locations/ID Number	Analytical Method	Data Package Turnaround Time	Laboratory / Organization (name and address, contact person and telephone number)	Backup Laboratory / Organization (name and address, contact person and telephone number)
Soil	As and Pb	Primary field and field QC samples	EPA 3050b/6020	30 days after samples are received at the laboratory	CAS Kelso 1317 S. 13th Ave. Kelso, WA 98626 360-577-7222 x3281	Not Applicable
Water	As and Pb	QC samples	EPA 3010/6020	30 days after samples are received at the laboratory	CAS Kelso 1317 S. 13th Ave. Kelso, WA 98626 360-577-7222 x3281	Not Applicable

SAP Worksheet #31 – Planned Project Assessments Table

Assessment Type	Frequency	Internal or External	Organiz-ation Performing Assessment	Person(s) Responsible for Performing Assessment	Person(s) Responsible for Responding to Assessment Findings	Person(s) Responsible for Identifying and Implementing Corrective Actions (CA)	Person(s) Responsible for Monitoring Effectiveness of CA
Review of draft report	Once	External	NAVFAC Hawaii	RPM	QA Manager	Project Manager	QA Manager
Review of field procedures	Daily	Internal	ESI	Field Team Leader	QA/QC Manager	QA/QC Manager	Project Manager
Review of field notes	Daily	Internal	ESI	Field Team Leader	QA/QC Manager	QA/QC Manager	Project Manager
Field Audit	Once	Internal	ESI	QA/QC Manager	Field Team Leader	Field Team Leader	QA/QC Manager
Review of COC forms	Daily	Internal	ESI	Project Chemist	QA/QC Manager	QA/QC Manager	Project Manager
Review NFESC Certification of Analytical Laboratory	Once	Internal	ESI	Project Chemist	Laboratory Project Manager	Laboratory Project Manager	QA/QC Manager
Laboratory Data Assessment	Once	External	LDC, Inc.	LDC, Inc. Staff/Project Chemist	QA/QC Manager	QA/QC Manager	Project Manager

SAP Worksheet #32 – Assessment Findings and Corrective Action Responses

Assessment Type	Nature of Deficiencies Documentation	Individual(s) Notified of Findings (name, title, organization)	Timeframe of Notification	Nature of Corrective Action Response Documentation	Individual(s) Receiving Corrective Action Response	Timeframe for Response
Review draft report	Written Comments	Project Manager, ESI	Immediately	Response to comments	RPM, NAVFAC Hawaii	Typically 2 weeks
Review of field procedures	Written Audit Report	QA/QC Manager, ESI	24 hours after audit	Letter	Project Manager, ESI RPM, NAVFAC Hawaii	24 hours after notification
Review of field notes	Written Audit Report	QA/QC Manager, ESI	24 hours after audit	Letter	Project Manager, ESI RPM, NAVFAC Hawaii	24 hours after notification
Review of COC forms	Written Audit Report	QA/QC Manager, ESI	24 hours after audit	Letter	Project Manager, ESI	24 hours after notification
Review NFESC Certification of Analytical Laboratory	Written Audit Report	Lab Director, CAS Kelso	24 hours after audit	Letter	Project Chemist, ESI RPM, NAVFAC Hawaii	24 hours after notification
Laboratory Data Assessment	Written Audit Report	Lab Director, CAS Kelso	24 hours after audit	Letter	Project Chemist, ESI RPM, NAVFAC Hawaii	1 week after 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)
Third Party Data Validation Report	Once per RSE sampling event	45 days after receipt of analytical data	LDC, Inc.	Project Chemist, ESI
Field Audit Report	Twice per year[1]	To Be Determined	QA/QC Manager, ESI	Project Manager, ESI, RPM NAVFAC Hawaii
QC Reports	Daily during fieldwork	To Be Determined	Field Team Leader	Project Manager, ESI, RPM, NAVFAC Hawaii

[1] Includes all ongoing activities at the site, for example subsequent removal and confirmation sampling activites.

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

Verification Input	Description	Internal / External	Responsible for Verification (name, organization)
Review of field procedures	Determine if field procedures are performed in accordance with this SAP and prescribed procedures.	Internal	Project Manager, ESI
Review of field notes	Ensure field notes allow reconstruction of activities. Sample inventory logs will include sample designation, labeling and descriptions, and will ensure accurate location where samples are collected.	Internal	QA/QC Manager, ESI
Review of COC forms and sample receipt forms	Determine if samples are labeled and handled in accordance with procedures described in this SAP, and the correct analyses are requested when compared to this SAP. Determine that all samples have been received by the laboratory.	Internal	Project Chemist, ESI
Analytical Data Packages	The laboratory shall verify internally that the complete and technically accurate contents are included in each analytical data package and provided to ESI and LDC.	Internal	Project Manager, CAS Kelso
Laboratory Data Assessment	Determine if all electronic and hardcopy data are received for all analyses requested, and contain the proper reporting format.	Internal	Project Chemist, ESI
Proficiency Test (PT) Data Assessment	Determine QA samples are received for all analyses requested, and meet project MPCs.	Internal	Project Chemist, ESI
Laboratory QC Assessment	Determine if all QC results are reported upon receipt of the data package.	External	LDC, Inc.

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

Step IIa / IIb[1]	Validation Input	Description	Responsible for Validation (name, organization)
IIb	Onsite data (e.g., PID measurements)	Onsite data will be reviewed against WP/SAP requirements for completeness and accuracy based on the field calibration requirements	Field Team Leader, ESI
IIa	Sampling SOPs and field notes	Ensure that sampling SOPs are followed.	Field Team Leader, ESI
IIa	Sample receipt forms and lab documentation of sample handling	Ensure that holding times, preservation and temperatures described in WP/SAP are met.	Project Manager, CAS Kelso Project Chemist, ESI
IIa	Documentation of method QC results	Establish that all method required QC samples were run and met required limits.	Project Manager, LDC
IIa	Documentation of method QA results for PT samples	Establish that all method QA samples were run and met required limits.	Project Manager, LDC
IIb	Documentation of QAPP QC results	Establish that all QAPP required QC samples were run and met required limits.	Project Manager, LDC
IIb	Project Quantitation Limits	Ensure that all sample results met the project quantitation limit specified in the QAPP.	Project Manager, LDC
IIa	Raw data	10% review of raw data will be reviewed to confirm laboratory calculations	Project Manager, LDC
IIb	Analytical data packages	Deviations from methods and project required quantitation limits as specified in the WP/SAP are summarized, qualifiers applied as described in ERP SOPs, and explained and summarized in validations report.	Project Manager, LDC

Notes
1. IIa=compliance with methods, procedures, and contracts [see Table 10, page 117, UFP-QAPP manual, V.1, March 2005.]
IIb=comparison with measurement performance criteria in the SAP [see Table 11, page 118, UFP-QAPP manual, V.1, March 2005]

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

Step IIa / IIb	**Matrix**	**Analytical Group**	**Validation Criteria**	**Data Validator** (title and organizational affiliation)
IIa	Soil	Heavy Metals	Validation procedures described in the NAVFAC Environmental Restoration Project Procedures Manual (DON 2007b)	LDC, Inc.

SAP Worksheet #37 – Usability Assessment

Validated data will be reviewed by the Project Chemist in the form of a usability assessment. The results of the usability assessment will be reviewed by the Project Team to determine if the data can be used to answer the principle study questions.

Precision: Project data must meet the measurement performance criteria for precision specified in Section 2.6.2.1 of the UFP QAPP (DoN 2005a) and this SAP. Laboratory analytical precision will be assessed through analysis of laboratory duplicates and MS/MSDs. Precision is calculated from percent recovery data of laboratory duplicates and MS/MSDs, and is expressed as the relative percent difference (RPD): RPD = (D1-D2/{1/2(D1+D2)} x 100 where D1 and D2 are the reported concentrations for sample and duplicate analyses.

Accuracy: Project data must meet the measurement performance criteria for accuracy specified in Section 2.6.2.2 of the UFP QAPP (DoN 2005a) and this SAP. All analytical equipment and instrumentation will meet proper calibration and maintenance criteria. Accuracy will be monitored by the use of PT samples, blank spikes or laboratory control samples (LCSs), MSs, and surrogates. Percent R is calculated using the following equation: %R = (A-B)/C x 100 where A = measured concentration of the spike compound in the spiked sample, B = measured concentration of the spike compound in the unspiked sample, C = concentration of the spike compound

Representativeness: Project data must meet the measurement performance criteria for representativeness specified in Section 2.6.2.4 of the UFP QAPP (EPA 2005a).The WP/SAP will include methods and protocols that ensure that samples are accurately representing a parameter or characteristic of a particular site. Collection of background samples is not planned. Representativeness will be ensured through appropriate sampling procedures, selection of analytical methods, sample identification, and COC. The representativeness will be evaluated qualitatively by second-party review of field and laboratory procedures and documentation. Care will be taken to collect samples that represent the conditions to be measured. Laboratory contaminants will be evaluated in accordance with ERP Data Validation SOPs and qualified accordingly. Analytes characterized as probable laboratory contaminants will be flagged and not evaluated further unless other evidence suggests that these analytes should be considered contaminants of concern.

Comparability: Project data must meet the measurement performance criteria for comparability specified in Section 2.6.2.5 of the UFP QAPP (EPA 2005a). Comparability will be applied to data sets of like matrices only. Comparability of data will be controlled by consistent application of the procedures outlined in this document. Analytical methods, reporting limits, and units of measurement for the appropriate analytes will be consistent throughout the project duration. If possible, the same laboratory will be used for all sampling events. To some extent, comparability will depend upon variability of the physical and chemical characteristics of samples taken at different locations. However, these sample matrix effects may be evaluated using MS/MSD and surrogate results. Individual results will be compared to historical data, and inconsistent results will be discussed in the Report.

Completeness: Project data must meet the measurement performance criteria for data completeness specified in Section 2.6.2.6 of the UFP QAPP (EPA 2005a).

Completeness will be assessed in terms of the percent of valid analytical results that are produced and will be based on the data validator's findings. The goal for completeness for each target analyte in each matrix is 90 percent (i.e., no more than 10 percent of analytical data for each target analyte in each matrix deemed unacceptable). If the completeness goal is not achieved, the effect on the recommendations and conclusions will be discussed in the Report.

Sensitivity: Project data must meet the measurement performance criteria for sensitivity specified in Section 2.6.2.3 of the UFP QAPP (EPA 2005a). Sensitivity will be measured by calculating the percent recovery of the analytes at the quantitation limit.

The PARCC (precision, accuracy, representativeness, comparability, and completeness) report will be included in the appendix of the Report.

Any results that impact these PARCCS parameters and may impact the PQOs, will be discussed with the Project Manager, and these impacts will be included in the Report.

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LEGEND

- BUILDINGS
- POI BOUNDARY
- NAVY PROPERTY BOUNDARY LINE

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. POI boundaries are based on current DoN data.

SOURCE

TetraTech CADD drawing - TetraTech, Inc., 2000

Base map - Navy CADD drawings & shapefiles

NORTH

1,700 0 1,700

Scale in Feet

FIGURE 3
SITE LOCATION MAP

REMOVAL SITE EVALUATION - WP/SAP
GOLF COURSE MAINTENANCE SHOP
FORMER NAS BARBERS POINT
KALAELOA, OAHU, HAWAII

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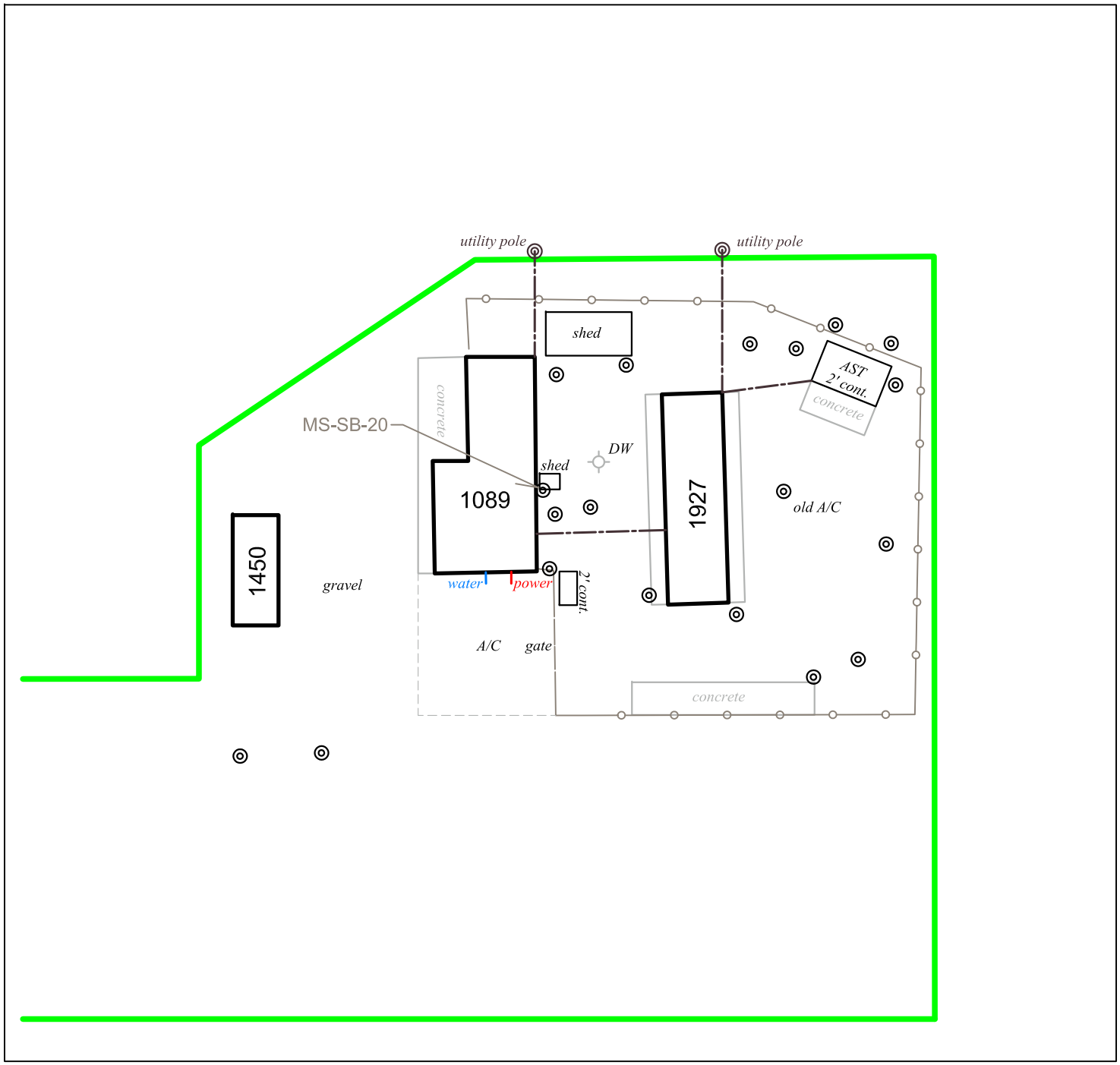


LEGEND

- BUILDINGS
- FENCELINE AND SITE BOUNDARY
- GOLF COURSE MAINTENANCE SHOP SITE
- UTILITY
- SI SAMPLE LOCATION (2001)

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. POI boundaries are based on current DoN data.

SOURCE

TetraTech CADD drawing - TetraTech, Inc., 2000

Base map - Navy CADD drawings & shapefiles

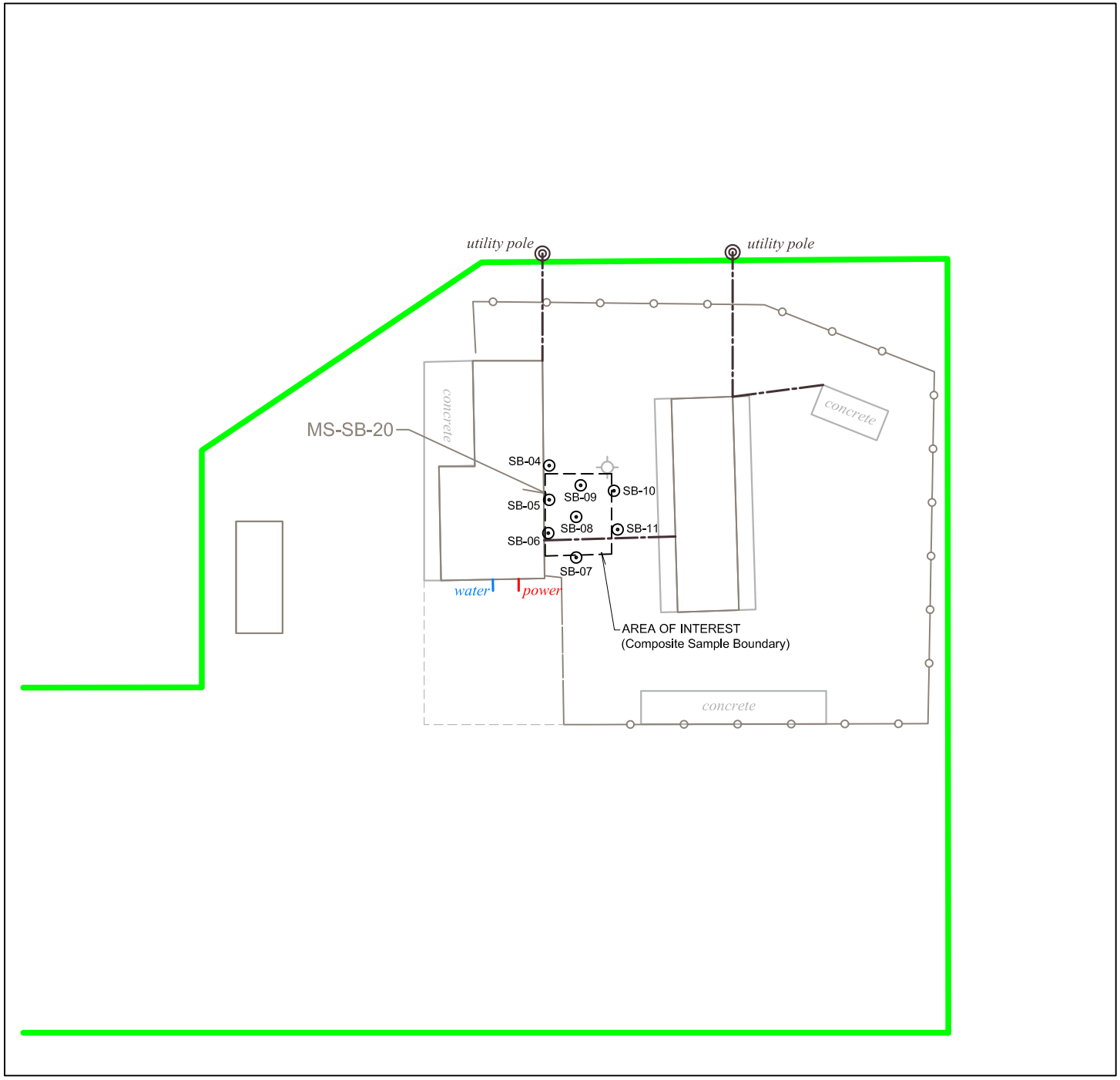
NORTH

70 0 70

Scale in Feet

FIGURE 4
2001 SI SAMPLE LOCATIONS

REMOVAL SITE EVALUATION - WP/SAP
GOLF COURSE MAINTENANCE SHOP
FORMER NAS BARBERS POINT
KALAELOA, OAHU, HAWAII



LEGEND

- BUILDINGS
- FENCELINE
- GCMS BOUNDARY
- DRY WELL
- SUBSURFACE UTILITY
- DISCRETE SAMPLE LOCATION (Depth = 0.5 - 2 feet bgs)

NOTES

1. The accuracy of this document is limited to the quality and scale of the source information. This document is not a legal representation of an engineered survey.
2. GCMS boundary is based on current DoN data.
3. MS-SB-20 is the 2001 SI sample location.
4. Composite sample location depth shall be from 0-0.5 feet below ground surface (bgs).
5. Sample ID numbers will follow the following convention: NASBP-**SB-04**-A-##.# to NASBP-**SB-11**-A-##.#.

SOURCE

TetraTech CADD drawing - TetraTech, Inc., 2000

Base map - Navy CADD drawings & shapefiles

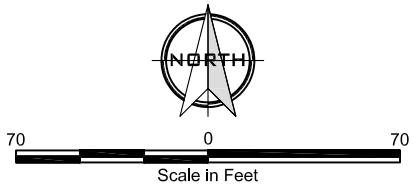


FIGURE 5
PROPOSED SAMPLE LOCATIONS
REMOVAL SITE EVALUATION - WP/SAP
GOLF COURSE MAINTENANCE SHOP
FORMER NAS BARBERS POINT
KALAELOA, OAHU, HAWAII

ATTACHMENT 1

LABORATORY STANDARD OPERATING PROCEDURES
(ON ATTACHED CD ROM)

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ATTACHMENT 2

RESPONSE TO COMMENTS

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Maria Reyes, State Department of Health
Project Title: Draft RSE WP/SAP
Pre-final Barbers Point Golf Course Maintenance Shop
Kalaeloa, Oahu, Hawaii

Item No.	Page, Line, Section No.	Reviewer's Comments	Response to Comments
1	ES, pg 3	Please be consistent with the name of the site. In the cover pages and Worksheet#1, the site is "Golf Course Maintenance Facility" while the rest of the worksheets refer to the site as "Golf Course Maintenance Shop."	The document has been changed throughout to reflect the site name as the *Golf Course Maintenance Shop* (GCMS).
2	Pg 6, List of Figures	Pagination is off; please correct.	The document has been changed as requested.
3	Pg 13, WS #3 Distribution List	Please change Dr. Kawaoka's title to Program Manager.	The document has been changed as requested.
4	Pg 27, Site Description,	Since reference was made to Figure 3 and Figure 3 does not have any labels, please label the military housing and recreational facilities on the figure.	The figure has been changed as requested.
5	Pg 30, Hydrology and Groundwater Classification	last paragraph - Please change "Figure 2" to "Figure 4".	The document has been changed as requested.
6	Pg 30-31, Vegetation/Wildlife	Page 30 & 3 1, Vegetation and Wildlife - Please italicize scientific names.	The document has been changed as requested.
7	Pg 32, Site Inspection Investigation	Besides lead and arsenic, were there any detections for the other analytes (i.e., Total Petroleum Hydrocarbons, Volatile Organic Compounds, Semi-volatile Organic Compounds, Polychlorinated Biphenyls, metals, pesticides, and herbicides) in surface soils. Were there any detections in building materials and groundwater?	The summary of the Site Inspection has been revised to include the following: "Aside from arsenic and lead, the SI report indicated that MCPP, aluminum, barium, cadmium, calcium, chromium, cobalt, copper, iron, magnesium, mercury, nickel, potassium, selenium, sodium, vanadium, zinc, DTT, DDE, 2-butanone, acetone, toluene, 10 SVOCs, PCBs and TPH were detected in surface soils of the GCMS. However, only iron, manganese and TPH as oil-range hydrocarbons were detected at a concentration above the screening criteria. As stated in the SI, "The Navy understands that EPA Region IX is not recommending further

Item No.	Page, Line, Section No.	Reviewer's Comments	Response to Comments
			action for iron detected at levels that exceed the PRG (Earth Tech 1999)." Groundwater of the well adjacent to the GCMS and constructed in May of 2000 was found to have no detects of COPC above screening levels. Therefore, the SI recommended no further action for groundwater of the site." The summary of the SSEBS includes the following: "According to the SSEBS, the GCMS building does not contain LBP." The last paragraph of the section *Previous Environmental Actions, BERA,* has been revised as follows: "Finally, the evaluation of site-specific factors resulted in the conclusion that COPC do not pose an unacceptable ecological risk, and that because the level of ecological risk at the Site was acceptable, the Site should be eliminated from further concern. Therefore, the Step 3a SMDP recommended no further action for eco-receptors of the site."
8	Pg 33, Site Inspection Investigation	second paragraph - Please include the background range of arsenic.	The document has been changed to reflect a background As range of 0.34 - 11 mg/kg (DoN 2006), as requested.
9	Pg 33, BERA	first sentence - Please change "ERA" to "BERA".	The document has been changed as requested.
10	Pg 33, BERA	fifth paragraph - Why was arsenic not evaluated using the Hazard Quotient?	It is unclear from the document specifically. Arsenic is included in the evaluation of eco-risk in Table 3-24, *Step 3a Final Screen for the Omnivorous Mammal - Golf Course Maintenance Shop, Exposure Dose and Hazard Quotient Estimates, Former NAS Barbers Point*; and Table 3-34, *Step 3a Final Screen for the Omnivorous Bird - Golf Course Maintenance Shop, Exposure Dose and Hazard Quotient Estimates, Former NAS Barbers Point*.

Item No.	Page, Line, Section No.	Reviewer's Comments	Response to Comments
11	Pg 36, What are the Project Action Limits?	first paragraph - Please correct information regarding HDOH Environmental Action Levels. Is the groundwater suitable for drinking water? Conflicting information was given on Page 29, Hydrogeology and Groundwater Classification. Is the site more than 150 m from surface waters?	Although the site is located mauka of the UIC line, the groundwater of the upper aquifer, the caprock aquifer, of the site is not suitable as a drinking water source. The document has been revised to indicate that the site is greater than 150 meters from surface waters, and includes amended EALs as applicable.
12	Pg. 36, What type of data are needed?	second paragraph - This paragraph states that a direct-push drilling method might be used. Information on Page 10 indicated that Worksheet #22 was omitted because "no field equipment other than hand tools are required for the project". Please clarify.	The document has been changed to include DP drilling equipment in WS #22 and reference to QC rinsate samples, as requested.
13	Pg. 37, How "good" do the data need to be to support…	It appears that the comment of Steven Mow, third comment on Page 24, was not addressed.	The purpose of the UFP-QAPP is to be site specific with corresponding site-specific measurement performance criteria (MPC). However, there are number of sources of established MPC that are referred to when establishing the site-specific criteria. For example, the *Quality Assurance Program Plan Pearl Harbor Naval Complex* (DoN 2000a) is referenced often in the document, including in WS # 2, Section 1. as a primary source document. The document also refers to ERP SOP III-A, *Laboratory QC Samples* that includes performance criteria for project-specific use. The document includes a summary of criteria in WS #28.
14	Pg. 37, How much data should be collected?	It appears that the comment of Steven Mow, second comment on Page 24, was not addressed. Why is the sample called "composite" and not "multi-increment"? How many samples will comprise the "composite" sample.	The document has been changed to reflect that 20-30 aliquots shall be collected per composite sample. The compositing method to be employed for the project does not include the numerous additional components of MI sampling methods (e.g., replicate, random field [aliquots] samples, aliquot collection frequency and spatial distribution, laboratory homogenization and sub

Item No.	Page, Line, Section No.	Reviewer's Comments	Response to Comments
			sampling, etc.). The MI method, useful in assessing exposure risks by estimating the population mean (μ) and establishing a reliable sample variance (s^2), has not been fully adopted by the Navy at this time. Further, as this is an RSE, risk is considered only secondarily as an approach to site closure, as illustrated in Figure 2, *Project Quality Objectives*.
15	Pg. 37, How much data should be collected?	Please define the decision unit.	The document has been changed to reflect the *area of interest* shown on Figure 5 as the boundary of the surface and subsurface decision units. The third paragraph of WS #17 also includes a description of the Decision Units.
16	Where, when, and how should the data be collected?	It appears that the comment of Steven Mow, fourth comment on Page 24, was not addressed. The information given did not answer the questions "where?", "when?', and "how?" will the data be collected. Citing only the guidance to be used is not adequate.	The document has been revised to include specifics on *where* the samples shall be collected from and the data generated: The area of interest illustrated on Figure 5; *when* the samples shall be collected: Spring 2009; and *how* the data shall be collected: chemical analyses of composite and discrete samples by a Navy-approved laboratory
17	Where, when, and how should the data be collected?	second paragraph - What does "ER" mean? It is not in the acronyms list.	The reference should be to "ERP" which means environmental restoration program, and has been included in the acronyms list as ERP.
18	How will the data be reported?	The first paragraph appears to be misplaced; the information it contains does not belong in this section.	The references to the Navy SOPs/QAPP in the first and third sentence are essential to outlining how the data are reported and ensures uniform generation of data from project to project. For example the ERP procedure I-B1 includes standards for generating field data reports and references ERP procedure I-E, *Soil and Rock Classification*. The following was deleted: "and placed into a cooler chilled with wet ice." We therefore respectfully disagree with the commenter in part.

Item No.	Page, Line, Section No.	Reviewer's Comments	Response to Comments
19	WS #15, Reference Limits and Evaluation Table	Please correct information given in the Notes regarding distance of site to surface waters. Conflicting information was given on Page 36. See comment #I 1.	The document has been changed as requested.
20	WS #16, Project Schedule/Timeline Table	Please update the dates as needed.	The document has been changed as requested.
21	WS #17, Sampling Design and Rationale	Third paragraph - Please include the rationale for the 2 feet depth-sampling limit. Please include the number of sample aliquots to be collected per composite sample.	The document has been changed to reflect that hard rock is encountered at the site at approximately 2 feet or less; and 20-30 aliquots shall be collected per composite sample, as requested.
22	WS #18, Sampling Locations and Methods/SOP Requirements Table	Please change the Number of Samples in the first row to "2".	The document has been changed as requested.
23	Figures	Please correct pagination starting from Figure 3**.** See comment #2.	The document has been changed as requested.
24	Figure 3	Please label some of the surrounding areas outside the Navy property line (e.g., City of Kapolei, communities of Ewa Beach and Ocean Pointe, Honouliuli Treatment Plant, Campbell Industrial Park). Also, please label what island is in the inset.	The document has been changed as requested.
25	Fig. 5	Please label the proposed discrete sampling points according to the ID numbers given in the table on Page 55, Worksheet #18 (e.g., SSC-xx-A or SB-xx-A).	The document has been changed as requested.
26	General Comment	Please make sure acronyms are spelled out on first use and included in the acronyms list.	The document has been changed as requested.
27	Tables	Please make sure that acronyms used in tables are included as a footnote to that table.	The document has been changed as requested.

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