WORK PLAN
RUNWAY STOCKPILES CHARACTERIZATION

HAMILTON ARMY AIRFIELD
NOVATO, CALIFORNIA

Final Submittal

Prepared by:

US Army Corps of Engineers ®

Sacramento District
Environmental Design Section

September 2003

DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ATLANTA FIELD OFFICE
BRAC ENVIRONMENTAL COORDINATOR
HAMILTON ARMY AIRFIELD
1 BURMA ROAD
NOVATO, CALIFORNIA 94949

October 7, 2003

DAIM-BO-A-HA

Subject: Forwarding the *Work Plan Runway Stockpiles Characterization,* for the Main Airfield Parcel; Hamilton Army Airfield, Novato, CA.

Ms. Naomi Feger
Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612

Dear Ms. Feger,

The Army is pleased to provide the *Work Plan Runway Stockpiles Characterization*, for the Main Airfield Parcel; Hamilton Army Airfield, Novato, CA for your files.

If you have any questions, please contact me at (415) 883-6386.

Sincerely,

Edward Keller, P.E.
BRAC Environmental Coordinator
Hamilton Army Airfield

Enclosure

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Work Plan Runway Stockpiles
Hamilton Army Airfield, Novato, CA 94949
September, 2003

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ACRONYMS

DTSC	Department Of Toxic Substances Control
EDS	Environmental Design Section
EKI	Erler and Kalinowski, Incorporated
FSP	Field Sampling Plan
HAAF	Hamilton Army Airfield
mg/kg	milligram/kilogram
OC	Organochlorine
PNA	Polynuclear Aromatic Hydrocarbons
QAPP	Quality Assurance Project Plan
SFBRWQCB	San Francisco Bay Area Regional Water Quality Control Board
SSHP	Site Safety and Health Plan
TPH	Total Petroleum Hydrocarbons
USACE	U.S. Army Corps of Engineers
WP	Work Plan

WORK PLAN
STOCKPILE CHARACTERIZATION
HAMILTON ARMY AIRFIELD

1.0 INTRODUCTION

1.1 SCOPE OF WORK

This Work Plan (WP) presents the project scope, regulatory authorities, site background, and project objectives for the Stockpile Characterization at the Hamilton Army Airfield (HAAF) in Novato, California. The stockpile characterization is designed to collect the data necessary to determine if the stockpiles at HAAF must be removed from the site because of chemicals of concern within the piles.

The US Army Corps of Engineers (USACE), Sacramento District will perform the work.

This WP includes a Field Sampling Plan (FSP), a Quality Assurance Project Plan (QAPP), and a Site Specific Health and Safety Plan (SSHP). The FSP presents detailed field procedures to be followed in performance of the stockpile characterization, sampling strategy and rationale, sampling locations, sample collection methods, and sampling handling procedures. The QAPP presents procedures to ensure data quality objectives are met, including field and laboratory procedures and details of the analytical protocols. The SSHP presents measures to ensure the safety of all field personnel.

1.2 REGULATORY AUTHORITIES

The San Francisco Bay Area Regional Water Quality Control Board (SFBRWQCB) shall administer regulatory oversight.

1.3 SITE BACKGROUND

HAAF is located in Novato, CA. HAAF is a former Air Force Base and Army Airfield. The location of HAAF is shown in Figure 1-1.

1.4 CHEMICALS OF CONCERN

The chemicals of concern for this stockpile characterization are metals, organochlorine (OC) pesticides, polynuclear aromatic hydrocarbons (PNAs), total petroleum hydrocarbons (TPH), and trichloroethene (TCE) and its breakdown products.

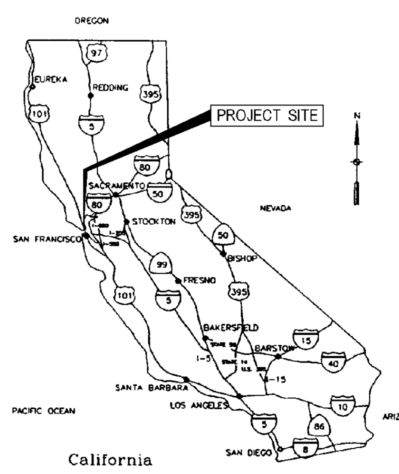

Figure 1-1: Project Location Map

1.5 SAMPLING STRATEGY ISSUES

The following information will be used to determine what stockpiles may be combined or grouped to constitute Stockpile Sets for sampling.

1) Source – Stockpiles from similar sources may be grouped together.
2) Physical location – Stockpiles located near one another may be grouped together.
3) Size of pile – Very small piles will be grouped with others so that each composite sample represents a similar volume.
4) Recent sampling – EKI data removes Group C3 piles from this sampling effort.

Individual stockpiles may be analyzed for specific constituents for the following reasons.

1) No historical data exists.
2) Current concentrations of TPH or PNAs are unknown following degradation, although previous concentrations were above current action goals.
3) Current concentrations of TCE and its breakdown products are unknown following volatilization and degradation, although they were detected previously.

1.6 CONSTITUENT SELECTION

The following information will be used to determine what constituents each Stockpile Set or individual stockpile will be analyzed for.

1) All Stockpile Sets will be analyzed for OC pesticides and metals, unless previously analyzed for the constituent.
2) Representative piles will be resampled and analyzed for TPH-Purgeable (including gasoline range organics) in historical concentration ranges from the ROD/RAP action goal (12 mg/kg) to 50 mg/kg, from 50 mg/kg to 500 mg/kg, and greater than 500 mg/kg. The results will indicate the concentration decrease for all piles with previous data in each concentration range.
3) Representative piles will be resampled and analyzed for TPH-Extractable (including diesel and motor oil range organics) in historical concentration ranges from the ROD/RAP action goal (144 mg/kg) to 500 mg/kg, from 500 mg/kg to 1,000 mg/kg, and greater than 1,000 mg/kg. The results will indicate the degree of degradation for all piles with previous data in each concentration range.

4) The six samples with historical PNA data above the ROD/RAP action goal will be reanalyzed for PNAs to assess degradation since the previous data was collected.

5) Stockpile sets with no previous data will be analyzed for all constituents of concern, including the OC pesticides and metals.

6) All stockpiles with historical detections of VOCs will be reanalyzed for those VOCs, limited to TCE and TCE breakdown products.

1.7 STOCKPILE LOCATIONS

Figure 1-2 shows the locations of the stockpiles.

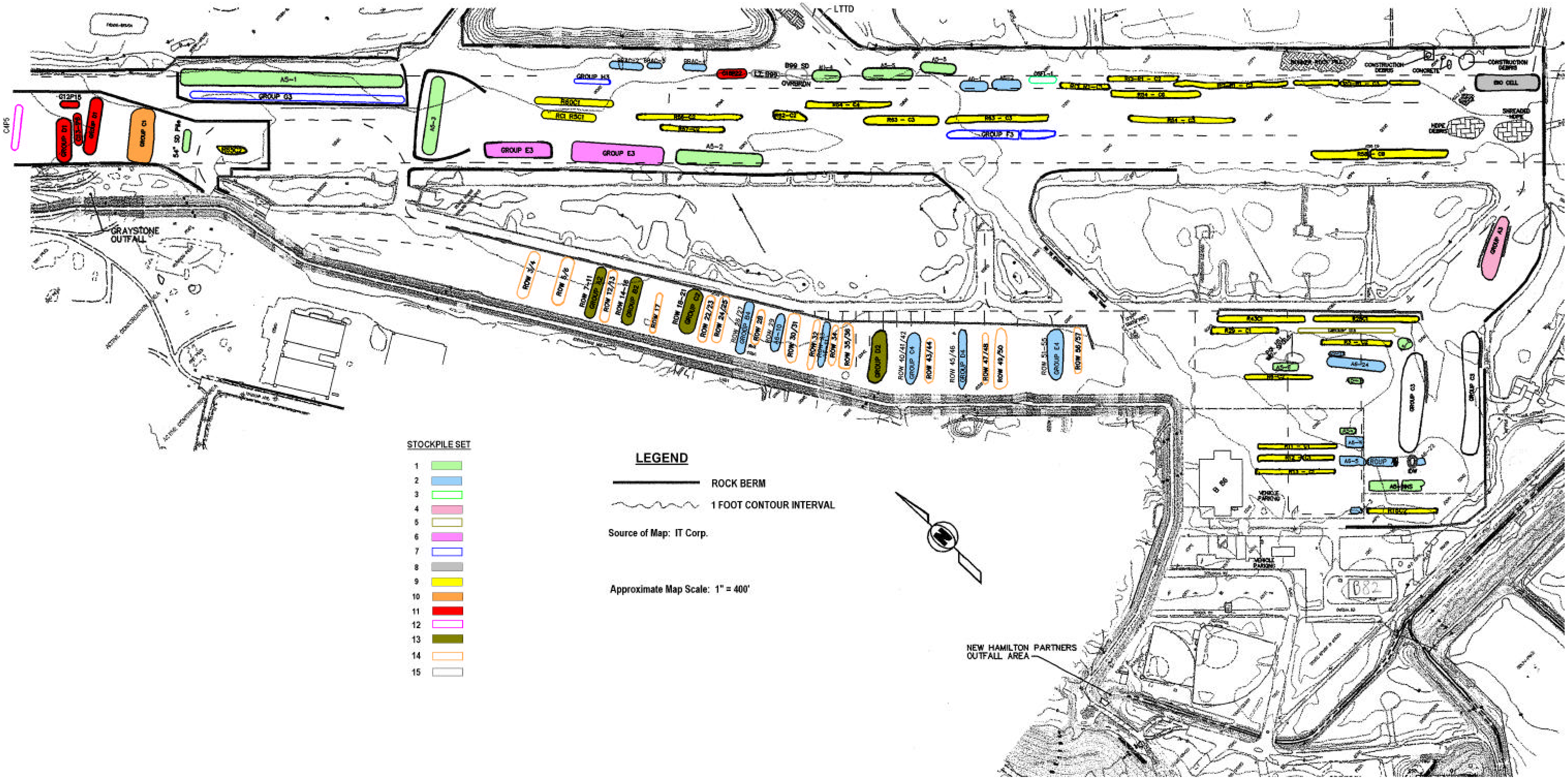

Figure 1-2: Stockpile Locations

2.0 STUDY OBJECTIVES

Stockpiles from previous remedial activities at HAAF remain throughout the inboard area. Much of the inboard area is planned for a future wetland and any soil remaining at this location must be protective of species anticipated to occupy the wetland.

The objective for this Stockpile Characterization is to complete the characterization of the stockpile soils. This information collected will be used to determine if the soil from the stockpiles may be left on-site, with restricted or unrestricted reuse, or must be disposed off-site.

3.0 PROJECT STAFFING AND SCHEDULE

3.1 PROJECT STAFFING

The Environmental Design Section (EDS), Sacramento District, USACE will perform this SCS, under the supervision of Rick Meagher, Section Chief. Key project contacts are:

Person	Responsibility
Chuck Richmond, PE	Environmental Engineer
Kathy Siebenmann	Technical Lead, Chemist
Donna Maxey	Industrial Hygienist

3.2 PROPOSED PROJECT SCHEDULE

The fieldwork for the Stockpile Characterization is scheduled for September 2003. The Field Report will be submitted within 30-days following the receipt and validation of the analytical data.

4.0 REFERENCES

Erler and Kalinowski, Inc., *Results of Investigation of Group 3 Stockpiles, GSA Phase I Sale Area, Former Hamilton Army Airfield, Novato, CA*, 7 August 2003

IT Corporation, *Soil Stockpile Disposition Report for Hamilton Army Airfield, GSA Phase I Sale Area and BRAC Property, Novato, California*, March 1999.

APPENDIX A

DATA QUALITY OBJECTIVES

DATA QUALITY OBJECTIVES
RUNWAY STOCKPILES
CHARACTERIZATION
HAMILTON ARMY AIRFIELD
NOVATO, CALIFORNIA

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September 2003

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DATA QUALITY OBJECTIVES
RUNWAY STOCKPILES CHARACTERIZATION
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1.0 INTRODUCTION

To generate data that will meet the project objectives, it is necessary to define the decisions that will be made, identify the intended use of the data, and design a data collection program. Data Quality Objectives (DQOs) are an integrated set of thought processes, which define data quality requirements based on the intended use of the data. This includes any type of information utilized to form the sampling strategy or achieve the objective, not just analytical data. The DQO process will assist in determining the appropriate sampling design, detection and quantitation limits, analytical methods, and sample handling procedures.

This sampling effort is designed to provide the RWQCB with the data necessary to determine if soil in the existing stockpiles at Hamilton Army Airfield must be removed from the site, if the soils may be used on-site with restrictions, or if the soil in each stockpile may be used unrestricted in the future wetlands area. Historical data from these stockpiles exists and will be used to determine what additional analyses must be performed. In particular, the vast majority of stockpiles have not been analyzed for metals and organochlorine pesticides.

2.0 DQO Steps

The seven steps of the DQO process are presented below.

2.1 State the Problem

Stockpiles of soil from previous remedial activities at HAAF remain throughout the inboard area. Much of the inboard area is planned for a future wetland and any soil remaining at this location must be protective of species anticipated to occupy the wetland. The construction of the wetland will require more soil than exists in-situ in the inboard area and the future owner may wish to use soil from these stockpiles to help make up part of the soil requirement needed to construct the wetlands. However, the available data from these stockpiles is not sufficient to determine if the soil may pose a risk to the wetland species if used unrestricted on-site. The data may also be used for waste characterization purposes for off-site disposal.

2.2 Identify the Decision

The primary decision is to determine if the soil from the stockpiles may be left on-site and reused in the wetlands construction or if it must be removed from the site. A secondary consideration is to determine if the soil from individual stockpiles that can be reused on-site will require cover.

2.3 Identify the Inputs to the Decision

The following information will be used to make the decision regarding the need for off-site disposal.

Information Required	Location of Information	Activity to Provide Information
Historical stockpile data, locations, and sources	HAAF Soil Stockpile Disposition Report (IT 1999) and EKI report (EKI 2003)	None
Action goals for inboard area	HAAF Final ROD/RAP (CH2MHill 2003)	None
Regulatory Guidance for sample quantity	RWQCB Guidance (RWQCB 2002)	None
Metals and organochlorine pesticides not available in historical dataset	To be collected as part of this sampling effort	Collect soil samples representative of stockpiles and analyze for metals and organochlorine pesticides
Constituent concentrations applicable to source of stockpile for piles without data	To be collected as part of this sampling effort	Collect soil samples representative of stockpiles without data and analyze for appropriate constituents
Current concentrations of various other constituents (TPH-E, TPH-P, PNAs, TCE and breakdown products) to verify degradation and/or volatilization	To be collected as part of this sampling effort	Collect soil samples from isolated stockpiles representative of previous concentration ranges for constituents previously above action goals, but likely to have undergone degradation and/or volatilization

2.4 Define the Boundaries

Spatial Boundaries: The physical boundary of the sampling area is the inboard area. The approximate boundary of each stockpile is depicted in Figure 1-2 of the Work Plan.

Temporal Boundaries: The majority of the sampling must take place before the end of Fiscal Year (FY) 2003 due to expiring funds.

2.5 Develop Decision Rule(s)

The RWQCB will be using these data to determine the disposition of the stockpiles. In this process it is anticipated that the RWQCB will use the Record of Decision/Remedial Action Plan (ROD/RAP) Inboard Area Action Goals (CH2MHill) as a reference.

2.6 Consequences of Decision Errors

The decision errors inherent in selecting sampling locations and analyzing chemicals consist of potential errors in sample design, location, heterogeneity, and sample analysis. Any decision errors due to analytical non-conformance will be evaluated during the data review, evaluation and validation process. Data found outside of acceptance criteria during validation will be qualified as estimated or rejected, as appropriate. The nature of the deficiency and the proximity to the associated action level and other quality control measures, such as field duplicates, will be used to assess the usability of the data. Adherence to quality control protocols should reduce the probability of decision errors.

Sample quantity was calculated using the Regional Water Quality Control Board document *Characterization & Reuse of Petroleum Hydrocarbon Impacted Soil as Inert Waste, June 2003 Final.* Composite samples will provide the most representative data for the stockpile(s) for the following reasons: 1) many of these stockpiles have been moved from the original stockpiled areas (near the excavations) and consolidated, thereby increasing the homogeneity of the constituents throughout the stockpile and 2) hotspots are not a concern because any hotspots that may remain in a stockpile currently will be eliminated during the movement, spreading, and consolidation of the soil. Stockpile sets for each composite sample were selected based upon previous data, physical location, and quantity of soil in each stockpile. Once these stockpile sets were determined, each actual sample location within the stockpiles is selected randomly; however, sample depth was selected as 2 feet below the surface of the pile to ensure that surface soil, which may have undergone changes due to exposure to the atmosphere, is not considered representative of the stockpile. Samples will be collected just above the base of the stockpile for those that are not 2 feet high. For all samples, the assumption is that the sampling locations and numbers of samples will be sufficient to meet the objective.

Null Hypothesis: There are no constituents greater than the criteria.

False Rejection Error and Consequences: The data indicate that at least one constituent is greater than the associated criteria (high bias). Restrictions may be placed on the use of the stockpile(s) or they may be required to be transported off-site, at unnecessary cost.

False Acceptance Error and Consequences: The data indicate that no constituents exceed the criteria (false negative or low bias) and the stockpile would remain onsite for future use. Contamination would be left in the future wetland area and could adversely affect the species that inhabit the wetland area. The tolerance for the false acceptance error is extremely low, so any potential for false negatives would be scrutinized during data validation.

2.7 Optimize the Sampling Design

The sampling designs for the stockpile sampling are listed below along with the applicable parameters. More detailed information regarding each stockpile can be found in the attached tables, entitled “Hamilton Army Airfield BRAC and GSA Stockpiled Soil Summary, Composite Sample Stockpile Sets.“ Anticipated accuracy and precision parameters and compound-specific quantitation limits (QLs) are listed in the Quality Assurance Project Plan (QAPP).

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
1	17,000 cubic yards (cy)	4-point composite sampling at least 2 feet beneath surface of pile, if possible	11	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	All BRAC A5 stockpiles. Data gap for constituents detected at Stockpiles C3. All historical data are below action goals except the following: Stockpile A5-12 with at least 1 sample with PNAs, barium, and lead above action goals. See A5-4 and A5-12 resampling below.
2	13,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible	11	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	All BRAC A-5 washrack and A-6 stockpiles. Data gap for constituents detected at Stockpiles C3. All historical data are below action goals except PNAs at BRAC –2. See BRAC-2 resampling below.
3	400	4-point composite sampling at least 2 feet beneath surface of pile, if possible	1	Organochlorine Pesticides/SW8081A, PNAs/SW8270C, TPH-E/SW8015B	On-site Fuel Line from hangar segment. Data gap for pesticides detected at Stockpiles C3. Metals already analyzed. All historical data are below action goals except motor oil and PNAs. Resample for these constituents to monitor biodegradation.
4	4,400	4-point composite sampling at least 2 feet beneath surface of pile, if possible	4	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	All from Group A3. Data gap for constituents detected at Stockpiles C3. All historical data are below action goals except one low-level petroleum hydrocarbon result.

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
5	500	4-point composite sampling at least 2 feet beneath surface of pile, if possible	1	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	All from Group D3. Data gaps for constituents detected at Stockpiles C3. All historical data are below action goals except TPH-P and TPH-E. See D3 resampling below.
6	2,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible	2	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	All from Group E3. Data gaps for constituents detected at Stockpiles C3. All historical data are below action goals.
7	6,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible; discrete samples for TPH-P analysis at least 2 feet beneath surface of pile, if possible.	6	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471, TPH-P/8015B, TPH-E/SW8015B, PNAs/ SW8270C	Groups F3, G3, and H3. No historical data found. Analyze for all chemicals of concern.
8	4,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible.	3	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	Consolidated biocells. Fill data gaps for constituents detected at Stockpiles C3. All historical data are below action goals, except 1 sample for TPH-E.
9	9,500	4-point composite sampling at least 2 feet beneath surface of pile, if possible	9	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	Miscellaneous GSA stockpiles. Fill data gaps for constituents detected at Stockpiles C3. All historical data are below action goals except 4 piles with TPH-P and 1 pile with TPH-E above action goals. See R29C1, RCI R1C1, and RCI R1C2 resampling below.
10	3,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible	2	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	Group C1. Fill data gaps for constituents detected at Stockpiles C3. All historical data are below action goals.
11	5,500	4-point composite sampling at least 2 feet beneath surface of pile, if possible	5	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	Group D1. Fill data gaps for constituents detected at Stockpiles C3. Historical data are below action goals except 1 pile for TPH-E and PAHs and 1 separate pile for TPH-P. See Group D1 and C12P15 resampling below.

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
12	1,500	4-point composite sampling at least 2 feet beneath surface of pile, if possible	1	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471,	GSA C4P5 from under Building 345. Fill data gaps for constituents detected at Stockpiles C3. Historical data are below action goals except TPH-P and TPH-E. See below for C4P5 resampling.
13	7,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible	7	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	GSA piles A2, B2, C2, and D2. Fill data gaps for constituents detected at Stockpiles C3. Historical data are below action goals. Three of the 4 piles contained TCE and breakdown products.
14	14,000	4-point composite sampling at least 2 feet beneath surface of pile, if possible	12	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	GSA miscellaneous piles. Fill data gaps for constituents detected at Stockpiles C3. Historical data are below action goals except 2 piles with PAHs, 3 piles with TPH-E, 1 pile with TPH-P above action goals. See Rows 5&6 and Rows 12&13 resampling below. 7 piles contained TCE and/or breakdown products.
15	1,500	4-point composite sampling at least 2 feet beneath surface of pile, if possible	1	Organochlorine Pesticides/SW8081A Metals/SW6010B, SW7471	LTTD and Building 99 piles. Fill data gaps for constituents detected at Stockpiles C3. Historical data are below action goals. LTTD soil had low level 1,2-DCE, assumed volatilized since sampled in 1996.
TOTAL VOLUME	**90,800**	**TOTAL NUMBER COMPOSITE SAMPLES**	**78**		
REANALYSES FOR INDIVIDUAL PILES					
D3	500	1 discrete sample at least 2 feet beneath surface of pile, if possible	1	TPH-P/SW8015B	Resample to monitor biodegradation of TPH-P concentration for all stockpiles with previous concentrations between action goal and 50 mg/kg in 1995.
RCI R1C2	500	1 discrete sample at least 2 feet beneath surface of pile, if possible	1	TPH-P/SW8015B	Resample to monitor biodegradation of TPH-P concentration for all stockpiles with previous concentrations between action goal and 50 mg/kg in 1995.

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
RCI R1C1	300	1 discrete sample at least 2 feet beneath surface of pile, if possible	1	TPH-P/SW8015B	Resample to monitor biodegradation of TPH-P concentration for all stockpiles with previous concentrations between 50 mg/kg and 500 mg/kg in 1997.
C12P15	500	1 discrete sample at least 2 feet beneath surface of pile, if possible	1	TPH-P/SW8015B	Resample to monitor biodegradation of TPH-P concentration for all stockpiles with previous concentrations greater than 500 mg/kg in 1996.
C4P5	1,500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	3	TPH-P/SW8015B	Resample to monitor biodegradation of TPH-P concentration for all stockpiles with previous concentrations greater than 500 mg/kg in 1996.
A5-4	1,000	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TPH-E/SW8015B	Resample pile to monitor biodegradation of TPH-E concentration for all stockpiles with previous concentrations between action goal and 500 mg/kg in 1997.
R29C1-5, -27	300	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	1	TPH-E/SW8015B	Resample pile to monitor biodegradation of TPH-E concentration for all stockpiles with previous concentrations between 500 mg/kg and 1,000 mg/kg in 1995.
A5-12	2,500	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	5	PNAs/SW8270C	Resample pile to monitor biodegradation of sum of PNA concentrations above action goal.
BRAC-2	1,000	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	PNAs/SW8270C	Resample pile to monitor biodegradation of sum of PNA concentrations above action goal.
Group D1	4,000	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	8	PNAs/SW8270C	Resample pile to monitor biodegradation of sum of PNA concentrations above action goal.
Rows 5 & 6	1,000	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	PNAs/SW8270C	Resample pile to monitor biodegradation of sum of PNA concentrations above action goal.
Rows 12 & 13	1,000	1 composite sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	PNAs/SW8270C	Resample pile to monitor biodegradation of sum of PNA concentrations above action goal.

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
B99 overburden	788	1 composite sample (discrete for TPH-P) at least 2 feet beneath surface of pile, if possible	1	TPH-P/SW8015B TPH-E/SW8015B PNAs/SW8270C	Sample for these constituents because pile never sampled before
Rows 40/41/42 Group C4	2,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	4	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Row 45/46, Group D4	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Group A2, Rows 7,10,11	1,500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	3	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Group B2, Rows 14-16	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Group D2, Rows 37-39	1,500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	3	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Row 32	500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	1	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Row 34	500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	1	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Rows 35&36	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Rows 43&44	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Rows 47&48	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products

Stockpile Set	Estimated Volume (cy)	Sampling Design	Number of Samples	Constituents/ Analytical Method(s)	Rationale
Rows 49&50	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
Rows 56&57	1,000	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	2	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
LTTD1	500	1 discrete sample/ 500 cy at least 2 feet beneath surface of pile, if possible	1	TCE and breakdown products/SW8260B	Resample pile to monitor degradation/volatilization of TCE and breakdown products
		TOTAL NUMBER OF INDIVIDUAL STOCKPILE SAMPLES	57		

ATTACHMENT

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
Stockpile Set 1: BRAC A5					Metals and Organochlorine Pesticides	
A5-1	Outparcel A5	4,700	TPH, PNAs, VOCs, BTEX	Jun. 24 & Oct. 23, '97	Below Action Goals	Stockpiled on north runway, west of Nina's Lake. Soil from Outparcel A5 excavation. 8 discrete and 6 composite PNA, TPH-E, TPH-MO, and VOC samples collected. All PNAs ND or < comparators. The highest DL was 0.058. All TPH ND or < comparator. All VOC ND. HB-4803 to -4807, HB-4809, HB-5360 to -5367.
A5-2	A5	2,750	TPH, PNAs, VOCs, BTEX	Jun. 25 & Oct 24, '97	Below Action Goals except MO MO = 610 MO = 210	Stockpiled mid runway on south edge west of Nina's Lake. Soil from Outparcel A5 excavation. 8 discrete and 3 composite PNA, TPH-E, TPH-MO, and VOC samples collected. All PNAs ND or < comparators. The highest DL was 0.038. All TPH ND or < comparator **except two MO > 144 ppm**. All VOC ND. HB-4810 to -4812, HB-5368 to –5375.
A5-3	A5	4,800	TPH, PNAs, VOCs, BTEX	Jun. 26 & Oct 27, '97	Below Action Goals	Stockpiled perpendicular to upper middle runway. Located near west corner of Nina's Lake. Soil from Outparcel A5 excavation. 7 discrete and 6 composite PNA, TPH-E, TPH-MO, and VOC samples collected. All PNAs ND or < comparators. The highest DL was 0.051. All TPH ND or < comparator. All VOC ND. HB-4813, -4815, -4819, HB-5376, -5377, HB-5379 to -5383.
A5-4	A5	936	TPH, PNAs, VOCs, BTEX	Jun. 26 & Oct 27, '97	Below Action Goals except MO MO = 300, 270, 210, 330	Stockpiled on upper mid runway at intersection of old and new runways. Soil from Outparcel A5 excavation. 8 discrete and 1 composite PNA, TPH-E, TPH-MO, and VOC samples collected. All PNAs ND or < comparators. The highest DL was 0.044. All TPH ND or < comparator **except four MO > 144 ppm**. All VOC ND. HB-4820, HB-5384 to -5391.
A5-5 In two stockpiles	A5	1,960	TPH, PNAs, VOCs, BTEX	Jun. 27 & Oct 28, '97	Below Action Goals	Stockpiled on upper mid runway at intersection of old and new runways. Soil from Outparcel A5 excavation. 8 discrete and 2 composite PNA, TPH-E, TPH-MO, and VOC samples collected. All PNAs ND or < comparators. The highest DL was 0.05. All

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
						TPH ND or < comparator. All VOC ND. HB-5392, HB-5394 to -5400, HB-4822, -4823.
A5-6	A5	370	TPH, PNAs, VOCs, BTEX	Jun. 27 & Oct 28, '97	Below Action Goals	Located at upper south apron east from former Bldg. 86. Soil from Outparcel A5 excavation. 2 PNA, TPH-E, TPH-MO, and VOC samples and one 4-point composite sample collected. PNAs ND or < comparators. The highest DL was 0.042. All TPH ND or < comparator. All VOC ND. HB-5358, HB-5359.
A5-7	A5	130	TPH, PNAs, VOCs, BTEX	Jun. 27 & Oct 28, '97	Below Action Goals	Located at mid south apron east from former Bldg. 86. Soil from Outparcel A5 excavation. 2 PNA, TPH-E, TPH-MO, and VOC samples and one 4-point composite sample collected. PNAs ND or < comparators. The highest DL was 0.037. All TPH ND or < comparator. All VOC ND. HB-5401, HB-5402.
A5-8	A5	400	TPH, PNAs, VOCs, BTEX	Jun. 27 & Oct 28, '97	Below Action Goals	Located adjacent to north end of Group C3 west stockpile, on south apron Soil from Outparcel A5 excavation. 2 PNA, TPH-E, TPH-MO, and VOC samples and one 4-point composite sample collected. PNAs ND or < comparators. The highest DL was 0.039. All TPH ND. All VOC ND. HB-4824, HB-5403 to -5404.
A5-10	A5	120	TPH, PNAs, VOCs, BTEX	Jun. 27 & Oct 28, '97	Below Action Goals	Located at upper south apron, northwest of Group C3 west stockpile. Soil from Outparcel A5 excavation. 2 PNA, TPH-E, TPH-MO, and VOC samples and one 4-point composite sample collected. PNAs ND or < comparators. The highest DL was 0.036.All TPH ND All VOC ND. HB-5405 to -5406.
A5-12	A5	670	TPH, PNAs, VOCs, BTEX, METALS	Jun. 27 & Oct 29, '97	All below action goals except PNAs, barium, and lead 3PNAs = 11.1 mg/kg Barium 202 to 1,610 mg/kg Lead 50.4 mg/kg	Located at upper south apron, north of Group C3 west stockpile. Soil from Outparcel A5 excavation. 9 PNA, TPH-E, TPH-MO, and VOC samples collected. PNAs ND or < comparators **except sample HB-5409.** All TPH ND or < 144 ppm. All VOC ND. All metals < comparators **except for 5 detections of barium above comparators, and one detection of lead.** HB-4825, HB-5409 to -5416.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
					(action goal 46.7)	
A5-Bins	A-5	80	TPH, PNAs, VOCs, Pesticides, Metals	Apr. '96	All Below Action Goals except TPH-gas Previous data may or may not pertain to the soil remaining on-site, so composite with other piles from A-5.	Located at lower south apron, northeast of Bldg. 82. Soil from Outparcel A5 excavation. See Technical Memoranda 08, 09, 12, 14, & 16 for analytical results and disposition. 1 - 4-point composite sample collected from each bin. All PNAs ND. **TPH-g detected at 18 mg/kg.** All metals < comparators. Technical Memorandum (TM) #09 includes analytical data from composite samples that have TPH –G and TPH-D values that range from 2.8 to 3,400 mg/kg TPH-G and from 63 to 1,800 mg/kg for TPH-D. Presumably, some of these values were included in bins that were removed from the facility for class II disposal. However, the composite samples that were subsequently collected from 39 discrete bins were analyzed for PCBs and Pesticides only and did not have TPH analyses. The TM No. 12 indicates the plan was to dump the bins that had no PCBs or pesticides onto the "Below Cleanup Goal" (BCG) stockpile. The 16 bins to be dumped would have contained approximately 590 tons or approximately 450 cy of soil. Although there are only 80 cy, this pile may need sampling.
54-inch Storm Drain Pile	54-inch Storm Drain Pile	440	TPH	NA	Associated data indicate TPH – assume biodegradation since 90s	Located near to the original excavation. At mid runway, northwest end just southeast of Group C1. Text of the stockpile disposition report mentions the excavations then provides no apparent backup documentation regarding characterization. The Figure 5-75 View F in the CRIR confirmation samples from pothole samples near the excavation indicates UPH ranging from ND to 220 mg/kg and TPH-Diesel ranging from ND to 330 mg/kg. Lead detections above the comparators also are indicated in the CRIR. This pile may need to be sampled or correct sample labels identified in report.
TOTAL BRAC A-5 VOLUME		**17,356**	NO. COMPOSITES PROPOSED		**11**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
STOCKPILE SET 2: BRAC A5&A6					Metals, Organochlorine Pesticides	
BRAC-2	A5, WASH RACK	875	TPH, PNAs, VOCs, BTEX	Jun. 30, 1997	Below Action Goals except PNAs. 3PNAs = 10.956 mg/kg	Located on runway at southwest side of Nina's Lake, Soil from Outparcel A5 wash rack excavation. 1 PNA, TPH-E, TPH-MO, and VOC sample collected. Some PNAs ND, **other detections > comparators**. All TPH-E ND or < the comparator -144 mg/kg. All VOC ND. HB-4829.
BRAC-3	A5, WASH RACK	143	TPH, PNAs, VOCs, BTEX	Jun. 30, 1997	Below Action Goals	Located south of Nina's Lake, Soil from Outparcel A5 wash rack excavation. 1 PNA, TPH-E, TPH-MO, and VOC sample collected. PNAs ND or < comparators. The DL was 0.037. All TPH ND. All VOC ND. HB-4830.
BRAC-4	A5, WASH RACK	460	TPH, PNAs, VOCs, BTEX	Jun. 30, 1997	Below Action Goals	Located south of Nina's Lake, Soil from Outparcel A5 wash rack excavation. 1 PNA, TPH-E, TPH-MO, and VOC sample collected. All PNAs ND. The DL was 0.036. All TPH ND or < 144 mg/kg. All VOC ND. HB-4831.
GROUP A4	A6-6 to A6-7	448	TPH-E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron northeast of Bldg. 82. Soil from Outparcel A6 excavation. 2 PNA, TPH-E, TPH-P, BTEX, and VOC samples collected. All PNAs ND or < comparators. The higher DL was 0.038 mg/kg. All TPH ND. All BTEX ND but J flagged for sample A6-6. All VOC ND. HB-4848, HB-4849.
ROWS 26/27, GROUP B4	A6-8 to A6-9	1,187	TPH-E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on-site northeast of the Hangars at upper mid apron. Soil from Outparcel A6 excavation. 2 PNA, TPH-E, TPH-P, BTEX, and VOC samples collected. PNAs ND. The higher DL was 0.053 mg/kg. All TPH ND but A6-9 results J flagged. All BTEX ND but A6-8 results J flagged. All VOC ND but A6-9 results J flagged. HB-4850, HB-4851.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
ROWS 40/41/42, GROUP C4	A6-12 to A6-14	2,050	TPH-E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals except TCE TCE > SQRT in 1 sample Resample for VOCs.	Stockpiled on-site northeast of the Hangars at lower mid apron. Soil from Outparcel A6 excavation. 3 PNA, TPH-E, TPH-P, BTEX, and VOC samples collected. PNAs ND or < comparators. The highest DL was 0.053 mg/kg.. All TPH ND or less than comparators. All BTEX ND. All VOC ND **except A6-12 and A6-14 trichloroethene results at 0.017 J- and 0.45**. VOC ND results J flagged on samples A6-12 & A6-13. HB-4854 to -4856.
ROW 45/46, GROUP D4	A6-15, A6-16	1,283	TPH-E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals except TCE TCE > SQRT 1 location Resample for VOCs.	Stockpiled on apron east of Outparcel A4, Soil from Outparcel A-6 excavation. 3 PNA, TPH-E, TPH-P, BTEX, and VOC samples collected. All PNAs ND. The highest DL was 0.051 mg/kg. All TPH ND but TPH-P results J flagged. All BTEX ND. All VOC ND **except trichloroethene results of 0.012 J-, 0.096 J- and 0.56 mg/kg for A6-15, A6-16 and A6-16 dup respectively.** HB-4857 to -4859.
ROW 51-55, GROUP E4	A6-17 to A6-21	2,913	TPH –E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron east of Outparcel A4. Soil from Outparcel A-6 excavation. 5 PNA, TPH-E, TPH-P, BTEX, and VOC samples collected. All PNAs ND. The highest DL was 0.055 mg/kg. All TPH ND or < comparators, and TPH-P results J flagged. All BTEX and all VOC ND, but A6-19 & A6-20 VOC results J flagged. HB-4860 to -4864.
A6-1	A6-1	490	TPH –E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on runway at intersection of old and new runways. Soil from Outparcel A-6 excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND. The DL was 0.046 mg/kg. All TPH ND. All BTEX ND. All VOC ND, but VOC results J flagged. HB-4842.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
A6-2	A6-2	580	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on runway at intersection of old and new runways. Soil from Outparcel A6 excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND except the following: dibenz(A,H) anthracene, fluoranthene, pyrene. ∑ PNAs Below Action Goals. The DL was 0.036 mg/kg. All TPH ND. All BTEX ND. All VOC ND. HB-4843.
A6-3	A6-3	147	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron north of Bldg. 82. Soil from Outparcel A-6 excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND. The DL was 0.043 mg/kg. All TPH ND or < comparators. All BTEX ND. All VOC ND, but J flagged. HB-4844.
A6-4	A6-4	149	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron north of Bldg. 82. Soil from Outparcel A-6 excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND with benzo(K)fluoranthene result J flagged. The DL was 0.04 mg/kg. All TPH, All BTEX, and All VOC ND, but J flagged. HB-4845.
A6-5	A6-5	439	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron north of Bldg. 82. Soil from Outparcel A-6 excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND with dibenz(A,H)anthracene result J flagged. The DL was 0.049 mg/kg. All TPH ND. All BTEX ND. All VOC ND. HB-4846, HB-4847.
A6-10, ROW 29	A6-10	542	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron east of Hangars. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND with benzo(K)fluoranthene result J flagged. The DL was 0.054 mg/kg. All TPH ND. All BTEX ND. All VOCs ND but J flagged. HB-4852.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition - Comments
A6-11, ROW 33	A6-11	598	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals, including TCE < SQRT	Stockpiled on apron east of Hangars. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND. The DL was 0.059 mg/kg. All TPH ND. All BTEX ND. All VOCs ND except trichloroethene result at 0.0081 J- and all VOC results J flagged. HB-4853.
A6-22	A6-22	109	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Stockpiled on apron northeast of Bldg. 82. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND with benzo(K)fluoranthene result J flagged. The DL was 0.035 mg/kg. All TPH ND. All BTEX ND. All VOCs ND. HB-4865.
A6-24	A6-24	805	TPH–E, TPH-P, PNAs, VOCs, BTEX	Jul. 1, '97	Below Action Goals	Located northeast of Bldg. 82 at upper south runway. Soil from storm drains and excavation Outparcel A6. 1 PNA, TPH-E, TPH-P, BTEX, and VOC sample collected. All PNAs ND with benzo(A)anthracene and benzo(B)fluoranthene results J flagged. The DL was 0.036 mg/kg. All TPH ND. All BTEX ND. All VOCs ND. HB-4867.
TOTAL BRAC A5 and A6 VOLUME		**13,218**	NO. COMPOSITES PROPOSED		**11**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition – Comments
Stockpile Set 3: OSFL					DDTs	
OSFL – 1	OSFL from Hangar Segment	371	TPH-E, BTEX, PNAs, METALS	Oct. 29,'97	Below Action Goals except ∑ PNAs ∑ PNAs = 41.15 (HB-5417) ∑ PNAs = 7.424 (HB-5420)	Stockpiled on runway east of intersection between old and new runways. 4 PNA, TPH-E, BTEX, VOCs, and METALS samples were collected. All PNAs in two samples were ND. **Two other samples had reported values within two orders of magnitude of the comparators.** The highest DL was 0.045 mg/kg. All TPH ND **except one value for motor oil at 260 ppm in sample HB-5418.** All BTEX ND. All VOCs ND. All metals < comparators except antimony with detection limits above the comparator value. OSFL – HB-5417-5420, Table D-2c.
TOTAL OSFL VOLUME		**371**	NUMBER OF COMPOSITES PROPOSED:		**1**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 4: A-3, GSA-1					Metals, Organochlorine Pesticides	Group A3 located at apron at south end of runway. Consolidated from 15 stockpiles.
R7C1-08, 10, 14, 19, 4, 1 Group A3	06, 07	675	UEH, UPH,PNA	Aug. 7, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 5 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DL was 0.15 mg/kg. All TPH ND or < comparator. HG-0443 to HG-0447.
R8C1 –11 Group A3	02	256	UEH, UPH,PNA	Aug. 7, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1PNA, TPH-E, TPH-P sample collected. All PNAs ND. The DL was 0.11 & 0.43 mg/kg. All TPH ND. HG-0451.
R8C2 –13 Group A3	19	257	UEH, UPH, PNA	Aug. 7, '95	Below Action Goals except UPH	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The DL was 0.051, 0.16, & 0.62 mg/kg. All TPH ND or < comparators **except UPH at 23 mg/kg**. HG-0449.
R9C1 -4, -8, -11, -16 Group A3	02	245	UEH, UPH, PNA	Aug. 7, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 4 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.17 & 0.67 mg/kg. All TPH ND. HG-0452 to -0455.
R10C2 -2, -6, -14 Group A3	07, 30	165	UEH, UPH, PNA	Aug. 7, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.17 & 0.67 mg/kg. All TPH ND or < comparators. HG-0457 to -0459.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R19C1 -1, -9, -11 Group A3	25, 30	289	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 3 R19C1 –1, -9, -11 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.15 & 0.61 mg/kg. All TPH ND. HG-0507, HG-0508, HG-0510.
R23C1 –2, -11, -23, -25 Group A3	07, 19, 30	436	UEH, UPH, PNA	Aug.11, '95 Aug. 10, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 4 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.17 & 0.7 mg/kg. All TPH ND or < comparators. HG-0471, HG-0499, HG-0501, HG-0502.
R35C1 Group A3	No data found	229	UEH, UPH, PNA	NA	Can't separate out this pile/area from A3 stockpile. Assume similar concentrations because from same sources	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. Consolidated in A3.
R36C1-3 Group A3	08	187	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The DLs were 0.16 & 0.65 mg/kg. All TPH ND or < comparators. HG-0469.
R37C1 Group A3	No data found	303	UEH, UPH, PNA	NA	Can't separate out this pile/area from A3 stockpile. Assume similar concentrations because from same sources	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. Consolidated in A3

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Source Location	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R38C1-17, -35 Group A3	20	379	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 2 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.18 & 0.71 mg/kg. All TPH ND. HG-0515, HG-0516.
R38C2-4 Group A3	20	124	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The DLs were 0.14 & 0.54 mg/kg. All TPH ND or < comparators. HG-0514.
R39C1-13, -19, -47 Group A3	20	444	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.16 & 0.66 mg/kg. All TPH ND or < comparators. HG-0517 to -0519.
R41C1-5 Group A3	20	213	UEH, UPH, PNA	Aug. 8, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.16 & 0.63 mg/kg. All TPH ND. HG-0525.
R42C1-15 Group A3	08	214	UEH, UPH, PNA	Aug. 16, '95	Below Action Goals	Group A3 located at apron at south end of runway. Soil from storm drains and excavation. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.13 & 0.54 mg/kg. All TPH ND or < comparators. HG-0541.
Total Volume A-3, GSA-1		**4,416**	NO. COMPOSITES PROPOSED		**4**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 5: D3, GSA-1					Metals, Organochlorine Pesticides	Consolidated – R2C3, R2C4
R2C3-2, -6 Group D3	01	150	UEH, UPH, PNA	Aug. 4, '95	Below Action Goals except TPH	Consolidated into Group D3 pile located at upper south apron, northeast of Group C3 west pile. Source: Lot 1 – Jet Engine Test Facility, Lots 1 & 2 – Fuel Distribution Lines, Lot 3 – Hangar Ave. Fuel Lines. 2 PNA, TPH-E, TPH-P samples collected. All PNAs ND The highest DLs were 0.16 & 0.62 mg/kg. All TPH ND **except TPH-G at 20 mg/kg and TPH-D at 160 mg/kg in sample –2.** R2C3-2, -6, HG-0431, -0432.
R2C4-2, -4, -9 Group D3	01	350	UEH, UPH, PNA	Aug. 4, '95	Below Action Goals	Consolidated into Group D3 pile, Soil from excavation see above sources. 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.16 & 0.65 mg/kg. All TPH ND or < comparators. R2C4-2, -4, -9. HG-0428 to -0430
TOTAL VOLUME D-3, GSA-1		**500**	NO. COMPOSITES PROPOSED		**1**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 6: E-3, GSA-1					Metals, Organochlorine Pesticides	Consolidated west of Nina's Lake in two stockpiles – BCG Pile 1, R64C1,
R64C1-30 Group E3	16	1,200	UEH, UPH, PNA	Aug. 1, '95	Below Action Goals	Former BCG Pile 1. Consolidated into Group E3 pile, Soil from excavations at Lot 3 & Lot 8. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The DLs were 0.18 & 0.72 mg/kg. All TPH ND. R64C1-30. HG-0322
R16C2-19	07	339	UEH, UPH, PNA	Aug. 8,'95	Below Action Goals	Located on south apron northeast of Bldg. 82. Stockpile was associated with the Lots 3 & 8. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.14 & 0.57 mg/kg. All TPH ND or# comparators. Sample HG-0513
R64C1-31 Group E3	29	330	UEH, UPH, PNA	Aug. 2, '95	Below Action Goals	Consolidated into Group E3 pile, Soil from excavations at Lot 3 & Lot 8. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND except fluorene at 0.16mg/kg. The DL was 0.08 mg/kg. All TPH ND or < comparators. R64C1-31. HG-0324
TOTAL VOLUME E-3, GSA-1		**1,869**	NO. COMPOSITES PROPOSED		**2**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 7: F3, G3, H3, GSA-1					TPH-P, TPH-E, Organochlorine Pesticides, Metals, PNAs	
GROUP F3 2 piles	GSA –I	2,526	Unknown	NA	No information	Former BCG Pile 2 Located at mid runway at intersection of runways. Source unclear, data unknown.
GROUP G3	GSA -I	2,613	Unknown	NA	No information	Located west of Nina's Lake parallel to Stockpile A5-1 composed of Row -67, Cell-1, Source: Lot 3, Hangar Ave Fuel Lines. Data Not Found (DNF)
GROUP H3	GSA -I	912	Unknown	NA	No information	Located on mid runway west of Nina's Lake - DNF
TOTAL VOLUME F3, G3, H3, GSA-1		**6,051**	NO. COMPOSITES PROPOSED		**4**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 8: BIOCELL, GSA-1					Metals, Organochlorine Pesticides	Consolidated from 3 piles near east corner of runway according to map. 12 Confirmation samples.
	Area 1	485	UEH, UPH	May 8, '97	Below Action Goals	All TPH-G &D and UPH, UEH were non detect or < comparators except HG-3453 with UEH at 240 J+ mg/kg. HG-3452 to –3454.
	Area 2	2,250	UEH, UPH	May 8, '97	Below Action Goals	All TPH-G &D and UPH, UEH were non detect or < comparators. HG-3447 to –3451.
	Area 3	1,325	UEH, UPH	May 8, '97	Below Action Goals	All TPH-G &D and UPH, UEH were non detect or < comparators. HG-3442 to –3446.
TOTAL VOLUME BIOCELL, GSA-1		**4,060**	NO. COMPOSITES PROPOSED		**3**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 9: Miscellaneous Rows, GSA-1					Metals, Organochlorine Pesticides	
R3C2-7, -8, -9, -13, -25	06, 25, 32	291	UEH, UPH, PNA	Aug. 4,'95	Below Action Goals	Located on Apron north of Group C3 west pile. Source: Lot 3 – Hangar Ave. Fuel Lines; Lot-8 – Plan Location 5. 5 UEH, UPH, PNA samples collected. All PNAs ND. The highest DLs were 0.17 & 0.67 mg/kg. All TPH ND or# comparators. HG-0434 to-0439.
R6C2-1	01	350	UEH, UPH, PNA	Aug. 7,'95	Below Action Goals	Located on south apron northeast of former Bldg. 86. Lots 1&2 Fuel Distribution Lines. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.17 & 0.69 mg/kg. All TPH ND or < comparators. Sample HG-0442.
R11C1-3, -20	25	337	UEH, UPH, PNA	Aug. 7,'95	Below Action Goals	Located on south apron north of Bldg. 82. Lot 3 – Hangar Ave. Fuel Lines; Lot-8 – Plan Location 5. 2 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.14 & 0.57 mg/kg. All TPH ND or < comparators. Sample HG-0460, -0462

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R12C1	Data Not Found	323	UEH, UPH, PNA	NA	Assume data similar to R6-C2, R3C2, R11C1, all Below Action Goals, from same sources	Located on south apron east of former Bldg. 86. Lots 1&2 Fuel Distribution Lines. Lot 3 – Hangar Ave. Fuel Lines. Stockpile was associated with the Lots 1 & 2 Fuel Distribution Lines and Lot 3 Hangar Ave Fuel distribution lines. Uncertain if PNA, TPH-E, TPH-P sample collected.
R13C1-16, -30	07	363	UEH, UPH, PNA	Aug. 7,’95	Below Action Goals	Located on south apron north of Bldg. 82. 2 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.17 & 0.67 mg/kg. All TPH ND. HG-0463, -0465
R28C1-35, -37	08, 26	446	UEH, UPH, PNA	Aug. 10,’95	Below Action Goals	Located on south apron north of Bldg. 82 & north of Group C3 west pile. 2 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The higher DL was 0.049 mg/kg. All TPH ND or < comparators. Sample HG-0463, -0465
R29C1-5, -27	20	294	UEH, UPH, PNA	Aug. 10,’95	Below Action Goals except UEH	See Group B3 above. Located on apron north of former Bldg. 86. Source: Lot 8 Battery Shop. 2 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The higher DL was 0.24 mg/kg. All TPH ND or < comparators **except UEH at 670 J mg/kg.** Samples HG-0481, -0482.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R43C1-24	08	350	UEH, UPH, PNA	Jul. 26,'95	Below Action Goals	Located on apron north of former Bldg. 86. Source: Lot 8 Battery Shop and Lot3 Hangar Ave. fuel lines. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The highest DLs were 0.14 & 0.56 mg/kg. All TPH ND or < comparators. Sample HG-0197.
R54C4-5, -51, -71, -77	11	300	UEH, UPH, PNA	Jul.31,'95	Below Action Goals	Located mid runway at intersection of old and new runways. Source: Lot 8 Plan Location 6/10 and Lot 3 Hangar Ave. fuel lines. 4 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DL was 0.57 mg/kg. All TPH ND or < comparators. Samples HG-0277, -0279, -0280, -0283. The last 3 samples were for soil used in NHP levee construction. Sample –5 was all ND.
R54C6-6, -27, -54	14, 29	359	UEH, UPH, PNA	Jul. 27,'95	Below Action Goals	Located mid runway south and east of runway intersections. Source: Lot 8, Plan Location 5 and Lot 3 Hangar Ave. fuel lines. 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.077 mg/kg. All TPH ND or < comparators. Samples HG-0226, -0227, -0229.
R56C2-45	12	437	UEH, UPH, PNA	Jul.31,'95	Below Action Goals	Located mid runway west of Nina's Lake. Source: Lot 3 Hangar Ave. fuel lines. 1 PNA, TPH-E, TPH-P sample collected. All PNAs ND. The DL was 0.059 mg/kg. All TPH ND or < comparators. Sample HG-0272

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R57C2	Data not found	434	UEH, UPH, PNA	NA	Assume similar to R58C9, -13, -44, -65, -85 due to same source	Did not find data. Located mid runway south of Nina's Lake. Source: Lot 3 Hangar Ave. fuel lines.
R58C9-13, -44, -65, -85 2 piles	14, 34	577	UEH, UPH, PNA	Jul.27,'95	Below Action Goals	Located mid runway south of Nina's Lake. Source: Lot 3 Hangar Ave. fuel lines. 4 PNA, TPH-E, TPH-P samples collected. All PNAs ND or <comparators The highest DL was 0.18 mg/kg. All TPH ND or < comparators. Sample HG-0210 to –0214
R60C1-16, -31, -42, -71, -95	15, 36	545	UEH, UPH, PNA	Aug.02,'95 Aug.03,'95	Below Action Goals except UGH slightly above AG.	Located mid runway west of Nina's Lake. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10, Lot 8 Battery Shop. 5 PNA, TPH-E, TPH-P samples collected. All PNAs ND or <comparators. The highest DL was 0.051 mg/kg. All TPH ND or < **comparators except sample HG-0351 with UGH at 13 J mg/kg**. Sample HG-0349 to –0352 and -0354
R62C2-19, -21, -33	29, 36	312	UEH, UPH, PNA	Jul.25,'95	Below Action Goals	Located mid runway southeast of Nina's Lake on west side of intersection of runways. Source: Lot 8 Plan Location 6/10, Lot 8 Battery Shop, Lot 8 Plan Location 5. 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DL was 0.07 mg/kg. All TPH ND or < comparators. Sample HG-0129, -0130- 0131

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R63C3-1, -6, -8, -14, -25, -28, -40, -47, -52, -54	4	409	UEH, UPH, PNA	Aug.16,'95 Aug.17,'95	Below Action Goals	Located mid runway southeast of Nina's Lake at the intersection of runways. Source: Lots 1 and 2 – Fuel distribution lines. 10 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.14 mg/kg. All TPH ND or < comparators. Sample HG-0529 to –0537 & -0539.
R63C3-03, -09, -30, -51, -72, -91, -92	18	285	UEH, UPH, PNA	Jul. 25,'95 Aug.11,'95	Below Action Goals	Located mid runway southeast of Nina's Lake on east side of intersection of runways. Source: Lots 1 and 2 – Fuel distribution lines. 7 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.15 mg/kg. All TPH ND or < comparators. Sample HG-0121 to -0123 & -0125 to –0128
R64C3-18, -23, -24, -43, -45	16, 36	503	Diesel/JP-4	Jul.24,'95	Below Action Goals	Located mid runway southeast of Nina's Lake on east side of intersection of runways. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Battery Shop. 5 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DL was 0.17 mg/kg. All TPH ND or < comparators. Sample HG-0094 to –0096, -0101 & -0102

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
R65C2-6, -8, -22, -22, -33, -36, -42	05	260	UEH, UPH, PNA	Jul.26,'95 Aug.10,'95 Aug.16,'95	Below Action Goals except UGH.	Located mid runway west of Nina's Lake and west of stockpile A5-1 with UTB group of stockpiles. Source: Lots 1 and 2 – Fuel distribution lines. Lot 3 Hangar Ave. fuel lines. 7 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators The highest DL was 0.15 mg/kg. All TPH ND or < comparators **except HG-0540 with 14 J mg/kg UPH**. Sample HG-0155 to –0159 and -0161, also HG-0540
RCI R1C1-2, -13, -28, -46, -50, -62, -79, -89, -101	38, 42	~300	UEH, UPH, PNA	07/07/97	Below Action Goals except UGH Resample this pile for TPH-P to verify biodegradation	Located mid runway southeast of Nina's Lake on east side of intersection of runways. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10 (2nd St.). 9 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.18 mg/kg. All TPH ND or < comparators **except HG-0545 with UGH at 280 J mg/kg and HG-0564 with 36 J mg/kg.** Sample HG-0545 to -0547 & -058 to -0560, -0562 to –0564.
RCI R1C2-41, -61, -98, -111	42	400	UEH, UPH, PNA	Aug.17,'95	Below Action Goals	Located upper runway at southeast end. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10 (2nd St.). 4 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.19 mg/kg. All TPH ND or < comparators. Sample HG-0565 to –0567, -0569

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
RCI R1C2-11, -12, -30, -44, -60, -74, -126, -139, -150	38, 39	420	UEH, UPH, PNA	Jul.27,'95	Below Action Goals except UPH	Located upper runway at southeast end. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10 (2nd St.). 9 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.21 mg/kg. All TPH ND or < comparators **except HG-0222 with UPH at 42 mg/kg.** Sample HG-0215 to –0219, -0221 to -0224
RCI R1C3-10, -26, -36, -41, -55, 72 In 3 piles	39, 43	371	UEH, UPH, PNA	Aug.11,'95 Aug.18,'95	Below Action Goals	Located upper runway at southeast end. Source: Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10 (2nd St.). 6 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DL was 0.2 mg/kg. All TPH ND or < comparators. Sample HG-0194, -0195, -0571, -0573, HG-0575, -0576
RCI R5C1-4, -19, -23	41	360	UEH, UPH, PNA	Aug.01,'95	Below Action Goals	Located mid runway west of Nina's Lake near Group E3. Source: Resample Lot 3 Hangar Ave. fuel lines, Lot 8 Plan Location 6/10 (2nd St.). 3 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.16 and 0.65 mg/kg for Naphthalene. All TPH ND or < comparators. Sample HG –0316, –0318, -0319
TOTAL VOLUME MISCELLANEOUS ROWS, GSA-I		**9,365**	NO. COMPOSITES PROPOSED		**9**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanation	Disposition – Comments
Stockpile Set 10: C1, GSA UTB					Metals, Organochlorine Pesticides	
GROUP C1	C15P19, C16P20	2,952	TPH, PNA, BTEX	Jul.10,'96 Jul.11,'96	Below Action Goals	Located with UTB group north end of runway. Consolidated - C15P19, C16P20. Source: BLDGS. 309 and 410, 8 PNA, TPH-E, TPH-P samples collected. For Bldg. 309 All PNAs ND. The highest DLs were 0.17 and 0.67 mg/kg. All TPH ND. For Bldg. 410: All PNAs ND or < comparators. The highest DLs were 0.19 and 0.77 mg/kg. All TPH ND or < comparators. HG-2212 to –2219 at Bldg. 309 stockpile and HG-2222 to –2224, -2226 to –2229, -2231, 2232, 2234 at Bldg. 410 stockpile.
TOTAL VOLUME C1, GSA UTB		**2,952**	NO. COMPOSITES PROPOSED		**2**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 11: D1, GSA UTB					Metals, Organochlorine Pesticides	Located with UTB group north end of runway. D1 north and south consolidated from - C14P17 and C14P18. Source: BLDG. 410, 11 PNA, TPH-E, TPH-P samples collected.
GROUP D1	C14P17	1,959	UEH, UPH, PNA	Jul.8,'96	Below Action Goals	All PNAs ND or < comparators. The highest DLs were 0.17 and 0.68 mg/kg. All TPH ND or < comparators. HG-2175, -2177 to –2180, 2182 to –2187.
GROUP D1	C14P18	1,959	UEH, UPH, PNA	Jul.10,'96	Below Action Goals except ∑ PNAs and UEH ∑ PNAs = 8.68 UEH = 460 (HG-2204) ∑ PNAs = 26.2 UEH = 150 (HG-2205)	All PNAs ND or < comparators **except HG-2204 and –2205 with elevated PNA values.** The highest DLs were 0.24 and 0.95 mg/kg. All TPH ND **except HG-2204, -2205 with UEH detected at 460 and 150 mg/kg**. HG-2197, -2198, –2201 to –2207, -2209, -2211.
C12P15	C12P15	491	UEH, UPH, PNA	Jul.5,'96	Below Action Goals except TPH-G quite high Analyze this pile for TPH-G to monitor biodegradation since 1996	Located with UTB group north end of runway. Not consolidated C12P15. Source Bldg. 410. 8 PNA, TPH-E, TPH-P samples collected. All PNAs ND or < comparators. The highest DLs were 0.18 and 0.7 mg/kg. All TPH ND or < comparators **except HG-2152 with TPH-G at 1,200 mg/kg**. HG-2152 to –2159.
C18P22	C18P22	810	UEH, UPH, PNA	Jul.12,'96	Below Action Goals	Located at south corner of Nina's Lake east of BRAC-4 stockpile. From UTB group at north end of

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
						runway. Not consolidated C18P22. Source Bldg. 410. 12 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.16 and 0.64 mg/kg. All TPH ND or < comparators. HG-2236 to –2242, -2244 to -2248.
C13P16	C13P16	280	UEH, UPH, PNA	Jul.12,'96	Below Action Goals	Located with UTB group north end of runway. Not consolidated C13P16. Source Bldg. 309. 8 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.16 and 0.65 mg/kg. All TPH ND or < comparators. HG-2188, -2190 to –2196.
TOTAL VOLUME D1, GSA UTB		**5,399**	NO. COMPOSITES PROPOSED		**5**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 12: C4P5 GSA UTB					Metals, Organochlorine Pesticides, TPH-P	
C4P5	C4P5	1,730	UEH, UPH, PNA	Jul.12,'96	Below Action Goals except TPH at very high concentrations Reanalyze TPH-P (gasoline) to verify current concentrations. Assume biodegradation of TPH-D since 1996.	Located with UTB group north end of runway. Not consolidated C4P5. Source Bldg. 345 - located on Parcel A-2. 10 PNA, TPH-E, TPH-P samples collected. All PNAs ND. The highest DLs were 0.17 and 0.67 mg/kg. All TPH ND or < comparators **except HG-2043 with TPH-G at 64,000 mg/kg and HG-2044 with TPH-D at 180 mg/kg.** HG-2033 to 2035, -2037, -2038, -2041 to -2045.
TOTAL VOLUME C4P5, GSA UTB		**1,730**	NO. COMPOSITES PROPOSED		**1**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 13: A2, B2, C2, D2, GSA Lot 7					Metals, Organochlorine Pesticides	
GROUP A2 Rows 7, 10, 11	3, 4	1,598	TPH, VOC, PNA	Jul.10,'96	Below Action Goals except VOCs 3 TCE > SQRT TCE from 0.0096 to 0.15 mg/kg 1,2-DCE from 0.030 to 0.17 mg/kg Resample for VOCs.	Located at north end of apron next to NHP Levee. Source: Bldg. 141/147. 19 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.19 and 0.76 mg/kg. All TPH ND or < comparators. All VOCs ND **except 7 detections of 1,2-DCE and 6 detections of TCE**. Samples HG-3032 to –3039 and –3040 to -3054.
GROUP B2 Rows 14-16	2H, 6	1,236	TPH, VOC, PNA	Jul.15,'96	Below Action Goals except VOCs 2 TCE > SQRT TCE from 0.0077 to 0.12 mg/kg 1,2-DCE from 0.012 to 0.24 mg/kg Resample for VOCs.	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 18 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.22 and 0.88 mg/kg. All TPH ND or < comparators. All VOCs ND **except 4 detections of 1,2-DCE and 3 detections of TCE.** Samples HG-3068 to –3082.
GROUP C2 Rows 18-21	7, 8	2,535	TPH, VOC, PNA	Jul.16,'96 Jul.17,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 23 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.72 mg/kg. All TPH ND or < comparators. All VOCs ND. Samples HG-3102 to –3129.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
GROUP D2 Rows 37-39	16, 17	1,656	TPH, VOC, PNA	Jul.26,'96	Below Action Goals except VOCs 1,2-DCE from 0.012 to 5.7 mg/kg TCE from 0.010 to 34 mg/kg Resample for VOCs.	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147 20 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators. The highest DLs were 0.19 and 0.77 mg/kg. All TPH ND or < comparators**. 10 of the 20 samples had detections of TCE & 10 of the 20 samples had detections of 1,2-DCE.** Samples HG-3211 to –3234.
TOTAL VOLUME A2, B2, C2, D2, GSA Lot 7		**7,025**	NO. COMPOSITES PROPOSED		**7**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 14: Miscellaneous Rows, GSA Lot 7					Metals, Organochlorine Pesticides	
ROWS 3 & 4	1	1,087	TPH, VOC, PNA	Jul.09,'96	Below Action Goals	Located at north end of the apron next to NHP Levee. Source: Bldg. 141/147 11 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.72 mg/kg. All TPH ND or < comparators. All VOCs ND. Samples HG-3001 to –3002, -3005 to -3013.
ROWS 5 & 6	2	1,121	TPH, VOC, PNA	Jul.10,'96	Below Action Goals except ∑ PNAs ∑ PNAs = 6.83 mg/kg	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 12 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators **except HG-3022.** The highest DLs were 0.18 and 0.72 mg/kg. All TPH ND. All VOCs ND. Samples HG-3014 to –3031.
ROWS 12 & 13	5	1,013	UEH, UPH, PNA	Jul.11,'96 Jul.12,'96	Below Action Goals except ∑ PNAs and UEH ∑ PNAs = 13.54 mg/kg	Located at the upper middle of the apron next to NHP Levee. Source: Bldg. 141/147. 11 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators **except HG-3067.** The highest DLs were 0.19 and 0.76 mg/kg. All TPH ND or < comparators **except HG-3056 with 210 mg/kg UEH.** All VOCs ND. Samples HG-3055 to -3067
ROW 17	3H	537	UEH, UPH, PNA	Jul.16,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.37 and 0.71 mg/kg. All TPH ND or < comparators**.** All VOCs ND except 1 detection of 1,4-DCB just above the detection limit but less than SQRT. Samples HG-3032 to –3039. Samples HG-3526 to -3528

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
ROWS 22 & 23	9	1,327	UEH, UPH, PNA	Jul.18,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 11 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators. The highest DLs were 0.17 and 0.69 mg/kg. All TPH ND. All VOCs ND. Samples HG-3130 to –3141.
ROWS 24 & 25	10	1,262	UEH, UPH, PNA	Jul.18,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 12 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.17 and 0.69 mg/kg. All TPH ND or < comparators. All VOCs ND. Samples HG-3142 to -3144, -3146, -3147, 3150, to –3152, 3154 to 3157.
ROW 28	12	539	UEH, UPH, PNA	Jul.19,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 7 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators. The highest DLs were 0.17 and 0.66 mg/kg. All TPH ND or < comparators. All VOCs ND except HG-3162, -3163 with 1,2-DCE at 0.066 and 0.02 mg/kg respectively and –3162 with 0.028 mg/kg TCE. Samples HG-3158 to –3167.
ROWS 30 & 31	5H	1,051	UEH, UPH, PNA	Jul.22,'96	Below Action Goals	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.17 and 0.69 mg/kg. All TPH ND or < comparators. All VOCs ND. Samples HG-3032 to –3039.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
ROW 32	13	526	Low level TCE	Jul.23,'96	Below Action Goals except VOCs 1 TCE > SQRT, but very low Resample for VOCs.	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 8 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators**.** The highest DLs were 0.18 and 0.71 mg/kg. All TPH ND or < comparators. All VOCs ND **except HG-3179 with 0.34 mg/kg 1,2-DCE and 0.032 mg/kg vinyl chloride (VC); HG-3180 with 0.18 mg/kg 1,2-DCE; HG-3188 with 0.073 mg/kg TCE, 2.1 mg/kg 1,2 DCE and 0.011 mg/kg VC.** Samples HG-3179, 3180, -3183 to –3185, -3187 to 3189.
ROW 34	6H	498	Low level TCE	Jul.25,'96	Below Action Goals except VOCs 1,2-DCE 0.064 to 0.57 mg/kg TCE 0.0099 to 0.01 mg/kg. VC 0.028 mg/kg All TCE < SQRT Resample for VOCs.	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 7 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.71 mg/kg. All TPH ND or < comparators. All VOCs ND **except 2 detections of 1,2-DCE, 2 detections of TCE, and 1detection of vinyl chloride.** Samples HG-3190 to –3197.
ROWS 35 & 36	15	890	PNA	Jul.25,'96	Below Action Goals except VOCs, UEH 1,2-DCE 0.012 to 0.24 mg/kg TCE 0.010 to 0.084 mg/kg 3TCE > SQRT Resample for VOCs.	Located at the middle of the apron next to NHP Levee. Source: Bldg. 141/147. 11 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or < comparators. The highest DLs were 0.17 and 0.68 mg/kg. All TPH ND or < comparators **except HG-3208 with 160 mg/kg UEH.** All VOC ND **except six of the eleven samples had low concentrations of TCE and seven had low concentrations of 1,2-DCE.** Samples HG-3198 to –3201, -3203 to -3209.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
ROWS 43 & 44	20	918	Low level TCE	Jul.30,'96	Below Action Goals except UPH and VOCs 1,2-DCE 0.18 to 17 mg/kg TCE 0.023 to 260 mg/kg Resample for VOCs.	Located at the south end of the apron next to NHP Levee. Source: Bldg. 141/147. 10 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.71 mg/kg. All TPH ND or < comparators **except HG-3239 with 35 mg/kg UPH.** All VOCs ND **except 3 of 10 samples had 1,2-DCE and 4 samples had TCE**. Samples HG-3235 to –3246.
ROWS 47 & 48	22	1,182	Low level TCE	Jul.30,'96	Below Action Goals except VOCs 1,2-DCE 0.11 to 3.4 mg/kg TCE 0.0073 to 26 mg/kg Resample for VOCs.	Located at the south end of the apron next to NHP Levee. Source: Bldg. 141/147. 16 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.73 mg/kg. All TPH ND or < comparators. All VOCs ND **except 3 detections of 1,2-DCE and 5 detections of TCE.** Samples HG-3248, to -3263
ROWS 49 & 50	23	1,233	UEH, UPH, PNA	Jul.31,'96	Below Action Goals except VOCs 1,2-DCE 0.015 to 0.63 mg/kg TCE 0.030 to 0.035 mg/kg (< SQRT) Resample for VOCs.	Located at the south end of the apron next to NHP Levee. Source: Bldg. 141/147. 10 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.18 and 0.72 mg/kg. All TPH ND or < comparators. All VOCs ND **except 3 detections of 1,2-DCE and 2 low detections of TCE.** Samples HG-3032 to –3039.

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
ROWS 56 & 57	8H	1,100	UEH, UPH, PNA	Aug.01,'96	Below Action Goals 1,2-DCE 0.035 to 0.11 mg/kg Resample for VOCs.	Located at the lower (south) end of the apron next to NHP. Levee. Source: Bldg. 141/147. 7 PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND. The highest DLs were 0.19 and 0.76 mg/kg. All TPH ND. All VOCs ND **except 2 low detections of 1,2-DCE.** Samples HG-3276 to –3282.
TOTAL VOLUME MISCELLANEOUS ROWS, GSA LOT 7		**14,284**	NO. COMPOSITES PROPOSED		**12**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

Stockpile Designation	Population	Estimated Volume (cy)	Chemicals of Concern	Sampling Date	Analyses and Explanations	Disposition – Comments
STOCKPILE SET 15: B99 & LTTD, BRAC LOT 7					Metals, Organochlorine Pesticides	
LTTD1	LOT 7, A6	238	DCE, TCE, VINYL CHLORIDE	Dec.22,'95-Jan. 22,'96	Below Action Goals Resample for VOCs.	Located on old runway north east of intersection with new runway. Low temperature thermal desorption of VOC – DCE & TCE. See Table 5-5 of Stockpile Disposition Report for chemistry. All PNAs ND or < comparators. All TPH ND. All VOCs ND **except several low values of 1,2-DCE** See sample-tracking details in LTTD binder. HT-0048A, HT-0053A, HT-0062A, HT-0073A, HT-0079A, HT-0080A, HT-0084A, HT-0085A, HT-0090A, HT-0091A, HT-0092A, HT-0095A.
BLDG 99 SD	BLDG 99	~400	UEH, UPH, PNA	Oct.30,'97	Below Action Goals	Located at south corner of Nina's Lake west of runway intersections. Source: Lot 7 Bldg. 99. (Some Consolidated to C3, Sediment) 9PNA, TPH-E, TPH-P, VOC samples collected. All PNAs ND or <comparators. The highest DL was 0.041 mg/kg. All TPH ND or < comparators. All VOCs ND. Samples HG-3538 to 3546.
BLDG.99 SD OVERBURDEN	BLDG.99	788	Uncharacterized	Not sampled	Assume at least as clean as Bldg 99 SD w/ similar COCs	Presumed clean and below cleanup goals. Sample for TPH-P, TPH-E, PNAs individually.
TOTAL VOLUME B99 & LTTD, BRAC, Lot 7		**1,426**	NO. COMPOSITES PROPOSED		**1**	

HAMILTON ARMY AIRFIELD BRAC AND GSA STOCKPILED SOIL SUMMARY
COMPOSITE SAMPLE STOCKPILE SETS

All soil in this summary list is stockpiled on the Hamilton Army Airfield runway or taxiway aprons.

BRAC denotes Base Realignment And Closure
TPH denotes total petroleum hydrocarbons, UEH -unidentified extractable hydrocarbons, UPH -unidentified purgeable hydrocarbons
VOC denotes volatile organic compounds
BTEX denotes benzene, toluene, ethyl-benzene, and total xylenes (meta-, ortho-, para-)
A5 denotes BRAC Outparcel Area–5
A6 denotes BRAC Outparcel Area–6
PNA denotes polynuclear aromatic hydrocarbons (PNA)
"GROUP A1", for example, refers to stockpiles of consolidated soil for characterization and /or treatment
LTTD denotes "Low-Temperature Thermal Desorption" treatment of VOC impacted soil
OSFL denotes the "On-Shore Fuel Lines" particularly soil excavated from under the footprint of the
New Hamilton Partners (NHP) levee
"GSA-I" denotes General Services Administration Phase I Sale Area Sites
"R3C2", for example, denotes row number 3 and cell number 2 used for identifying soil stockpiles
"SD" denotes storm drain
DCE denotes dichloroethylene; TCE denotes trichloroethylene
Detection Limits (DLs) refer to PNA DLs.
SSDR is the Soil Stockpile Disposition Report, March 1999, IT Corporation
UTB denotes under the buildings

REFERENCES

CH2MHill, 2003, Record of Decision/ Remedial Action Plan, Final.

IT Corporation, 1996, (April), Stockpile Sampling Plan GSA Phase I Sale Area, Martinez, California

IT Corporation, 1997, (August), Stockpile Aeration And Conditioning Work Plan GSA Phase I Sale Area And BRAC Outparcels A-5 And A-6, Hamilton Army Airfield, Novato, California, Revision 3, Martinez, California

IT Corporation, 1999, (March), Soil Stockpile Disposition Report, GSA Phase I Sale Area And BRAC Property, Hamilton Army Airfield, Novato, California, Revision 3, Martinez, California

APPENDIX B

FIELD SAMPLING PLAN

FIELD SAMPLING PLAN

RUNWAY STOCKPILES CHARACTERIZATION

HAMILTON ARMY AIRFIELD

NOVATO, CALIFORNIA

Final Submittal

Prepared by:

US Army Corps of Engineers ®

Sacramento District
Environmental Design Section

September 2003

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ACRONYMS

COC	Chain of Custody
DQOs	Data Quality Objectives
EDS	Environmental Design Section
FSP	Field Sampling Plan
HAAF	Hamilton Army Airfield
IDW	Investigation Derived Waste
mg/kg	milligram/kilogram
OC	Organochlorine
PNAs	Polynuclear Aromatics
QAPP	Quality Assurance Project Plan
QC	Quality Control
SSHP	Site Safety and Health Plan
TPH-E	Total Petroleum Hydrocarbons - Extractable
TPH-P	Total Petroleum Hydrocarbons - Purgeable
USACE	U.S. Army Corps of Engineers
USTs	Underground Storage Tanks
WP	Work Plan

FIELD SAMPLING PLAN
STOCKPILE CHARACTERIZATION
HAMILTON ARMY AIRFIELD

1. INTRODUCTION

1.1 SCOPE OF PROJECT

This Field Sampling Plan (FSP) describes the work to be performed, which will complete the characterization of the soil in 92 stockpiles along the runways in the inboard area at Hamilton Army Airfield (HAAF). The stockpile characterization is designed to collect data that will be used to determine if the stockpiles at HAAF can remain on-site or must be removed from the site because the concentrations of the chemicals of concern in the piles are greater than the criteria.

The FSP outlines the method of sampling and analysis of the stockpile soils. The US Army Corps of Engineers (USACE), Sacramento District is performing the Stockpile Characterization.

1.2 SCOPE OF REPORT

This FSP presents the stockpile characterization sampling and analysis programs, sampling objectives, sampling strategy and rationale, sampling locations, sample collection methods, and sample handling procedures. The FSP is designed to ensure that field procedures and documentation are standardized, so that data collected are valid and defensible. All field personnel will become familiar with the FSP prior to conducting fieldwork.

The FSP will be implemented in conjunction with the Quality Assurance Project Plan (QAPP) and the Site Safety and Health Plan (SSHP).

1.3 SITE LOCATION

HAAF is located in Novato, CA. HAAF was a former Air Force Base and Army Airfield. The location of HAAF is shown in Figure 1-1.

1.4 ORIGIN OF STOCKPILE SOILS

The remedial activities conducted at the GSA Phase I Sale Area and BRAC Outparcels A-5 and A-6 consisted of the excavation and removal of contaminated soil with subsequent placement in stockpiles on the airfield. The stockpile soil was derived from the following actions:

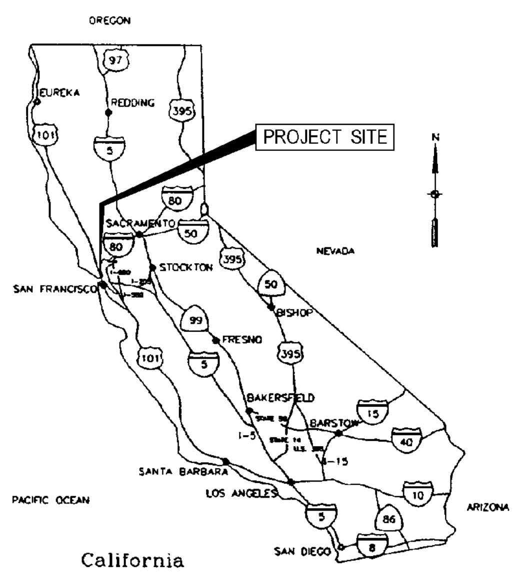

Figure 1-1: Project Location Map

- GSA Phase I Sale Area soil excavated prior to the GSA Phase I building demolitions.
- GSA Phase I Sale Area soil excavated after the building demolitions known as "Under the Buildings" soil.
- GSA Phase I Sale Area Lot 7 soil, which was segregated from the other lots because of VOC contamination.
- Soil excavated from BRAC Outparcels A-5 and A-6.

GSA Phase I Sale Area consisted of the following:

- Lot 1 - Jet Engine Test Facility
- Lots 1 and 2 – Fuel Distribution Lines
- Lot 3 – Hangar Avenue Fuel Lines (3,500 feet of fuel lines)
- Lot 8 – Plan Location 5 (base motor pool area)
- Lot 8 – Plan Location 6/10 (three steel tanks and twenty six underground storage tanks (USTs)

Under the Buildings Soil consisted of soils from under Buildings 309, 312, 315, 318, 345, 346, 348, 405, and 410.

Lot 7 consisted of Building 141/147, a depression area, storm drain, and Building 99.

BRAC Outparcel A-5 was northwest of Building 95. BRAC Outparcel A-6 was west of Building 95.

1.5 PROJECT STAFFING

This study is being designed and implemented by the Environmental Design Section (EDS), Sacramento District, and USACE under the general supervision of Rick Meagher, Section Chief. The technical design team includes:

Person	Responsibility
Kathy Siebenmann	Technical Team Lead and Chemist
Chuck Richmond, PE	Environmental Engineer
Donna Maxey	Industrial Hygienist

Each team member provides an integral part in completing this Study, including preparation and implementation of the Design Quality Objectives (DQOs), Work Plan (WP), performing fieldwork, and report.

2. SAMPLING OBJECTIVES

Stockpiles from previous remedial activities at HAAF remain throughout the inboard area. Much of the inboard area is planned for a future wetland and any soil remaining at this location must be protective of species anticipated to occupy the wetland.

The objective for this sampling effort is to complete the characterization of the stockpiles. This information collected will be used to determine if the soil from the stockpiles may be left on-site, restricted or unrestricted or must be disposed off-site.

3. SAMPLING STRATEGY AND RATIONALE

This section provides the sample locations, number of samples, analytical methods, and the rationale for the sampling and analytical program. Investigation and sampling techniques and procedures are discussed in Section 4.0. The investigation will include soil sampling.

During the performance of fieldwork, sampling locations and depths stated in this FSP may be adjusted, deleted, or additional samples added, based on field observations or conditions.

3.1 SOIL SAMPLING

Soil samples will be collected at the stockpile locations shown in Figure 3-1 utilizing a hand auger, glass jars, and EnCores™ (for total purgeable petroleum hydrocarbons [TPH-P] and volatile organic compound [VOC] analysis only). Sample locations may be adjusted based on site conditions and accessibility. Soil samples will be collected from the sample locations at a depth of 2-foot below the stockpile soil surface, if possible. Samples will be collected as deep as possible, yet above the bottom of the stockpile, for stockpiles less than 2-feet deep.

Four discrete soil samples will be composited together to make a composite soil sample. Each discrete soil sample to be used for making a composite sample shall be of approximately the same volume. The soil from four discrete samples shall be placed in a clean mixing bowl, thoroughly mixed for uniformity, and placed into a glass jar.

3.2 ANALYTICAL PLAN

The analytes were selected based on the results of previous analytical results at HAAF. Soil samples will be analyzed for the following analytes:

Metals by Method SW6010B/SW7471A.

Organochlorine (OC) Pesticides by Method SW8081A.

Polynuclear Aromatic Hydrocarbons (PNAs) by Modified Method SW8270C.

Total Extractable Petroleum Hydrocarbons (TPH-E) by Method SW8015B.

TPH-P by Method SW8015B.

Select VOCs by Method SW8260B.

Table 3-1 shows the summary of the proposed analytical parameters.

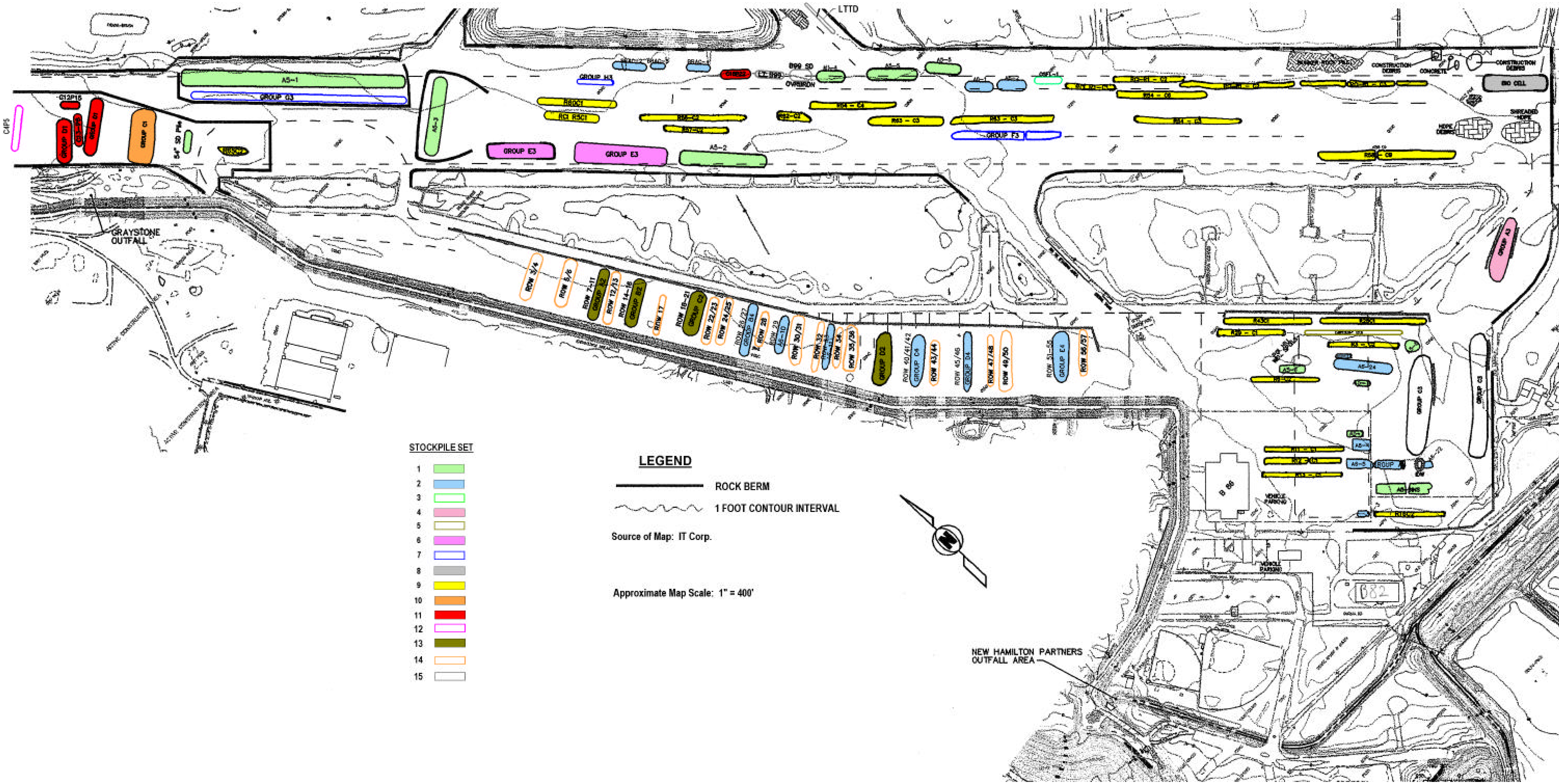

Figure 3-1: Stockpile Locations

TABLE 3-1: Summary of Proposed Analytical Parameters

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
1	HAAF-SP1-2001 HAAF-SP1-2002 HAAF-SP1-2003 HAAF-SP1-2004 HAAF-SP1-2005 HAAF-SP1-2006 HAAF-SP1-2007 HAAF-SP1-2008 HAAF-SP1-2009 HAAF-SP1-2010 HAAF-SP1-2011 HAAF-SPD-2101	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample and Field Duplicate Sample (12 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
2	HAAF-SP2-2012 HAAF-SP2-2013 HAAF-SP2-2014 HAAF-SP2-2015 HAAF-SP2-2016 HAAF-SP2-2017 HAAF-SP2-2018 HAAF-SP2-2019 HAAF-SP2-2xxx HAAF-SP2-2xxx HAAF-SP2-2xxx HAAF-SPD-2102	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample and Field Duplicate Sample (12 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
3	HAAF-SP3-2020	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (1 Jar Total)	OC Pesticides	SW 8081A
				PNAs	SW 8270C
				TPH-E	SW 8015B
4	HAAF-SP4-2021 HAAF-SP4-2022 HAAF-SP4-2023 HAAF-SP4-2xxx	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (4 Jars Total)	Metals	SW 6010B & 7471A
5	HAAF-SP5-2024	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (1 Jar Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
6	HAAF-SP6-2025 HAAF-SP6-2xxx	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
7	HAAF-SP7-2026 HAAF-SP7-2027 HAAF-SP7-2028 HAAF-SP7-2029 HAAF-SP7-2xxx HAAF-SP7-2xxx HAAF-SPD-2103	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible; discrete samples for TPH-P analysis at least 2-feet beneath surface of stockpile, if possible	3 EnCore®/Discrete Sample and Field Duplicate Sample (21 Total)	TPH-P	SW 8015B
			1 Glass jar/ Composite Sample and Field Duplicate Sample (7 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
				TPH-E	SW 8015B
				PNAs	SW 8270C

TABLE 3-1: Summary of Proposed Analytical Parameters (Continued)

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	**SAMPLE ID**	**SAMPLING DESIGN**	**CONTAINER TYPE/NUMBER**	**ANALYTE**	**METHOD**
8	HAAF-SP8-2030 HAAF-SP8-2031 HAAF-SP8-2032	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (3 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
9	HAAF-SP9-2033 HAAF-SP9-2034 HAAF-SP9-2035 HAAF-SP9-2036 HAAF-SP9-2037 HAAF-SP9-2038 HAAF-SP9-2xxx HAAF-SP9-2xxx HAAF-SP9-2xxx HAAF-SPD-2104	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample and Field Duplicate Sample (10 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
10	HAAF-SP10-2039 HAAF-SP10-2040	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
11	HAAF-SP11-2041 HAAF-SP11-2042 HAAF-SP11-2043 HAAF-SP11-2044 HAAF-SP11-2xxx	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (5 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
12	HAAF-SP12-2045	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (1 Jar Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
13	HAAF-SP13-2046 HAAF-SP13-2047 HAAF-SP13-2048 HAAF-SP13-2049 HAAF-SP13-2xxx HAAF-SP13-2xxx HAAF-SP13-2xxx HAAF-SPD-2105	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample and Field Duplicate Sample (8 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
14	HAAF-SP14-2050 HAAF-SP14-2051 HAAF-SP14-2052 HAAF-SP14-2053	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample and Field Duplicate Sample (13 Jars Total)	Metals	SW 6010B & 7471A

TABLE 3-1: Summary of Proposed Analytical Parameters (Continued)

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	**SAMPLE ID**	**SAMPLING DESIGN**	**CONTAINER TYPE/NUMBER**	**ANALYTE**	**METHOD**
	HAAF-SP14-2054 HAAF-SP14-2055 HAAF-SP14-2056 HAAF-SP14-2057 HAAF-SP14-2058 HAAF-SP14-2xxx HAAF-SP14-2xxx HAAF-SP14-2xxx HAAF-SPD-2106			OC Pesticides	SW 8081A
15	HAAF-SP15-2059 HAAF-SP15-2xxx	4-point composite sampling at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2 Jars Total)	Metals	SW 6010B & 7471A
				OC Pesticides	SW 8081A
				OC Pesticides	SW 8081A
Individual Stockpile Sampling					
D3	HAAF-D3-2061	1 discrete sample at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TPH-P	SW 8015B
RCI R1C2	HAAF-R1C2-2062	1 discrete sample at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TPH-P	SW 8015B
RCI R1C1	HAAF-R1C1-2063 HAAF-SPD-2107	1 discrete sample at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample or Field Duplicate Sample (6 Total)	TPH-P	SW 8015B
C12P15	HAAF-P15-2064	1 discrete sample at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TPH-P	SW 8015B
C4P5	HAAF-C4P5-2065 HAAF-C4P5-2066 HAAF-C4P5-2067	1 discrete sample at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (9 Total)	TPH-P	SW 8015B
A5-4	HAAF-A54-2068 HAAF-A54-2069	1 composite sample at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2 Jars Total)	TPH-E	SW 8015B
R29C1-5,-27	HAAF-R29-2070 HAAF-SPD-2108	1 composite sample at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample or Field Duplicate Sample (2 Jar Total)	TPH-E	SW 8015B

TABLE 3-1: Summary of Proposed Analytical Parameters (Continued)

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	**SAMPLE ID**	**SAMPLING DESIGN**	**CONTAINER TYPE/NUMBER**	**ANALYTE**	**METHOD**
A5-12	HAAF-A512-2071 HAAF-A512-2072 HAAF-A512-2073 HAAF-A512-2074 HAAF-A512-2075	1 composite sample/ 500 cy at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (5 Jars Total)	PNAs	SW 8270C
BRAC-2	HAAF-BRAC2-2076 HAAF-BRAC2-2077	1 composite sample/ 500 cy at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2 Jars Total)	PNAs	SW 8270C
Group D1	HAAF-D1-2078 HAAF-D1-2079 HAAF-D1-2080 HAAF-D1-2081 HAAF-D1-2082 HAAF-D1-2083 HAAF-D1-2084 HAAF-D1-2085 HAAF-SPD-2109	1 composite sample/ 500 cy at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample or Field Duplicate Sample (9Jars Total)	PNAs	SW 8270C
Rows 5 and 6	HAAF-R5&6-2086 HAAF-R5&6-2087	1 composite sample/ 500 cy at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2Jars Total)	PNAs	SW 8270C
Rows 12 and 13	HAAF-R12&13-2088 HAAF-R12&13-2089	1 composite sample/ 500 cy at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (2Jars Total)	PNAs	SW 8270C
B99 overburden	HAAF-B99O-2xxx	1 composite sample (discrete for TPH-P) at least 2-feet beneath the surface of the stockpile, if possible	1 Glass jar/ Composite Sample (1Jar and 3 EnCore®/total)	TPH-P, TPH-E, PNAs	SW8015B, SW8015B, SW8270C
Rows 40/41/42 Group C4	HAAF-R40/41/4242-2xxx HAAF-R40/41/4242-2xxx HAAF-R40/41/4242-2xxx HAAF-R40/41/4242-2xxx HAAF-SPD-2110	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample and duplicate sample (15 Total)	TCE and Breakdown products	SW8260B
Row 45/46, Group D4	HAAF-D4-2xxx HAAF-D4-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B

TABLE 3-1: Summary of Proposed Analytical Parameters (Continued)

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	**SAMPLE ID**	**SAMPLING DESIGN**	**CONTAINER TYPE/NUMBER**	**ANALYTE**	**METHOD**
Group A2, Rows 7,10,11	HAAF-A2-2xxx HAAF-A2-2xxx HAAF-A2-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (9 Total)	TCE and Breakdown products	SW8260B
Group B2, Rows 14-16	HAAF-B2-2xxx HAAF-B2-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B
Group D2, Rows 37-39	HAAF-D2-2xxx HAAF-D2-2xxx HAAF-D2-2xxx HAAF-SPD-2111	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample and duplicate sample (12 Total)	TCE and Breakdown products	SW8260B
Row 32	HAAF-R32-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TCE and Breakdown products	SW8260B
Row 34	HAAF-R34-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TCE and Breakdown products	SW8260B
Rows 35&36	HAAF-R35&36-2xxx HAAF-R35&36-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B
Rows 43&44	HAAF-R43&44-2xxx HAAF-R43&44-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B
Rows 47&48	HAAF-R47&48-2xxx HAAF-R47&48-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B
Rows 49&50	HAAF-R49&50-2xxx HAAF-R49&50-2xxx HAAF-SPD-2112	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample and duplicate sample (9 Total)	TCE and Breakdown products	SW8260B

TABLE 3-1: Summary of Proposed Analytical Parameters (Continued)

SAMPLE IDENTIFICATION				ANALYTE PROGRAM	
STOCKPILE SET	SAMPLE ID	SAMPLING DESIGN	CONTAINER TYPE/NUMBER	ANALYTE	METHOD
Rows 56&57	HAAF-R56&57-2xxx HAAF-R56&57-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (6 Total)	TCE and Breakdown products	SW8260B
LTTD1	HAAF-LTTD-2xxx	1 discrete sample / 500 cy at least 2-feet beneath the surface of the stockpile, if possible	3 EnCore®/Discrete Sample (3 Total)	TCE and Breakdown products	SW8260B

cy: cubic yards
PNAs: Polynuclear Aromatic Hydrocarbons
TPH-E: Total Petroleum Hydrocarbons - Extractable
TPH-P: Total Petroleum Hydrocarbons – Purgeable
TCE: Trichloroethene

4. SAMPLING EQUIPMENT AND PROCEDURES

The field methods to be employed during the stockpile characterization fieldwork performed under this FSP will be conducted in accordance with the SSHP and the QAPP, both prepared specifically for this study.

4.1 INVESTIGATIVE EQUIPMENT AND PROCEDURES

To collect soil samples for chemical analysis (except TPH-P and select VOCs), a hand auger or shovel shall be used. The auger or shovel shall be pushed to the appropriate sample collection depth and withdrawn. If necessary, a backhoe will be used to expose the soil at the proper depth and samples will be collected from the side wall of the excavation. The four discrete soil samples shall be placed into a stainless steel bowl and composited prior to shipping to the laboratory for analysis.

A specially designed sampling device, EnCore®, will be used to collect soil samples for TPH-P and select VOC analysis. Soil is collected using the EnCore® coring device, which seals the soil in the container for laboratory shipment.

Samples collected for laboratory analysis will be labeled as described in Section 5.0, sealed in zip-lock bags, and placed in ice-filled coolers. The samples will be sent to the laboratory daily via Federal Express under chain of custody, or hand delivered.

4.2 QUALITY CONTROL PROGRAM

The purpose of this section is to describe the field quality control (QC) samples that will be included in this project to support the data quality presented in the QAPP. The sampling methodologies, preservation techniques, and decontamination procedures described in this FSP have been selected to ensure appropriate data quality. The appropriateness of the field sampling protocol will be verified by inclusion of QC samples as described below. Specific QC duplicate samples are included in Table 3-1.

4.2.1 Field Duplicates (QC Samples)

QC duplicate samples collected in the field will provide precision information for the entire measurement system, including sample acquisition, homogeneity, handling, shipping, storage, preparation, and analysis. The field duplicates will be placed in a separate sample jar as the normal sample after homogenization of the four discrete samples in the mixing bowl. The identity of these samples will be held blind to the analysts and laboratory personnel until the data are in deliverable form. Duplicate analyses will be performed on approximately 10% of the total investigative samples for each method. QC sample locations are defined in this FSP, however, the locations may be adjusted based on information determined in the field. Odors or visual indicators may be used to assist in directing the location of QC samples to areas suspected to have the highest concentrations of the contaminants of interest. Duplicate samples will be analyzed by the laboratory for the same parameters as the primary sample (i.e., the sample that is being duplicated).

4.2.2 Blanks

4.2.2.1 Equipment Blanks

Contamination of samples introduced by sampling equipment can be detected by analyzing equipment blanks. Equipment blanks will be collected for all non-disposable sampling equipment after decontamination has been performed. Equipment blanks will be obtained with reagent grade water that is determined to be free of the analyte of concern. Pouring the reagent grade water over the sampling equipment and collecting the water in an amber glass jar is the method to be used to collect equipment blanks. One equipment blank will be collected per day of sampling for an estimated total of 5.

4.2.2.2 Temperature Blanks

A small sample container of water will be labeled as a temperature blank. One temperature blank will be included in each cooler. The temperature blank will be packaged and handled in the same manner as the other samples to assure that its temperature is representative of the samples in that cooler. The laboratory will use a calibrated thermometer to directly measure the temperature of this sample. The temperature reading from the temperature blank will be used to determine whether samples were stored under the appropriate thermal conditions.

4.3 EQUIPMENT DECONTAMINATION PROCEDURES

During sampling activities, appropriate decontamination measures will be taken to minimize sample contamination from sampling equipment. The decontamination procedures for sampling equipment will incorporate the washing steps outlined below.

All down-hole sampling equipment (excluding disposable equipment) used in the collection of samples will be decontaminated as described in the following paragraphs. Decontamination should be executed immediately prior to equipment use. Whenever this is not possible or practical, measures will be taken to assure that contamination of clean equipment will not occur. Clean disposable gloves will be worn while decontaminating sampling equipment and tools. Clean sampling equipment will not be placed on the ground or other contaminated surfaces prior to use. All non-disposable sampling equipment will be constructed of stainless steel and/or Teflon™.

Detergent and reagent grade water rinses are the first steps in the decontamination process. Deionized water will be stored in plastic containers and applied via pump sprayers or decanted directly from the storage container. The waste decontamination fluids will be collected and handled in accordance with Section 6.0.

Decontamination will consist of:

1) Wash with non-phosphate detergent,
2) Rinse with potable water,
3) Rinse with analyte free water (type II reagent grade water or equivalent),
4) Air dry,
5) Wrap equipment completely with aluminum foil (shiny side out) and place in a plastic bag to prevent contamination if equipment is to be stored or transported.

4.4 SAMPLING CONTAINERS AND PRESERVATION

The laboratory performing the analyses will supply sample containers for this project. A complete set of sampling containers will be prepared for each sample in advance of the sampling event. Containers will be labeled with the date, time, project name, sample number, samplers initials, parameters for analysis, and preservative. A total of 135 primary samples, 12 QC samples, and 5 equipment blanks (estimated) shall be collected. Temperature blanks will be used for all coolers containing samples requiring preservation at 4°C ± 2°C.

5. SAMPLING DOCUMENTATION AND HANDLING

5.1 SAMPLE NUMBERING SYSTEM

A unique identification number will be assigned to each sample. The number is typically an alphanumeric sequence or integer that serves as an acronym to identify the sample. Specific sample identification procedures will follow the strategy outlined below:

Primary Sample	HAAF - SPY - XX
Duplicate Sample	HAAF - SPD - ZZ
Equipment Blank	HAAF - EB - Sequential Sample Number

SP designator is for stockpiles. Y is the stockpile set number or the stockpile indicator. XX is the sequential sample number, starting at 2001. D indicates the sample is a duplicate sample. ZZ is the sequential duplicate sample number starting at 2001. EB is the designator for equipment blanks. The equipment blank sequential sample number shall start at 1.

As an example, sample ID "HAAF-SP7-2024" is the first composite sample from stockpile set 7, sample 24.

5.2 SAMPLE LABELS

The identification number references information pertaining to a particular sample. It is recorded on the sample container, in the field logbook, and on the sample chain-of-custody form. Following sample collection, the sample label is completed in waterproof ink and secured to the sample container with clear tape.

Each sample collected at the site will be labeled with the following information:

- Sample identification number;
- Site name;
- Date and time of collection;
- Name of person collecting the sample;
- Analysis requested;
- Preservation;
- Any other information pertinent to the sample.

5.3 FIELD LOGBOOK

A field notebook bound with serially numbered pages will be used to record personnel on site, sample identification numbers, sampling date and time, and any significant observations or events during field activities. The project name, site location, sampling event, project leader, telephone number and address of contact office (should the book be misplaced or lost) will be listed in ink. The field notebook is intended to record events during sampling in sufficient detail to allow field personnel to reconstruct events that transpired during the project

The Sampling Team Leader, who will sign and date the notebook prior to initiation of fieldwork will maintain the field notebook. If it is necessary to transfer the logbook to alternative personnel during the course of fieldwork, the person relinquishing the logbook will sign and date the logbook at the time the logbook is transferred and the person receiving the logbook will do likewise. Crossing a line through the entry and entering the correct information will make corrections to erroneous data. The correction will be initialed and dated by the person making the entry. Unused portions of logbook pages will be crossed out, signed, and dated at the end of each workday. Logbook entries must be dated, legible, in ink, and contain accurate documentation. Language used will be objective, factual, and free of personal opinions. Hypotheses for observed phenomena may be recorded, however, they must be clearly indicated as such and only relate to the subject observation.

The sample identification number, sample media, number of containers and laboratory analyses to be conducted are recorded with the sample identification number in the field log book and on the chain-of-custody.

The date and time of sample preparation and collection, and the personnel who conducted sampling are recorded with the sample identification number in the field logbook and on the chain-of custody form. The names of visitors and other persons on site are also recorded in the field logbook. Sampling personnel will also record the ambient weather conditions and other conditions at the sampling location that may affect sample collection, the apparent representativeness of the sample, or sample analysis in the field log book.

5.4 SAMPLE PACKAGING AND SHIPPING

Samples will be transported as soon as possible after sample collection to the primary laboratory for analysis. The following procedures are to be used when packing and transporting samples to the laboratory:

- Use rigid plastic coolers,
- Tape the cooler drain closed both inside and out,
- Wrap glass containers with cushioning material,
- Package samples in individual plastic bags and place in cooler (sets of EnCore® samples from the same sample location may be packaged in the same bag),

- Place a temperature blank in the cooler,
- Package ice in double plastic bags and place bags around, among, and on top of the samples,
- Put paperwork (chain-of-custody record, etc.) in a waterproof plastic bag and tape it to the inside lid of the cooler,
- Tape the cooler lid shut with fiber-reinforced tape,
- Place two signed custody seals on cooler, one at the front right and one at the back left of cooler,
- Attach completed shipping label to the top of cooler and ship following the carrier's instructions.

Sample coolers are typically shipped by overnight express carrier to the laboratory. A copy of the bill of lading (air bill) is to be retained and becomes part of the sample custody documentation. The laboratory will be notified in advance of all shipments, preferably by telephone on the day of shipment and by advanced scheduling.

5.5 CHAIN OF CUSTODY PROCEDURES

Custody of samples must be maintained and documented from the time of sample collection to completion of the analyses. Each sample will be considered to be in the sampler's custody, and the sampler will be personally responsible for the care and custody of the samples until they are delivered to the courier service for delivery to the laboratory. A sample is considered to be under a person's custody if:

- The sample is in the person's physical possession,
- The sample is in view of the person after that person has taken possession,
- The sample is secured by that person so that no one can tamper with the sample, or
- The sample is secured by that person in an area that is restricted to authorized personnel.

All samples will be accompanied to the laboratory by a chain-of-custody (COC) form, i.e. CESPK Form 111 (Figure 5-1). The chain-of-custody form contains the following information:

- Project name,
- Sample numbers,
- Sample collection point,

- Date and time of collection of samples (these must match the date and time recorded on the sample label),
- Sample matrix description,
- Analyses requested for each sample
- Preservation method,
- Number and type of containers used,
- Any special handling or analysis requirements,
- Signature of person collecting the samples,
- Signature of persons involved in the chain of possession, and
- Names and telephone numbers of the project point of contacts (POCs)

The chain-of-custody record forms will be filled out with ink. Prior to packaging samples for shipment, all samples should be double checked against the chain of custody form. When the samples are transferred from one party to another, the individuals will sign, date, and note the time on the form. A separate COC will accompany each delivery of samples to the laboratory. The chain-of-custody form will be included in the cooler used for preservation and transport of the samples. The sampling personnel will retain a copy of the form.

6. INVESTIGATION DERIVED WASTE

Expected or potential sources of IDW for this project include rinse water from decontamination procedures. The waste decontamination fluids will be collected during the decontamination procedures. Rinse water shall be collected in separate buckets during decontamination. All containers shall be Department of Transportation (DOT) approved. Each container shall be labeled with a potential hazardous waste label indicating date sample was collected and Contaminated Waste Water. IDW in each container shall be characterized prior to disposal. If the characterization results indicate the materials in a container are hazardous, the container shall be labeled with a Hazardous Waste Label. USACE will dispose of the small amounts of IDW in accordance with all Federal, state, and local regulations.

Personal Protective Equipment (PPE), including nitrile gloves and tyvek overalls/booties (not anticipated), will be handled as non-hazardous waste.

The field report will document IDW disposal.

7. REFERENCES

U.S. Environmental Protection Agency (EPA), 1996, *Test Methods for Evaluating Solid Waste Physical/Chemical Methods, Third Edition*, December 1996.

IT Corporation, *Soil Stockpile Disposition Report for Hamilton Army Airfield, GSA Phase I Sale Area and BRAC Property, Novato, California,* March 1999.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN RUNWAY STOCKPILES CHARACTERIZATION

HAMILTON ARMY AIRFIELD

NOVATO, CALIFORNIA

Final Submittal

Prepared by:

US Army Corps of Engineers ®

Sacramento District
Environmental Design Section

September 2003

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LIST OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
BRAC	Base Realignment and Closure
CCB	Continuing Calibration Blank
CCC	Calibration Check Compounds
CCV	Continuing Calibration Verification
CDQAR	Chemical Data Quality Assessment Report
CESPK	Corps of Engineers, Sacramento District
CL	Control Limit
COC	Chain of Custody
CRWQCB	California Regional Water Quality Control Board
cy	cubic yards
DL	Detection Limit
DQO	Data Quality Objectives
DTSC	California Department of Toxic Substances Control
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GC	Gas Chromatograph
GC/MS	Gas Chromatography/Mass Spectrometry
HAAF	Hamilton Army Airfield
ICAL	Initial Calibration
ICB	Initial Calibration Blank
ICP	Inductively Coupled Plasma (Spectroscopy)

ICS	Interference Check Standard
ICV	Initial Calibration Verification
IS	Internal Standard
LCS	Laboratory Control Sample
LIMS	Laboratory Information Management System
LUFT	Leaking Underground Fuel Tank
MDL	Method Detection Limit
MS	Matrix Spike
MSA	Method of Standard Addition
MSD	Matrix Spike Duplicate
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
P.E.	Professional Engineer
PM	Project Manager
PNAs	Polynuclear Aromatic Hydrocarbons
QL	Quantitation Limit
QA	Quality Assurance
QAC	Quality Assurance Chemist
QAPP	Quality Assurance Project Plan
QC	Quality Control
QCSR	Quality Control Summary Report
RF	Response Factor
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
RT	Retention Time
SAP	Sampling and Analysis Plan
SD	Serial Dilution
SIM	Selective Ion Monitoring
SOPs	Standard Operating Procedures

SPCC	System Performance Check Compounds
TCE	Trichloroethene
TPH-E	Total Petroleum Hydrocarbons - Extractable
TPH-P	Total Petroleum Hydrocarbons - Purgeable
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
VOC	Volatile Organic Compound

QUALITY ASSURANCE PROJECT PLAN
RUNWAY STOCKPILES CHARACTERIZATION
HAMILTON ARMY AIRFIELD

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents functions, procedures, and specific quality assurance (QA) and quality control (QC) activities designed to achieve the data quality goals for determining the disposition options for the runway stockpiles at Hamilton Army Airfield. This project is conducted by the Environmental Design Section of the U.S. Army Corps of Engineers, Sacramento District (CESPK) on behalf of the Army Base Realignment and Closure (BRAC) environmental office and the Formerly Used Defense Sites (FUDS) program. This QAPP is prepared in accordance with EPA QA/R-5, EPA Requirements for Quality Assurance Project Plans (U.S. EPA, 2001). This document accompanies the Work Plan and the Field Sampling Plan.

1.1 Site Location and Project Objectives

The site location is illustrated in Figure 1-1 of the Work Plan. For this effort, stockpiled soil from various excavations at Hamilton Army Airfield must be characterized to determine if the soil stockpiled on the runways may be used unrestricted, restricted, or must be disposed of off-site. Historical data for the majority of stockpiles includes contaminant concentrations for many parameters, but not pesticides or metals. To achieve the objective, samples will be collected from the stockpiles and analyzed for pesticides and metals. In addition, the samples may be analyzed for other parameters either not available or parameters that may have degraded since the historical data was collected. The results will be compared to inboard area action goals.

1.2 QAPP Objectives and Use

Standard procedures and specifications are established to ensure that all laboratories produce comparable data, and that data quality is consistently assessed and documented. The specific objectives of this QAPP are to:

- provide standardized references and quality specifications for all anticipated field sampling, analysis, and data review procedures required for the project sites;
- provide guidance and criteria for selected field and analytical procedures; and
- establish procedures for reviewing and documenting compliance with field and analytical

procedures.

The fieldwork will include: hand auger drilling to 2 feet below the surface of the stockpiles, soil sample collection, packaging, and shipping to offsite laboratory for analysis.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

2.1 Corps of Engineers

The following Sacramento District, Corps of Engineers personnel have been assigned to accomplish the sampling design and execution required supporting this project. The USACE Project Manager is Jim McAlister for FUDS portion and Ray Zimny for the BRAC portion of the stockpile sampling and disposal. The project execution will be performed under the general supervision of Rick Meagher P.E., Chief of Environmental Design Section. The technical team consists of the following personnel:

Technical Team Leader:	Kathy Siebenmann	(916) 557-7180
Sampling Team Leader:	Paige Caldwell	(916) 557-6903
Chemist:	Kathy Siebenmann	(916) 557-7180
Health & Safety:	Donna Maxey	(916) 557-7437

USACE fax number: (916) 557-7465

2.2 Project Management

2.2.1 Project Leader

The Project Leader will be responsible for reviewing the sampling plans and associated field activities, and ensuring that all sampling activities conform to the QAPP. The Project Leader will oversee quality assurance of field activities. Prior to the start of field activities, preparatory meetings will be held with the field crew. If field conditions require modifications to protocol outlined in the SAP or if questions arise, the Sampling Team Leader or field crew will contact the Project Leader for direction. The Project Leader will also be responsible for overseeing the project and subcontractors, directing field crews, and the compilation of data. The Project Leader reports to the Section Chief.

2.2.2 Project Chemist

The Project Chemist will have a “hands on” role in management of project tasks associated with sampling and analysis. These tasks include:

- Coordination with the analytical laboratory to ensure readiness to implement project specific requirements,
- Review of analytical data as it becomes available to ensure conformance with quality standards, and
- Implementation of corrective actions in accordance with QAPP specifications when review of data uncovers deficiencies.

2.2.3 Health and Safety Manager

The certified industrial hygienist is responsible for the general health and safety plan development and training for field personnel. This individual is also responsible for ensuring that health and safety procedures are understood and followed by all field personnel, and for reporting and correcting any violations of policy or regulations.

2.2.4 Sampling Team Leader

The Sampling Team Leader will be responsible for quality assurance of field activities and for executing all work elements related to the sampling program, including documenting field activities, maintaining field notes and photographs, maintaining a record of onsite personnel and visitors, and implementing the sampling plan. These tasks include instruction of field personnel in sampling and preservation requirements and general oversight of field personnel involved in sampling activities.

2.2.5 Field Crew

Field crew personnel will be responsible for performance of project mobilization, demobilization, sample collection and oversight. Field personnel will report to the Sampling Team Leader. Field personnel will include members of the USACE Environmental Design Section, Sacramento District.

3.0 QUALITY OBJECTIVES FOR ENVIRONMENTAL DATA

3.1 Characteristics of Data Quality

The term "data quality" refers to the level of uncertainty associated with a particular data set. Data quality associated with environmental measurement is a function of the sampling plan rationale and procedures used to collect the samples, as well as of the analytical methods and instrumentation used in making the measurements. Uncertainty cannot be eliminated entirely from environmental data. However, quality assurance programs effective in measuring uncertainty in data are employed to monitor and control excursions from the desired data quality objectives (DQOs). The DQO process and data needs are specified in Attachment A. Sources of uncertainty that can be traced to the sampling component are poor sampling plan design, incorrect sample handling, faulty sample transportation, and inconsistent use of standard operating procedures. The most common sources of uncertainty that can be traced to the analytical component of the total measurement system are calibration and contamination.

The purpose of this QAPP is to ensure that the data collected are of known and documented quality and useful for the purposes for which they are intended. The procedures described are designed to obtain data quality indicators for each field procedure and analytical method. Data quality indicators include the PARCC parameters (i.e., Precision, Accuracy, Representativeness, Comparability, and Completeness). To ensure that quality data continues to be produced, systematic checks must show that test results and field procedures remain reproducible and that the analytical methodology is actually measuring the quantity of analytes in each sample.

A laboratory certified by the State of California and validated by the USACE will generate all laboratory chemical data. Laboratories must have an in-place program for data reduction, validation, and reporting as discussed in Section 7.0. The reliability and credibility of analytical laboratory results can be corroborated by the inclusion of a program of scheduled replicate analyses, analyses of standard or spiked samples, and analysis of split samples with QA laboratories for some projects. Regularly scheduled analyses of known duplicates, standards, and spiked samples are a routine aspect of data reduction, validation, and reporting procedures.

All data that will be collected for this project will be definitive data for organics/inorganics using EPA procedures and should be usable in stockpile characterization and engineering design. The data obtained will conform to the quality control requirements specified in the following text and the tables accompanying this document.

4.0 SAMPLE ACQUISITION, CUSTODY, MANAGEMENT, AND DECONTAMINATION

Sample acquisition, custody, management, and decontamination procedures are described in the Field Sampling Plan (FSP).

The samples will be sent to a State of California and USACE certified or National Environmental Laboratory Accreditation Conference (NELAC) audited laboratory. The USACE certification includes in-depth audits to determine if quality assurance and quality control measures are in place and adequate. These audits are based upon many of the same elements as the NELAC audits. The address and point of contact are listed below.

POC: Anna Pajarillo
Curtis and Tompkins, Ltd.
2323 Fifth Street
Berkeley, California 94710
Phone: (510) 486-0925 #103
Fax: (510) 486-0532

5.0 ANALYTICAL METHODS AND CALIBRATION

This section contains brief descriptions of preparation and analytical methods that will be used to analyze soil samples collected for this project. These methods are listed in Table 5-1.

Table 5-1. Summary of Analytical Methods

Analytes	Preparatory	Analytical Methods
Metals	SW3050B	SW6010B/SW7471A
TPH-purgeable (gasoline range – C5-C12)	SW5035/SW5030	SW8015B
TPH-extractable (diesel - C12-C24) (motor oil - C24-C36)	SW3550B, SW3630C	SW8015B
Organochlorine Pesticides	SW3550B, SW3630C	SW8081A
Polynuclear Aromatic Hydrocarbons (PNAs)	SW3550B	SW8270C Modified
Trichloroethene and breakdown products	SW5035/SW5030	SW8260B

Unless authorized by the Project Chemist, the most current promulgated method shall be utilized. If during the course of a project, it becomes necessary to apply a different quantitation limit because of changes in instrument capabilities, the Project Chemist will be notified and approval must first be obtained in instances where higher quantitation limits result. Methodology references contain specific QC criteria associated with the particular methods. These specific requirements include calibration and QC samples, and are described in detail within the methods. Daily performance tests and demonstrations of precision and accuracy are required.

The laboratory methods identified in this document were published by the United States Environmental Protection Agency (U.S. EPA) in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods SW-846*, Third Edition (November 1986; Revision 1, July 1992; and Revision 2, November 1992, Update I, August 1993, Update II, September 1994, Update III, 1998). Preservation and holding times for these analytical procedures are presented in Table 5-2. Attachment A summarizes the calibration and the internal quality control procedures; Attachment B lists the quantitation limits and Action Goals that will be used for this project.

Table 5-2. Preservation and Holding Times

Method	Chemical Preservation	Holding Time	Temperature Preservation
SW8015B (TPH-Purgeable)	None	2 days to preservation or freezing, 7 days from preservation to analysis	Cool to 4°C
SW8015B (TPH-Extractable)	None	14 days before extraction, 40 days after extraction	Cool to 4°C
SW8081A	None	14 days before extraction, 40 days after extraction	Cool to 4°C
Modified SW8270C	None	14 days before extraction, 40 days after extraction	Cool to 4°C
SW8260B	None	2 days to preservation or freezing, 7 days from preservation to analysis	Cool to 4°C
SW6010B	None	40 days before digestion, 6 months after digestion	None
SW7471A	None	28 days to analysis	Cool to 4°C

5.1 Sample Preparation and Analytical Methods - Organic

The following sections briefly summarize the sample preparation and analytical methods to be performed for the determination of organic analytes. Various cleanup methods may be used, depending upon the interferences encountered following extraction. Not all potential cleanup methods are included below. The Project Chemist should be advised of any alternative cleanup methods proposed by the laboratory.

5.1.1 Method SW3550B: Sonication Extraction

Method 3550B is a procedure for extracting nonvolatile and semivolatile organic compounds from solids such as soils, wastes, and sludges. The sonication process ensures intimate contact of the sample matrix with the extraction solvent. A weighted portion of the solid material is mixed with the anhydrous sodium sulfate, ground to form a free-flowing powder, and then dispersed into the methylene chloride. The extract is separated from the sample by vacuum or gravity filtration, or centrifugation, and then dried with anhydrous sodium sulfate and concentrated to an appropriate volume for analysis.

5.1.2 Method SW3630C: Silica Gel Cleanup

Generally, solid-phase extraction cartridges filled with silica gel are used. Aliquots of sample extract are loaded onto the cartridges that are then eluted with suitable solvents, depending upon the analysis method. The collected fractions are analyzed by the appropriate method.

5.1.3 Method SW3640A: Gel-Permeation Cleanup

The extract is passed through a column containing a hydrophobic gel absorbent. The column is then flushed with clean organic solvents to separate the interferences from the analytes of interest by retention time.

5.1.4 Method SW5035: Closed System Purge and Trap Method

Method SW5035 is used to determine the concentration of VOCs and TPH-P in solid matrices. It is a closed-system purge-and-trap gas chromatographic procedure. The success of this method depends on the level of interference in the sample. For this project, EnCore™ samplers will be used to sub-sample stainless steel sleeves for VOCs. Three EnCore™ samplers will be collected for each sample and test required - one sampler for low-level analysis, one for back up, and one for methanol preservation (medium level) upon receipt. The methanol-preserved sample will be used if VOC concentrations in the low-level analysis exceed 200 µg/kg. The low concentration soil samples are weighed in the field to approximately 5 grams, and are preserved with sodium bisulfate usually in the laboratory. The vial is sealed and sent to the laboratory. Prior to analysis, organic-free reagent water, surrogates and internal standards (if applicable) are added to the sample, without opening the vial. The vial is heated, and the vapors are purged into an appropriate trap. For expected concentrations greater than 200 µg/kg, the high concentration method is used. For the high concentration sample, 5 milliliters (mLs) of methanol is added to the sample vial. At the laboratory, surrogates (and internal standards) are added, and then an aliquot of the extract is purged using Method SW5030. An inert gas is bubbled through the sample at ambient temperature to transfer the volatile components to the vapor phase. The vapor is swept through a sorbent column where the volatile components are trapped. After purging is completed, the sorbent column is heated and backflushed with inert gas to desorb the components onto a gas chromatographic column for analysis.

5.1.5 Method SW8015B: Total Petroleum Hydrocarbons – Purgeable and Extractable

Method SW8015 is used to determine gasoline, diesel, and residual range organics quantitated as gasoline or diesel. The purgeable component of TPH consists of those hydrocarbons in the gasoline boiling or carbon range. The extractable component of TPH consists of those hydrocarbons in the diesel fuel and motor oil boiling or carbon range.

For analysis of the TPH-P component, the sample is collected and prepared for analysis using Method SW5035 for soils as described above. For analysis of the TPH-E component, the sample is first extracted following Method SW3540 or SW3550 for soil or sludge matrices. Analysis is accomplished on a gas chromatograph (GC) equipped with a capillary or megabore column and flame ionization detector (FID) and photoionization detector (PID).

The chromatograms consist of groups of peaks that have a general shape or pattern and fall within a noted carbon range (i.e., number of carbon atoms in the molecule). Diesel fuel will be used to calibrate the instruments and determine response factors for quantitation of TPH-E (C12 through C26) and motor oil (C26 through C40). Gasoline will be used to calibrate the instruments and determine response factors for quantitation of TPH-P (C6 through C12). No second-column confirmation will be performed because identification is based on pattern recognition and not retention time (where false positives due to interference are likely). In addition, the patterns and carbon ranges of other petroleum hydrocarbons listed above will be used to compare to sample chromatograms for identification. Often, unknown or un-calibrated hydrocarbons are encountered; therefore, the concentration reported is considered estimated. Carbon ranges and significant deviations of the pattern from the patterns of reported analytes will be described in the analytical report.

Quantitation of both standards and samples will be performed by adding the area from all peaks from the baseline of the entire chromatogram. In cases where the range of the pattern in the sample extends outside of the gasoline or diesel fuel standard ranges, the area throughout the range of the sample pattern will be quantitated (relative to gasoline or diesel).

5.1.6 Method SW8081A: Organochlorine Pesticides

Method SW8081A is used to determine the concentration of various organochlorine pesticides. Prior to analysis, the sample is extracted into solution. An aliquot of solution is injected into an open-tubular capillary column, and detected by an electron capture detector (ECD) or electrolytic conductivity detector (ELCD). Any compounds identified tentatively in the primary analysis are confirmed on a second GC column.

5.1.7 Modified Method SW8270C: Polynuclear Aromatic Hydrocarbons by GC/MS Selective Ion Monitoring

Method SW8270C is used to quantify most neutral, acidic, and basic organic compounds that are soluble in methylene chloride. Such compounds include polynuclear aromatic hydrocarbons (PAHs). The concentrated extract is injected into a gas chromatograph for separation and detected by mass spectrometry. Mass spectrometry provides a characteristic ion pattern for fragmented target analytes, providing a high level of confidence in compound identification. Compounds are quantitated by comparing the response of a characteristic ion to the average response from a 5-point calibration. The internal standard technique is used for calibration. The instrument will be modified for selective ion monitoring (SIM) to reduce interferences and lower the quantitation and detection limits of PAHs for this project. Aliquot of the extract is injected into a GC/MS that is set up to detect only specific ions found in the PAH analytes.

5.1.8 Method SW8260B: Trichloroethene and breakdown products

Method SW8260 is used to determine volatile organic compounds in a variety of matrices. The volatile compounds are introduced into the gas chromatograph by the purge-and-trap method or by direct injection. Purged sample components are trapped in a tube containing suitable sorbent materials as described in Method SW5030. Once the components are desorbed onto the capillary column, the column is temperature programmed to separate the analytes, which are then detected with a mass spectrometer interfaced to the gas chromatograph. Usually the average response factor is used for quantitation but linear regression is also acceptable. Method SW8260 will be used to analyze soil for TCE and breakdown products only.

5.2 Sample Preparation and Analysis Methods - Inorganic

The following sections briefly summarize the sample preparation and analysis methods to be performed for the determination of inorganic analytes.

5.2.1. Method SW3050B: Acid Digestion of Sediments, Sludges, and Soils

This digestion procedure is used for the preparation of solid samples for analysis by inductively coupled plasma/atomic emission spectroscopy (ICP). A mixture of nitric acid, and the material to be analyzed is refluxed in a covered Griffin beaker or equivalent. This step is repeated with additional portions of nitric acid until the digestate is light in color or until its color has stabilized. Hydrogen peroxide is then added and the mixture warmed. The digestate is then cooled and brought to a low volume with water. If the digestate contains suspended solids, it must be centrifuged, filtered, or allowed to settle before analysis.

5.2.2 Method SW6010B: Inductively Coupled Plasma-Atomic Emission Spectrometry

ICP determines elements in solution. The sample requires digestion by Method SW3050B for soil prior to analysis.

The method provides a simultaneous or sequential multi-element determination of elements by ICP. Element-emitted light is measured by optical spectrometry. Samples are nebulized and the resulting aerosol is transported to the plasma torch. Element-specific atomic line emission spectra are produced by radio frequency inductively coupled plasma. The spectra are dispersed and photo-multiplier tubes monitor the intensities of the lines. The spectra are the physical property of the element and the intensity is proportional to the concentration of the element in solution.

5.2.3 Method SW7471A: Cold Vapor Atomic Absorption Spectroscopy

Method SW7471A is based on the absorption of radiation at the 253.7 nm wavelength by mercury vapor. The mercury is reduced to the elemental state and aerated from solution in a closed system. The mercury vapor passes through a cell positioned in the light path of an atomic absorption spectrophotometer. Absorbance is measured as a function of mercury concentration. Quantitation is accomplished by comparing the absorbance to a five-point calibration curve prepared from standards of known mercury concentration.

6.0 QUALITY ASSURANCE AND QUALITY CONTROL PROCEDURES

6.1 Calibration Procedures and Frequency

All instruments and equipment used during sample analysis are operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations, as well as criteria set forth in the applicable analytical methods. Personnel properly trained in these procedures will operate, calibrate, and maintain the instruments. Laboratory capabilities will be demonstrated initially for instrument and reagent/standards performance as well as accuracy and precision of analytical methodology.

Calibration of instruments is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established quantitation limits. Each instrument will be calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method presented in Section 5.0. The frequency of calibration and calibration verification and the concentration of calibration standards are determined by the manufacturer's guidelines and the analytical method. Calibration procedures for all instruments are summarized in the method-specific tables in Attachment A. All samples must be bracketed by passing calibration check samples for the majority of methods. Failure to bracket all samples with acceptable calibration checks may result in the reanalysis of affected samples.

6.1.1 Gas Chromatography

The field of chromatography involves a variety of instrumentation and detection systems. While calibration standards and acceptance criteria vary depending on the type of system and analytical methodology required for a specific analysis, the general principles of calibration apply uniformly. As outlined in EPA SW-846 procedures, each chromatographic system is calibrated prior to performance of analyses using five concentrations by external standard technique for all columns. The lowest calibration standard shall be within a factor of two relative to the QL, and the others corresponding to the expected range of concentrations or defining the working range of the detector. This is done on each chromatographic column and each instrument at the beginning of the contract period and each time a new column is installed. The results are used to determine a calibration curve and response factors for each analyte. Initial calibration consists of determining the working range, establishing limits of detection, and establishing retention time windows. The calibration is checked on a daily basis to ensure that the system remains within specifications. Second column confirmation is required for single compound analytes.

Continuing calibration standards are analyzed to check the instrument response relative to the initial calibration curve at the beginning and end of each analytical run. Calibration checks are also performed for overall system performance and for retention time shifts, as specified in SW-846. Individual and standard mixes are analyzed to establish response factors and absolute retention time. The response factors and retention times are verified throughout the analytical run and at the end of the analytical sequence. Each analyte must be within its retention time window or the analyst shall take corrective action. For GC analyses conducted on this project, the response factor must agree with the factor determined during the initial 5-point calibration within 15% for quantitation analysis utilizing SW-846 methodology.

The instrumental detection limit, the linear range of the instrument, and interference effects must be established for each individual analyte on that particular instrument. The calibration is verified initially prior to sample analysis using an independent second source standard. Calibration verification standards are analyzed after every 10 samples using a midrange calibration check standard and must be within 15% of the expected value.

6.1.2 GC/MS analysis

Each day prior to analysis of samples, the instrument is tuned with bromofluorobenzene for volatile compounds and decafluorotriphenylphosphine for semivolatile compounds or other tuning criteria as specified by the method used. Mass spectral peaks must conform both in mass numbers and relative intensity to method-specified requirements before analyses can proceed.

The instrument is then calibrated for all target compounds. An initial calibration curve is produced to define the working range to establish criteria for identification. All GC/MS instruments are calibrated at five different concentrations for analytes of interest, using the procedures outlined in SW-846. Method system performance check compounds (SPCC's) must show a minimum mean response factor and method calibration check compounds (CCC) must show a relative standard deviation (RSD) less than the method specified standard for the initial calibration to be considered valid. On a daily basis, SPCC's must meet the same criteria relevant for the initial calibration and CCCs must show a minimum percent drift relative to the expected concentration of the CCC to be considered valid. This initial calibration is evaluated on a daily basis to ensure that the system is within calibration. If the daily standard does not meet the established criteria, the system is recalibrated. These procedures will be modified for selective ion monitoring.

Following a successful tune, the initial five-point calibration is verified by a single mid-range concentration standard. The calibration is verified daily prior to sample analysis using an independent second source standard. This initial calibration can be utilized as long as the calibration verification remains valid.

6.1.3 Inductively Coupled Argon Plasma-Atomic Emission Spectrometry (ICPES) Metals

Plasma emission spectrophotometry, also termed inductively coupled argon plasma (ICP) spectrometry, is calibrated daily using either one standard solution and one blank or a four-point calibration (3 levels plus blank). For the single standard calibration, the calibration standard must be within the demonstrated linear range of the instrument. The instrumental detection limit, the linear range of the instrument, and interference effects must be established for each individual analyte on that particular instrument. The linear range is verified at the time of the analysis by analyzing the highest calibration standard as a sample, the results of which must be within ± 5% of its true value. The calibration is verified initially prior to sample analysis using an independent second source standard at a concentration mid-range of the calibration. Continuing calibration checks are analyzed after every 10 samples using a mid-range calibration check standard and must be within ±10% of the expected value. Sensitivity is established at the lower calibration level by analyzing a low level standard at the QL (3 to 5 times the MDL). Calibration blanks are analyzed after all calibration check standards and no analytes may be detected above one-half the QL. An interelement check standard is analyzed at the beginning and end of each analytical run, to verify that interelement and background correction factors have remained constant. Results outside of the established criteria trigger reanalysis of samples.

6.1.4 Atomic Absorption Spectroscopy

The instrument must be calibrated and checked for contamination before each set of samples. An initial calibration (ICAL) consists of a minimum of a blank and three calibration standards. The least concentrated standard will be at a concentration corresponding to the QL. The remaining standards will define the working range of the instrument. A linear regression fit of the calibration data must yield a correlation coefficient must be at least 0.995. Failure to meet these criteria will require recalibration and possible preparation of a new set of standards. Prior to sample analysis, an initial calibration verification (ICV), consisting of a second source standard, and an initial calibration blank (ICB) will be analyzed to verify the quantitation and to detect any contamination. A continuing calibration verification (CCV) at a mid-curve concentration and CCB will be analyzed very 10 samples and at the end of analytical sequence. If the CCV value varies from the predicted concentration by more than + 10% then the analysis must be stopped. The problem must be identified and corrected, and rerun the impacted samples. All samples must be bracketed by calibration standards that meet the stated criteria.

6.2 Standard and Reagent Preparation

A critical element in the generation of quality data is the purity and traceability of the standard solutions and reagents used in the analytical operations. The preparation and maintenance of standards and reagents will be performed per the specified analytical methods presented in Section 5.0. The laboratory shall continually monitor the quality of reagents and standard solutions through a series of well-documented standard operating procedures (SOPs). In general, SOPs for standards preparation should incorporate the following items:

- Documentation and labeling of date received, lot number, date opened, and expiration date;
- Documentation of tracability;
- Preparation, storage, and labeling of stock and working solutions; and
- Establishing and documenting expiration dates and disposal of unusable standards.

Primary reference standards and standard solutions used by the laboratory are to be obtained from the National Institute of Standards and Technology, or other reliable commercial sources to ensure the highest level of purity possible. All standards and standard solutions shall be catalogued to identify the supplier, lot number, purity/concentration, receipt/preparation date, preparer's name, method of preparation, expiration date, and all other pertinent information included in the specific SOP.

6.3 Standard Solutions and Reagents

Standard solutions and reagents are validated prior to use. Validation procedures can range from a check for chromatographic purity to verification of the concentration of the standard using a standard prepared at a different time, concentration or source. Reagents are examined for purity by subjecting an aliquot or subsample to the analytical method in which it will be used; for example, every lot of dichloromethane (for organic extractables) is analyzed for undesirable contaminants prior to use in the laboratory. Stock and working standards are checked regularly for signs of deterioration, such as discoloration, formation of precipitates, or change in concentration. Care is to be exercised in the proper storage and handling of standard solutions, and all containers are labeled as to compound, concentration, solvent, expiration date, and preparation data (initials of the preparer/date of preparation).

6.4 Field Quality Control Checks

Quality control checks in the field will include the collection of field duplicate, equipment rinsate and temperature blank samples. These QC checks are described in Section 4.2 of the FSP.

6.5 Laboratory Quality Control Checks

The Project Laboratories will have a QA/QC program that monitors data quality with internal QC checks. Internal QC checks are used to answer two questions:

1) Are laboratory operations in-control, (i.e., operating within acceptable QC guidelines), during data generation?

2) What effect does the sample matrix have on the data being generated?

Laboratory performance QC is based on the use of a standard control matrix to generate precision and accuracy data that are compared, on a daily basis, to control limits. This information, in conjunction with method blank data, is used to assess daily laboratory performance.

The second question is addressed with Matrix-Specific QC. Matrix-Specific QC is based on the use of an actual environmental sample for precision and accuracy determinations and commonly relies on the analysis of matrix spikes and matrix spike duplicates. This information, supplemented with field blank results, is used to assess the effect of the matrix and field conditions on analytical data.

Laboratory Performance QC will be provided as a standard part of every routine analysis. Matrix-Specific QC will be required per the guidance documents presented in Section 5.0. A brief summary of the required QC samples follows. The type and frequency of QC samples performed by the laboratory will be according to the specified analytical method.

6.5.1 Analytical Batch (Preparation Batch)

The analytical batch is defined as a preparation batch. The analytical batch will not exceed 20 samples and is defined as a set of samples that are extracted/analyzed concurrently or sequentially. Significant gaps (greater than two hours) in the analytical sequence will result in the termination of the previous sequence and the initiation of a new analytical sequence. The analytical batch shall be analyzed sequentially on a single instrument. The practice of "holding a batch open" and performing a single set of batch QC samples for all analyses performed during that period is unacceptable.

The laboratory shall, at a minimum, analyze internal QC samples at the frequency specified in this QAPP for all analytical methods. These QC samples for each analytical batch shall include method blanks (MB), MS/MSD analyses, and laboratory control samples (LCS). Definitions for the QC samples described above are provided in Chapter 1, Update III to EPA SW-846. The matrix used for LCS analyses shall be reagent grade water for aqueous analyses and reagent sand for soil/sediment matrices.

Second column confirmation for all GC sample analyses involving identification of discrete peaks with detected concentrations will be required, as per the methods. Second column confirmation is not required for concentrations reported between the MDL and the QL.

6.5.2 Blanks

Two types of blanks routinely analyzed in the laboratory are method blanks and reagent blanks. Method blanks and reagent/solvent blanks are used to assess laboratory procedures as possible sources of sample contamination.

Method or preparation blanks for all samples consist of deionized water or reagent sand that is subjected to the entire analytical procedure, including extraction, distillation, digestion, etc., as appropriate for the analytical method being utilized. One method blank will be analyzed for each analytical batch (minimum of one per day; one every 12 hours for GC/MS analyses). If the blank does not meet acceptance criteria, the source of contamination will be investigated and appropriate corrective action will be taken and documented. Investigation includes an evaluation of the data to determine the extent and effect of the contamination on the sample results. Corrective actions may include reanalysis of the blank and/or repreparation and reanalysis of the blank and all associated samples. No method blank may exhibit a detected concentration greater than the quantitation limit. However, exceptions may be made when the analyte is not detected in the related sample. Sample results are not corrected for blank contamination unless required by the analytical method.

Reagent/solvent blanks consist of individual reagents or solvents subjected to the entire analytical procedure as appropriate for the analytical method being utilized. The blanks are only used if contamination problems are indicated by the method blank or if a new lot of materials are being checked before use.

6.5.3 Laboratory Control Samples

Laboratory control samples (LCS) are used as a means of evaluating the efficiency of the analytical process. As discussed above, LCS is used to generate precision and accuracy data that are compared, on a daily basis, to control limits. Laboratory control samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized. They are generally introduced into an analytical batch (20 samples) immediately before extraction or analysis. LCS samples will be performed for both inorganic and organic laboratory methods.

6.5.4 Matrix Spikes and Matrix Spike Duplicates

A Matrix Spike (MS) is an environmental sample to which known concentrations of analytes have been added. The MS is taken through the entire analytical procedure and the recovery of the analytes is calculated. Results are expressed as percent recovery. The MS is used to evaluate the effect of the sample matrix on the accuracy of the analysis.

A Matrix Spike Duplicate (MSD) is a duplicate of the environmental sample described above, each of which is spiked with known concentrations of analytes. The two spiked samples are processed separately and the results compared to determine the effects of the matrix on the precision and accuracy of the analysis. Results are expressed as relative percent difference (RPD) and percent recovery (%R).

6.5.5 Surrogate Recoveries and Standard Additions

Surrogates are organic compounds which are similar to the analytes of interest in chemical behavior, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Results are reported in terms of percent recovery. Laboratories routinely add surrogates to samples requiring GC or GC/MS analysis and report these surrogate recoveries to the client. The laboratory does not modify its operations based on surrogate recoveries in environmental samples. The surrogate recoveries are primarily used by the laboratory to assess matrix effects. However, obvious problems with sample preparation and analysis (e.g. evaporation to dryness, leaking septum, etc.) which can lead to poor surrogate spike recoveries must be ruled out prior to attributing low surrogate recoveries to matrix effects.

Standard Additions is the practice of adding a series of known amounts of an analyte to an environmental sample. The fortified samples are then analyzed and the recovery of the analytes calculated. The practice of standard addition is generally used with metals analysis and wet chemistry to determine the effect of the sample matrix on the accuracy of the analyses.

6.5.6 Calibration Standard

A calibration standard is prepared in the laboratory by dissolving a known amount of a purchased pure compound or standard mix in an appropriate matrix. The final concentration calculated from the known quantities is the true value of the standard. The results obtained from these standards are used to generate a standard curve and thereby quantify the compound in the environmental sample.

6.5.7 Reference Standard

A reference standard is prepared in the same manner as a calibration standard or may be obtained from National Institute of Standards and Testing (NIST). A reference standard is obtained from a source independent of the source of the calibration standard. The concentration of the known quantity is the "true" value of the standard. A reference standard is not carried through the same process used for the environmental samples, but is analyzed without digestion or extraction. A reference standard result is used to validate an existing concentration calibration standard file or calibration curve. The reference standard can provide information on the accuracy of the instrumental analytical method independent of various sample matrices.

6.5.8 Laboratory Performance Evaluation Samples

At a minimum the contract laboratory will participate in at least one performance evaluation program.

The performance evaluation samples are single blind (prepared by the laboratory from ambulated standards) and are often associated with the regular laboratory audits performed by the agencies.

6.6 Corrective Action

The Project Leader is responsible for initiating corrective action and for implementation of all corrective actions with respect to the field sampling operations. The laboratory QA Director in consultation with the Project Chemist is responsible for implementing corrective actions in the laboratory. It is their combined responsibility to see that all analytical and sampling procedures are followed as specified and that the data generated meet the acceptance criteria. The acceptance criteria for many of the QC samples (LCS, MS, surrogate recoveries) will be those calculated by the laboratory as control limits. The number of samples used to develop the statistical control limits shall be all those analyzed within the previous six months or a minimum of 20 datapoints. The comparison control limits in Attachment A are to ensure that the laboratory can produce data with acceptable accuracy. If the laboratory statistical limits are consistently different from the comparison limits, a different laboratory shall be selected for that analytical method, or an alternate analytical or preparation method shall be selected that increases the accuracy of the laboratory. Corrective action procedures are summarized for each method in Attachment A.

Corrective actions for the laboratory may include, but are not limited to:

- Reanalyzing samples;
- Correcting laboratory procedures;
- Recalibrating instruments using freshly prepared standards;
- Replacing solvents or other reagents that give unacceptable blank values;
- Training laboratory personnel in correct sample preparation and analysis procedures; and
- Accepting data with an acknowledged and documented level of uncertainty.

Whenever corrective action is deemed necessary, the Laboratory Director will ensure that the following steps are taken:

- The problem is defined;
- The cause of the problem is investigated and determined;
- Appropriate corrective action is determined; and
- Corrective action is implemented and its effectiveness verified.

6.7 Documentation

All calibration information, instrument maintenance and repair are recorded by the laboratory on appropriate forms developed for SW-846 procedures. Out-of-control analyses are generally described on a QA/QC discrepancy form and submitted to the laboratory supervisor for corrective action. Copies are distributed to the laboratory QA coordinator and laboratory director for approval, and to the case file. The calibration information is filed with the raw data in the reports area.

7.0 DATA REDUCTION, VALIDATION AND REPORTING

7.1 Laboratory

7.1.1 Data Reduction and Validation

All analytical data generated within the laboratories shall be reviewed prior to report generation to assure the validity of the reported data. The data validation process consists of data generation, reduction, and three levels of documented review. In each stage, the review process will be documented by the signature of the reviewer and the date reviewed.

The analyst who generates the analytical data will have the prime responsibility for the correctness and completeness of the data. All data will be generated and reduced following protocols specified in laboratory SOPs. Each analyst will review the quality of his or her work based on an established set of guidelines outlined in the SOPs. The analyst will review the data package to ensure that:

- The correct samples were analyzed and reported in appropriate units,
- Preservation and holding time requirements were met,
- Sample preparation information is correct and complete,
- Appropriate SOPs have been followed,
- Analytical results are correct and complete,
- QC samples are within established control limits,
- Blanks are within appropriate QC limits,
- Special sample preparation and analytical requirements have been met, and
- Documentation is complete (e.g., all anomalies in the preparation and analysis have been documented, anomaly forms are complete; holding times are documented, etc.).

The data reduction and validation steps shall be documented, signed and dated by the analyst. The analyst will then pass the data package to an independent reviewer, who will perform an independent review of the data package. This review is also to be conducted according to an established set of guidelines and to be structured to ensure that:

- Calibration data are scientifically sound, appropriate to the method, and completely documented,

- QC samples are within established guidelines,
- Qualitative identification of sample components is correct
- Quantitative results are correct,
- Documentation is complete and correct (e.g., anomalies in the preparation and analysis have been documented; anomaly forms are complete; holding times are documented, etc.), and
- The data are ready for incorporation into the final report; and the data package is complete and ready for data archive.

The review is to be structured so that all calibration data and QC sample results are reviewed and all of the analytical results from 10% of the samples are checked back to the bench sheet. If no problems are found with the data package, the review is complete. If any problems are found with the data package, an additional 10% of the samples will be checked to the bench sheet. This process will continue until no errors are found or until the data package has been reviewed in its entirety.

Data reviews shall be documented and the signature of the reviewer and the date of review recorded. The reviewed data are then approved for release and a final report is prepared. Before the report is released to the client, the data are reviewed for completeness and to ensure that the data satisfy the overall objectives of the project. This review is typically done by the Laboratory Project Manager.

Each step of this review process involves evaluation of data quality based on both the results of the QC data and the professional judgment of those conducting the review. This application of technical knowledge and experience to the evaluation of the data is essential in ensuring that data of high quality are generated consistently.

7.1.2 Data Reporting

At the conclusion of all analytical work for this project, the primary laboratory will submit a comprehensive certificate of analysis. The final certificates of analysis will be submitted no later than 21 days after the last sample has been submitted to the laboratory for the project. All samples shall be reported in a legally defensible package.

The data package for organics analyses will consist of a case narrative, chain-of-custody documentation, cooler receipt form, summary of results for environmental samples, summary of QA/QC results, and the data. Legible copies of all data will be organized systematically on numbered pages. The data for compound identification and quantitation must be sufficient to support all results presented in other sections of the data package. This section of the data package will include legible copies of the data for environmental samples (arranged in increasing order of field ID), and instrument calibration, QA/QC analyses, sample extraction and cleanup logs, instrument analysis logs for each instrument used. Instrument analysis logs are particularly important because they provide the basic link between all sample analyses and QC information (calibration, matrix spike, etc.). Instrument analysis logs for all instruments used for sample data for each analysis will include measurement printouts and quantitation reports for each instrument used.

Raw data will be available for further inspection, if required, and maintained in the central job file. All records related to the analytical effort are maintained at the primary laboratory in secured filing cabinets (i.e., cost information, scheduling, and custody). All records are maintained for five years after the final report is issued. Types of records to be maintained for the project include the following:

- Chain-of-custody records, including: information on the sampler's name, date of sampling, type of sampling, location of sampling, location of sampling station, number and type of containers used, signature of sampler relinquishing samples to non-contract personnel (e.g., Federal Express agent) with the date and time of transfer noted, signature of primary laboratory sample custodian receiving samples with date and time noted
- Cooler receipt form documenting sample conditions upon arrival at the laboratory.
- Any discrepancy/deficiency report forms due to problems encountered during sampling, transportation, or analysis
- Sample destruction authorization forms containing information on the manner of final disposal of samples upon completion of analysis
- All laboratory notebooks including raw data readings, calibration details, QC checks, etc
- Hard copies of data system printouts (chromatograms, mass spectra, ICP data files, etc.)

- Tabulation of analytical results with supporting quality control information

7.1.2.1 Case Narrative

The case narrative will be written and the release of data will be authorized by the laboratory director or his/her designee. Items to be included in the case narrative are the field sample ID with the corresponding laboratory ID, parameters analyzed in each sample and the methodology used (EPA method numbers or other citation), detailed description of all problems encountered and corrective actions taken, discussion of possible reasons for out-of-control QA/QC results, and observations regarding any occurrences which may affect sample integrity or data quality.

7.1.2.2 Chain-of-Custody Documentation

Legible copies of chain-of-custody forms for each sample will be maintained in the data package. Cooler log-in sheets will be associated with the corresponding chain-of-custody form. Any integral laboratory-tracking document will also be included.

7.1.2.3 Summary of Environmental Results

For each environmental sample analysis, this summary shall include field ID and corresponding laboratory ID, sample matrix, date of sample extraction (if applicable), date and time of analysis, identification of the instrument used for analysis, instrument specifications, weight or volume of the sample used for analysis/extraction, dilution or concentration factor used for the sample extract, method detection limit or sample quantitation limit, definitions of any data qualifiers used, and analytical results.

7.1.2.4 Summary of QA/QC Results

The following QA/QC results will be presented in summary form. Details specified in Section 7.1.2.3 also will be included for the summary of QA/QC results. Acceptance limits for all categories of QC criteria will be provided with the data.

7.1.2.4.1 Organic Analyses (General)

The summary of QA/QC results for organic analyses will include:

- Initial Calibration - The concentrations of the standards used for analysis and the date and time of analysis. The response factor, percent relative standard deviation (%RSD), and retention time for each analyte (as applicable, GC, HPLC and GC/MS analyses) will be included in initial calibration summaries. A statement should also be made about the samples or dates for which a single initial calibration applies.

- Daily Calibration and Mid-level Standard - The concentration of the calibration standard used for daily calibration and/or the mid-level calibration check will be reported. The response factor, percent difference, and retention time for each analyte will be reported (GC and GC/MS). Daily calibration information will be linked to sample analyses by summary.
- Method Blank Analyses - The concentrations of any analytes found in method blanks will be reported even if detected amounts are less than the QL. The environmental samples and QA/QC analyses associated with each method blank will be stated.
- Surrogate Standard Recovery - The name and concentration of each surrogate compound added will be detailed. The percent recovery of each surrogate compound in the samples, method blanks, matrix spike/matrix spike duplicates and other QA/QC analyses will be summarized with sample IDs such that the information can be linked to sample and QA/QC analyses.
- Precision and Accuracy - For matrix spike/matrix spike duplicate analyses, the sample results, spiked sample results, percent recovery, and RPD with the associated control limits will be detailed. For laboratory duplicate analyses, the RPD between duplicate analyses will be reported as applicable. For laboratory QC check and/or LCS analyses, the percent recovery and acceptable control limits for each analyte will be reported. All batch QC information will be linked to the corresponding sample groups.
- Compound Identification (GC, HPLC, GC/MS): The retention times and the concentrations of each analyte detected in environmental and QC/QC samples will be reported for both primary and confirmation analyses.
- Method Detection Limit (MDL): The MDL study result sheet will have laboratory heading, instrument identification, analysis date, spike level, average recovery, standard deviation and calculated MDL for each analyte.

In addition, the summary of QA/QC results for organic analyses will include the following information relating specifically to the method used.

7.1.2.4.2 GC and GC/MS Analyses

This section of the data package will include legible copies of the data for environmental samples (arranged in increasing order of field ID, primary and confirmation analyses). The raw data for each analysis will include chromatograms (with target compound, internal standard, and surrogate compounds labeled by name) with a quantitation report and/or area printout. GC/MS analyses will also include the mass spectra or ion chromatograms for each reported analyte.

7.1.2.4.3 Inorganic Analyses

The summary of QA/QC results for the inorganic analyses will include:

- Initial Calibration: The source of the calibration standards, true value concentrations, found concentrations, the percent recovery for each element analyzed, and the date and time of analysis will be reported.
- Continuing Calibration Verification: The source of the calibration standard, true value concentrations, found concentrations, the percent recovery for each element analyzed, and the date and time of analysis will be reported.
- Method Blank Analyses: The concentrations of any analytes found in initial calibration, continuing calibration blank, and in the preparation blank will be reported. The date and time of analysis also will be reported.
- Precision and Accuracy - Matrix Spikes and Sample Duplicates: For matrix spike analyses, the sample results, spiked sample results, percent recovery, spiking solution used, and the control range for each element will be detailed. For post digestion spikes, the concentrations of the spiked sample, the sample result, the spiking solution added, and recovery and control limits will be detailed. For laboratory duplicates, the original concentration, duplicate concentration, relative percent difference, and control limits will be detailed. Date and time for all analyses will be recorded.
- Precision and Accuracy - Laboratory Control Samples: The source of the laboratory control sample, true value concentrations, found concentrations, percent recovery for each element analyzed, and the date and time of analysis will be reported.
- Method of Standard Additions (MSA): This summary must be included when MSA analyses are required for analysis by Graphite Furnace AA. The absorbance values and the corresponding concentration values, the final analyte concentrations, and correlation coefficients will be reported for all analyses. Date and time of analysis will be recorded

for all analyses.

- Method Detection Limit (MDL): The MDL study result sheet will have laboratory heading, instrument identification, analysis date, spike level, average recovery, standard deviation and calculated MDL for each analyte.

7.1.3 Quality Assurance Reports

The laboratory data will be validated using guidelines in Attachment C. The validation guidelines are based on EPA SW-846 methods and the EPA National Functional Guidelines for Organic and Inorganic Data Review. The Project Chemist, or designee, will review the data and prepare a Quality Control Summary Report (QCSR). The QCSR presents all laboratory and field QC results and any qualifiers applied to the data. The Project Chemist will discuss the data usability and precision based upon all information that affects the quality of the data (not just laboratory QC results) in a Chemical Data Quality Assessment Report (CDQAR).

7.2 Field Activities

7.2.1 Data Reduction

Since no field screening equipment will be used during this sampling event, data reduction is not applicable.

7.2.2 Data Integrity

Integrity of information and data on field activities shall be maintained by the Project Leader. Integrity of the field sample custody is accomplished by the field staff, according to the sample custody procedures discussed in Section 5.0. This information is generated in the field and recorded in the project field logbook and on the sample chain-of-custody form, shall be verified before sample shipping, and confirmed at the laboratory upon their receipt of the samples.

7.2.3 Data Validation

Validation of information and data on field activities shall be conducted as a QC procedure by the Project Leader. The Project Manager shall review laboratory results and field data before use. Field logbooks and chain-of-custody forms shall be cross-checked to each other and to the laboratory results to assure conformity of sample identification numbers. This information is compared to results of duplicate and blank samples, and field conditions at the time of sample collection will be taken into account when qualifying the sample analytical results.

7.2.4 Data Storage

Field and laboratory data shall be stored in hard copy and floppy disk format (when applicable) as part of the project file. This information is retained in the project file until project completion and closeout. Upon project closeout, all records shall be archived for permanent storage.

8.0 PREVENTIVE MAINTENANCE

To minimize downtime and interruption of analytical work, preventive maintenance is routinely performed on each analytical instrument. Each laboratory shall have detailed SOPs on file that describe preventive maintenance procedures and schedules. All service and maintenance will be conducted by qualified laboratory staff or under service agreement with the manufacturer or their approved agent. All repairs, adjustments, and calibrations will be documented in a maintenance notebook or data sheet that will be maintained in a permanent file. The instrument notebook will clearly document the date, the problem description, corrective action taken, results of actions, and the name of the person performing the work. Table 8-1 lists common laboratory preventative maintenance parameters for laboratory instrumentation.

Table 8-1. Routine Laboratory Instrument Maintenance

Instrument	**Operation**	**Frequency**
Gas Chromatography	Change septum Change injection port liner Change column Bake detectors	Daily when used Daily when used As needed (when standard response decreases or sample carryover is noted, approximately monthly) As needed (when standard response decreases or sample carryover is noted , approximately monthly)
GC/MS	Clean source	As needed (show reduced sensitivity)
Atomic Absorption Spectrometer	Warm up instrument for 30 min. Digital readout values checked; check gas flows, cell alignment, wavelength, Photo multiplier voltage and lamp voltage Tygon tubing replaced Change contact rings Replace optical lens	Daily when used Daily when used Quarterly or as needed Daily, as needed or when used 6 months, or if deterioration is observed
Balances	Calibrate by manufacturer	Annually / verify monthly
Ovens/Refrigerators	Check temperature	Daily

9.0 LABORATORY PROCEDURES USED TO ASSESS DATA QUALITY AND DETERMINE SENSITIVITY

9.1 Data Quality Assessment

The effectiveness of a QA program is measured by the quality of data generated by the laboratory. Data quality is judged in terms of its PARCC parameters as presented in Section 3.0. These terms are described as follows:

9.1.1 Precision

Precision is a measure of the reproducibility of analyses under a given set of conditions. Precision can be assessed by replicate measurements of duplicate control samples, reference materials, or environmental samples. The routine comparison of precision is measured by the relative percent different (RPD) between duplicate control sample measurements with control limits established at plus three standard deviations from the mean RPD of historical duplicate control sample data. The overall precision of a sampling event has a sampling and an analytical component. The following QC data will be collected to determine sampling and analytical precision:

- Laboratory Control Standards and duplicates (LCD/LCSD) as well as matrix spikes and matrix spike duplicates (MS/MSD) will be used as a measure the precision of the analytical process for organic analyses. LCS/LCSD and/or MS/MSD samples will be run on each batch of samples up to a maximum of 20.
- Field duplicate samples, submitted to the laboratory “blind”, measure the precision of the entire measurement system including sampling and analytical procedures. Field duplicate samples will be collected at a rate of 1 per 10 primary samples.
- Laboratory duplicates will be performed for every inorganic analytical batch. The maximum size of each batch shall not exceed 20 samples.

The RPD between the two samples may be used to estimate precision where:

$$\text{RPD} = \frac{|D_1 - D_2|}{(D_1 + D_2)} \text{ x } 200$$

RPD = *absolute relative percent difference*

D_1 = *first sample value*

D_2 = *second sample value (duplicate)*

Note: If the laboratory determines that failure to meet QC criteria for accuracy or precision is a result of objectively verifiable matrix effects, no further re-extractions will be required. However, the narrative must contain an explicit description of the laboratory's rationale in this regard with reference to objectively verifiable features of raw data. The sufficiency of the laboratory's explanation will be determined by the Project Manager or an appointed representative.

9.1.2 Accuracy

Accuracy is a determination of how close the measurement is to the true value. Accuracy can be assessed using laboratory control samples, standard reference materials, or spiked environmental samples. Unless specified otherwise in special contracts, the laboratory shall monitor accuracy by comparing laboratory control sample results with control limits established at plus or minus three standard deviation units from the mean of historical laboratory control sample results. The accuracy of the data submitted for this project will be assessed in the following manner:

- Accuracy for each sample will be checked by calculating surrogate percent recoveries, as applicable.
- The percent recovery of matrix spikes, matrix spike duplicates, and/or laboratory control samples will be calculated.
- The level of target compounds that are found (if any) in laboratory method blanks will be checked. If a target compound is found above the practical quantitation limit in the method blank corresponding to a batch of samples and the same target compound is found in a sample, the data will not be background subtracted but will be flagged to indicate the result in the blank.

Accuracy is presented as percent recovery. Since accuracy is often determined from spiked samples, laboratories commonly report accuracy as

$$\% \text{ Recovery } \frac{R}{S} \text{ x } 100$$

Where: *S = spiked concentration*

R = reported concentration

Note: If the laboratory determines that failure to meet QC criteria for accuracy or precision is a result of objectively verifiable matrix effects, no further re-extractions will be required. However, the narrative must contain an explicit description of the laboratory's rationale in this regard with reference to objectively verifiable features of raw data. The sufficiency of the laboratory's explanation will be determined by the Project Manager or an appointed representative.

9.1.3 Representativeness

Representativeness is a qualitative parameter that reflects the extent to which a given sample is characteristic of a given population at a specific location or under a given environmental condition. Representativeness is best satisfied by making certain that sampling locations are selected properly, a sufficient number of samples are collected, and an appropriate sampling technique is employed. Variations at a sampling point will be evaluated based on the results of field duplicates. Some samples may require analysis of multiple phases to obtain representative results. Analytical data should represent the sample analyzed regardless of the heterogeneity of the original sample matrix. Sample representativeness will also be evaluated on the basis of results from method blanks and trip blanks.

9.1.4 Completeness

Completeness will be evaluated qualitatively and quantitatively. The qualitative evaluation of completeness will be determined as a function of all events contributing to the sampling event including items such as correct handling of COC forms, incorporation of QC samples at the appropriate frequency, etc. The quantitative description of completeness will be defined as the percentage of contract laboratory controlled QC parameters that are acceptable. The goals for completeness are as follows: contract (95%), analytical (85%, technical (95%), and field sampling completeness (100%). Contract completeness is a measure of the results that meets contract requirements relative to the number of reported results expressed as a percentage. Analytical completeness is a measure of all unqualified results relative to the number of reported results expressed as a percentage. Technical completeness is a measure of the usable results relative to the number of reported results expressed as a percentage. Field sampling completeness is a measure of the number of samples collected relative to the number of samples planned expressed as a percentage.

9.1.5 Comparability

Comparability expresses the confidence with which one data set can be compared to another data set measuring the same property. To ensure comparability, field procedures will be standardized and field operations will adhere to standard operating procedures. Laboratory data comparability will be assured by use of established and approved analytical methods, consistency in the basis of analysis (wet weight, volume, etc.), and consistency in reporting units (µg/L, mg/kg, etc.). Analysis of standard reference materials will follow USEPA or other standard analytical methods, which utilize standard units of measurement, methods of analysis, and reporting format.

9.2 Sensitivity

9.2.1 Method Detection Limit (MDL)

The method detection limit (MDL) is the lowest concentration at which a specific analyte in a matrix can be measured and reported with 99-percent confidence that the analyte concentration is greater than zero. MDLs are experimentally determined for each target analyte of the method. Each individual instrument will maintain a current MDL study. MDLs are based on the results of seven spikes of clean matrix at the estimated MDL and are statistically calculated in accordance with the Title 40, Code of Federal Regulations Part 136 (40 CFR 136), Attachment B. The standard deviation of the seven replicates is determined and multiplied by 3.143 (i.e., the 99-percent confidence interval from the one-sided student t-test). The MDLs are updated annually and whenever significant instrument maintenance is performed (i.e., GC Column, AA lamp, etc.).

9.2.2 Quantitation Limit (QL)

The quantitation limit is defined by the lowest concentration in the multi-point initial calibration. The QL is the lowest level for quantitation decisions based on individual measurements for a given method and representative matrix. The QL for this project is based on a project-specific action level and the capability of the method and laboratory. Detected results above the MDL but below the QL, are qualified with a J flag due to the very low comparator values. The J flag will denote the sample results as below the QL and as qualitative, estimated concentrations. This increases the probability of false positive results at these low concentrations, especially for the sample matrix anticipated for this project. However, analyst judgment will be used to determine if an apparent detected value should be reported or appears to be a false positive due to the sample matrix (e.g., from baseline "noise").

If dilution to bring the reported concentration of a single compound of interest within the linear range of the calibration, results in non-detect values for all other analytes with detected concentrations in the initial sample analysis, the results of the original run and the dilution will be reported with appropriate notations in the narrative of the report. Matrix effects (i.e., highly contaminated samples requiring dilution for analysis, dilution to bring detected levels within the range of calibration, and matrix interference requiring elevation of detection limits) will be considered in assessing compliance with the requirements for sensitivity. Cleanup procedures will be used to minimize interferences and lower the QLs to those required. In addition, the sample aliquot will be increased from the standard mass to make up for the increased QLs when data is reported on a dry weight basis (these samples are expected to be at least 50% moisture). This increased aliquot size may also increase the matrix interferences, as they too will have increased in mass. The QLs required by this project are listed in the method-specific tables in Attachment B of this document.

10.0 CORRECTIVE ACTION FOR UNACCEPTABLE QUALITY CONTROL DATA

10.1 Field Activities

All technical staff will be responsible for reporting all suspected technical nonconformances by initiating a nonconformance report of any issued deliverable or document. All staff will be responsible for reporting all suspected QA nonconformance by initiating a nonconformance report.

The Project Leader will be responsible for ensuring that corrective actions for nonconformance are implemented by:

- Evaluating all reported nonconformance;
- Controlling additional work on nonconforming items;
- Determining disposition or action to be taken;
- Maintaining a log of nonconformance;
- Reviewing nonconformance reports;
- Evaluating disposition or action taken; and
- Ensuring nonconformance reports are included in the final site documentation in document control.

Any staff member who discovers or suspects a nonconformance, which is an identified or suspected deficiency in an approved document, is responsible for initiating a nonconformance report. The Project Leader will ensure that no additional work, which is dependent on the nonconforming activity, is performed until the nonconformance report is corrected. The Project Leader will also be responsible for carrying out corrective action as initiated by the program QA manager. Each nonconformance report will be evaluated and the disposition and action taken will be recorded.

10.2 Laboratory

When errors, deficiencies, or out-of-control situations exist, the QA program provides systematic procedures, called "corrective actions", to resolve problems and restore proper functioning to the analytical system (see section 5.0).

Laboratory personnel are alerted that corrective actions may be necessary if:

- QC data are outside the acceptable windows for precision and accuracy;
- Blanks, duplicate control samples or single control samples contain contaminants above acceptable levels;
- Undesirable trends are detected in spike recoveries or RPD between duplicates;
- There are unusual changes in detection limits;
- Deficiencies are detected by the QA department during internal or external audits or from the results of performance evaluation samples; or
- Inquiries concerning data quality are received from clients.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the laboratory supervisor, manager and/or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the project records.

10.3 Non-routine Occurrence Reports

The laboratory will send written reports of all significant non-routine occurrence events to the project chemist within 48 hours of occurrence of non-routine events for laboratory work. These reports will identify:

- the problem,
- corrective actions taken,
- verbal / written instructions from the USACE project chemist regarding reextraction and reanalysis of project samples and/or other applicable corrective actions to be taken.

Significant events are occurrences impacting cost of work, schedule of work, and quality of environmental analytical data.

11.0 REFERENCES

11.1 Environmental Protection Agency (EPA)

EPA 2001. *EPA Requirements for Quality Assurance Project Plans,* EPA QA/R-5, Final Interim Final, March.

EPA 2000a. *Guidance for Data Assessment*, USEPA QA/G-9, Final, July.

EPA 2000b. *Guidance on the Data Quality Objectives Process*, USEPA QA/G-4, Final, September.

EPA 1998. *Test Methods for Evaluating Solid Waste*, USEPA SW-846, Third Edition, (Update III), June.

National Functional Guidelines for Inorganics Data Review, USEPA Contract Laboratory Program, EPA 540/R-94/013.

National Functional Guidelines for Organic Data Review, USEPA Contract Laboratory Program, EPA 540/R-94/012.

11.2 U.S. Army Corps of Engineers (USACE)

Requirements for the Preparation of Sampling and Analysis Plans, Engineering Manual EM. 200-1-3, 1998.

Chemical Data Quality Management for Hazardous Waste Remedial Activities, Engineering Regulation 1110-1-263, October 1990.

11.3 International Technology (IT)

IT 1999. *Soil Stockpile Disposition Report*, Hamilton Army Airfield. Novato, California. March.

APPENDIX D

SITE SPECIFIC HEALTH AND SAFETY PLAN

SITE SAFETY AND HEALTH PLAN

HAMILTON AIRFIELD
Novato, California

Approved by: ________________________________ Date: __________
A.R. Smith
Chief, Safety and Occupational Health Office

Prepared by: ________________________________ Date: __________
Donna R. Maxey
Project Safety and Health Officer

________________________________ Date: __________
Kathy Siebenmann
Project Team Lead

U.S. Army Corps of Engineers
Sacramento District

September 2003

This document was prepared using the guidance of ER 385-1-92. It is prepared for the sole use of the U.S. Army Corps of Engineers, Sacramento District.

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PART I

1.0 INTRODUCTION

This Site Safety and Health Plan (SSHP) establishes the responsibilities, requirements, and procedures for the protection of U.S. Army Corps of Engineers (USACE) Sacramento District (SPK) field personnel during site activities involving preliminary non-intrusive activities (i.e., initial site visits, pre-work plan visits); contractor quality assurance audits; and sampling (soil). This SSHP is prepared for the sole use of SPK personnel.

1.1 Policy Statement

SPK's policy is to provide a safe and healthful work environment for field personnel. Field personnel will receive the appropriate training, equipment, medical, and other resources necessary to complete assigned tasks in a safe manner.

1.1.1 *Safety / Health Responsibilities*

SPK's Project Manager (PM), Project Safety and Health Officer (PSHO) and Site Safety and Health Officer (SSHO) will cooperatively implement the requirements of this SSHP / Accident Prevention Plan (APP).

1.2 Purpose

The purpose of this SSHP is to heighten awareness of the Hazards present, enhance the safety and health of SPK's site personnel performing field work at Hamilton Airfield Guidelines for emergency response. This SSHP is written to meet the safety and health requirements in EM 385-1-1 and ER 385-1-92 as well as OSHAAF requirements (29 CFR 1926.65 / 29 CFR 1910.120). The procedures and guidelines contained herein are based upon the best available information regarding the physical, chemical, biological, radiological, and safety hazards known, or suspected to be present at HAAF at the time of this SSHP's preparation. Specific requirements may be revised if new information is received or site conditions change. Any revisions to this plan will be made with the knowledge and concurrence of the PM, PSHO, and the Chief of the Safety and Occupational Health Office (SOH).

1.3 Supplemental SSHP

This SSHP supplements any contractor's SSHP when SPK personnel are auditing the contractor.

1.3.1 *Contractor's SSHP*

Contractors are responsible for their own SSHP and the safety and health of their employees. Contractor developed SSHP(s) are available to SPK personnel.

1.3.2 *Multi-Employer Job Setting*

Under OSHAAF, each employer is required to provide a safe and healthful working environment for its employees. SPK may be simultaneously working in conjunction with other contractors. In this situation, the activities of one employer could cause harm to the employees of another employer. SPK and contractors will present the particular safety and health issues associated with each day's activities at the daily tailgate safety meeting.

1.4 Accident Prevention Plan

This SSHP also serves as the Accident Prevention Plan (APP) as required by EM 385-1-1 (Appendix A).

1.5 Compliance

SPK personnel will comply with this SSHP, any contractor prepared SSHP, applicable Federal, state, and local environmental laws, and occupational safety and health regulations.

1.6 Applicability

SPK site personnel are responsible for reading, understanding and abiding by this SSHP and documenting such understanding through signing the SSHP's Employee Acknowledgment Form.

1.7 Notification Requirements

The PM will be immediately notified of the following:

a. Any required site evacuation, e.g., based on contractor air monitoring data.
b. Any fatality or admission of one or more site personnel to the hospital. The PM will be responsible for notifying the employee's supervisor, the SOH and the client.
c. Any site physical Hazard where continued site work could lead to possible death or permanent injury.

1.8 References

The SSHP and subsequent activities will comply with the following referenced documents, at a minimum:

a. Title 29 Code of Federal Regulations (CFR) 29 CFR 1926.65 / 29 CRF 1910.120, *Hazardous Waste Operations and Emergency Response*.
b. USACE, *Safety and Health Requirements Manual*, EM 385-1-1.
c. USACE, *Safety and Occupational Health Document Requirements for Hazardous, Toxic and Radioactive Waste (HTRW) Activities*, ER 385-1-92.
d. NIOSH/OSHAAF/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Activities*.

1.9 SSHP Organization

This SSHP is comprised of two sections.

1.9.1 *Section 1*

This section addresses site specific safety and health issues. It includes a site description and contaminant characterization a safety and health risk/Hazard analysis for chemical, physical, biological, safety, and radiological Hazards; monitoring requirements and action levels for upgrading or downgrading personal protective equipment (PPE) or evacuating the site; and emergency assistance information.

1.9.2 *Section II*

Section II (under development) includes general safety and health procedures common to SPK field efforts at any site. Section II describes the roles and responsibilities of field personnel with respect to safety and health, safety training requirements, medical surveillance program, descriptions of different levels of PPE, and standard safety procedures such as safety inspections, emergency response planning, Hazard communication, and spill containment. Information is this section will aid SPK employees when conducting contractor quality assurance audits.

1.9.3 *SPK-OM-385-1-1*

This SSHP will be utilized in conjunction with SPK's *Safety and Occupational Health Policy and Procedures Manual*, OM 385-1-1.

1.10 Activity Hazard Analysis (AHA)

Before activities begin, a safety and health tailgate meeting will be conducted by the SSHO and contractors to review the AHAs. This meeting will include a review of potential Hazards and control measures necessary to perform project activities safely as well as any contingency planning in the event of an emergency.

1.10.1 *SPK Tasks*

Work tasks include non-intrusive activities (i.e., initial site visits, pre-work plan visits); contractor quality assurance audits; and sampling (soil).

1.10.2 *Contractor Tasks*

The Contractor's work tasks are described in the contractor's SSHP(s).

2.0 SITE DESCRIPTION AND CONTAMINATION CHARACTERIZATION

The Hamilton Airfield is located in Novato, California. HAAF was a former Air Force Base and Army Field.

The Stockpile Soils at the Hamilton Airfield originated from the following:

- GSA Phase I Sale Area soil excavated prior to the GSA Phase I building demolitions
- GSA Phase I Sale Area soil excavated after the building demolitions known as " Under the Buildings" soil.
- GSA Phase I Sale Area Lot 7 soil, which was segregated from the other lots because of VOC contamination.
- Soil Excavated from BRAC Outparcels A-5 and A-6

GSA Phase I Sale Area Consisted of the following:

- Lot I - Jet Engine Test Facility
- Lot 1 and 2 – Fuel Distribution Lines
- Lot 3 – Hangar Avenue Fuel Lines (3,500 feet of fuel lines)
- Lot 8 – Plan Location 5 (base motor pool area)

- Lot 8 – Plan Location 6/10 (three steel tanks and twenty six underground storage tanks (USTs)

Under the Buildings Soil consisted of soils from under Buildings 309, 312, 315, 318, 345, 346, 348, 405, and 410.

Lot 7 consisted of Building 141/147, a depression area, storm drain, and Building 99.

BRAC Outparcel A-5 was Northwest of Building 95. BRAC Outparcel A-6 was west of Building 95.

2.1 Contaminant Characterization

A list of potential contaminants found or known to be present at HAAF is included as attachment Table 1 – Occupational Health Exposure and Toxicological Properties for Contaminants of Potential Concern. Compilation of this list is based on results of previous studies or selecting the likely contaminants based on site history and prior site uses/activities.

3.0 HAZARD/RISK ANALYSIS

3.1 General

This SSHP identifies the chemical, physical, biological, radiological, safety, and OE/CWM Hazards may be encountered. The AHA identifies potential Hazards and control measures to be implemented to eliminate or reduce each Hazard to an acceptable level.

3.1.1 *Tasks*

a. Non-intrusive visits.
b. Soil sampling in soil stockpiles up to 2 feet deep.

3.2 Chemical Hazards

Known or suspected chemical Hazards exist at HAAF (see attached Table 1). These include potential exposure to a variety of metals such as lead, antimony, copper and zinc, explosive compounds, volatile and semi-volatile organic compounds, pesticides, PCBs, and dioxins. The chemicals are either known or suspected to exist at HAAF, with their respective exposure limits, are listed. The OSHA permissible exposure limit (PEL) and short-term exposure limit (STEL), the American Conference of Governmental Industrial Hygienist (ACGIH®) Threshold Limit values (TLV®), and the National Institute for Occupational Health and Safety (NIOSH) Immediately Dangerous to Life and Health (IDLH) concentrations are listed, if available, for each chemical. The actual exposure limit concentrations of these materials vary, depending upon the media in which the chemicals are present and site activities. Based on current information, it is suspected the surface and subsurface at HAAF may be contaminated with some or all of the compounds listed in the table. Actual contaminants encountered may not be limited to these. Personal exposures to these chemicals may be through inhalation, ingestion, skin and eye contact, skin absorption, or by a combination of these routes. Additionally, SPK will evaluate safety and health Hazards for Hazardous substances brought on site for the execution of site activities.

3.2.1 *Chemicals of Potential Concern (COPC)*

See attached Table 1

3.2.2 *Chemical Information and Material safety Data Sheets (MSDS)*

Prior to the commencement of work, all available information concerning the chemical, physical, and toxicologic properties of each substance known or expected to be present on site will be made available to the affected employees. MSDSs will be available for Hazardous materials brought to the site by SPK and any contractor. It is not anticipated SPK will bring any Hazardous chemicals to the site in support of site activities.

3.2.3 *Action Levels*

Action levels are not required for SPK activities. SPK will comply with the contractor's actions levels for sites being audited.

3.3 Physical Hazards

Potential Hazards from physical agents include noise, heat and cold stress, solar radiation, weather, lifting, slipping, tripping, or falling,

3.4 Biological Hazards

Biological Hazards include insects, spiders, ticks and fleas, rattlesnakes, scorpions, rodents, and plants with thorns, spines and needles.

a. Snakes and insects are found throughout HAAF. Possible cover and Habitat for these shall be minimized in the field operations area.
b. Hantavirus exposure is also a potential Hazard. Potential risk factors for Hantavirus exposure include disturbing mice nests or areas with visible mouse droppings.

3.5 Radiological Hazards

There is no evidence of ionizing radiation sources or radioactive waste disposal at HAAF; therefore, no specific radiation screening is planned. In the event information is provided contradicts with this assumption, this SSHP will be amended to include appropriate screening and action levels for Halting or altering site work. SPK will not use nuclear sourced equipment (i.e., soil compaction nuclear density gauge, XRF).

3.6 Safety Hazards

Safety Hazards from SPK and contractor site conditions and activities include excavation, slips, trips, and falls on same surface, electrical, equipment and machinery, weather, etc. SPK will ensure the controls implemented to address these safety Hazards comply with applicable sections of EM 385-1-1.

3.7 Hazard Analysis

This certifies SPK assessed the type, risk level, and severity of Hazards for the tasks and selected appropriate personal protective equipment in accordance with 29 CFR 1910.132

3.7.1 *Heavy Equipment Operations*

Prudent care will be exercised when moving about machinery of any kind. Personnel will be aware the use of certain protective equipment may limit dexterity and visibility, and may increase the difficulty in performing certain tasks.

3.7.2 *Vehicle Traffic*

Employees may be exposed to vehicle accident Hazards associated with the operation of vehicles during the project. Seat belts will be worn and basic speed laws followed.

3.7.3 *Heavy Lifting*

During manual lifting tasks, personnel will lift with the force of the load suspended on their legs and not their backs. They are to maintain a straight back and hold the object close to the body. Mechanical lifting devices or help from a fellow field team member will be sought when the object is too heavy for one person to lift.

3.7.4 *Slip/Trip/Fall*

All field members are to be vigilant in providing clear footing, identify obstructions, holes or other tripping Hazards, and maintaining an awareness of uneven terrain and slippery surfaces. Working at heights above six feet is not anticipated.

3.7.5 *Noise*

All field personnel will be required to wear hearing protective devices in areas where normal communication cannot be understood when field personnel are within three feet from one another and when working within 20 feet of heavy equipment.

3.8 Hazard Communication Program

SPK includes a Hazard communication program in SPK-OM-385-1-1.

4.0 STAFF ORGANIZATION, QUALIFICATIONS, AND RESPONSIBILITIES

The operational and safety and health responsibilities will be undertaken by qualified and competent safety and health professionals. Each person assigned specific safety and health responsibilities is identified.

4.1 SPK Chain of Command

Ms. Kathy Siebenmann is the Technical Team Lead, Ms. Donna Maxey is the Project Safety and Health Officer, Mr. A.R. Smith is the District Chief of Safety and Occupational Health, and the SSHO/Field Team Lead will be determined.

4.2 SPK Personnel Responsibility and Authority

SPK personnel are responsible for performing tasks in a safe and healthful manner, preventing unnecessary risk of Hazardous exposure to field personnel, other site personnel, the public, or the environment. Each individual is responsible for acknowledging and following applicable safe work rules and guidelines in this SSHP and the contractor's SSHP(s) and using best professional judgment in minimizing the potential for injury or adverse health associated with activities governed by this SSHP.

4.2.1 *Project Manager*

As the senior management representative, the PM is responsible for defining project objectives, allocating resources, determining the project delivery team, and evaluating project outcome. The PM will ensure the reporting, scheduling, and budgetary obligations are met.

4.2.2 *Site Safety and Health Officer*

Day-to-day safety and industrial hygiene support, including air monitoring, training, daily site safety inspections, will be provided by a designated SSHO who will report activities to the PSHO.

4.2.3 *Field Personnel*

All personnel will attend a project-specific briefing conducted by the PSHO or SSHO. This briefing is used to orient all site personnel to the nature of the site, the scope of work, the contents of the SSHP and any unique site conditions warrant explanation.

4.2.4 *Project Safety and Health Officer*

The PSHO is responsible for the development, technical assistance, and oversight of this SSHP. The PSHO shall ensure all health and safety program documents comply with Federal, state and local health and safety requirements. If necessary, the PSHO will modify the SSHP to adjust for on-site changes that affect safety and/or health. The PSHO will coordinate with the SSHO on all modification to the SSHP and will be available for consultation when required.

4.2.5 *Chief, Safety and Occupational Health Office*

The Chief, SOH is responsible for verifying that SPK personnel are current participants in the medical surveillance program, have current respiratory fit test (if applicable), complete safety and health training; and providing quality assurance for consistency with Corps policy and procedure. The SPK SOH may conduct a site safety audit. This audit will be to check for conformance with the SSHP. Findings will be written up and discussed with the PM, PSHO and SSHO to ensure that any deficiencies are corrected.

4.2.6 *Other Key Safety and Health Personnel*

a. SPK will utilize the services of Dr. Lee Wugofski, MD, of the Division of Federal Occupational Health (DFOH) unit. Dr. Wugofski is certified in occupational medicine.
b. SPK will utilize laboratories which are proficient to conduct personnel, area, and environmental analysis for organic and inorganic chemicals; fully equipped to analyze the required NIOSH, OSHA, and EPA analyses; and currently participating in the American Industrial Hygiene Association (AIHA) Proficiency Analytical Testing (PAT) Program and is certified by AIHA.

4.2.7 *Key Personnel*

Technical Team Leader	Kathy Siebenmann	(916) 557-7180
Chief SOH	Arthur R Smith	(916) 557-6973
Project Safety and Health Officer	Donna Maxey	(916) 557-7437
Site Safety and Health Officer	Kim Emerick	(916) 557-7319
Public Health Service (PHS)	Marion Conley, RN	(916) 930-2290
Occupational Physician (PHS)	Dr. Lee Wugfoski, MD	(415) 556-2975

4.2.8 *Site Visitors*

Visitors may be present at the project site during field activities. These individuals may include SPK staff, regulatory agency personnel, client personnel, and visitors. The SSHO will provide a brief overview of the field activities to the site visitors.

5.0 Training

5.1 General

All personnel who enter a Hazardous waste site must recognize and understand the potential Hazards to health and safety. It is the intent of this SSHP to provide every person a level of health and safety training consistent with their job function and responsibility. SPK on-site personnel have completed formal Hazardous waste operations (HAZWOPER) training and will complete an on-site briefing on this SSHP, the AHA, PPE, and Hazard communication. SPK personnel performing on-site activities will be familiar with the contents of this SSHP along with any contractor's SSHP(s), and sign the SSHP Employee Acknowledgment form.

5.1.1 *Additional Training*

In addition to the OSHA Hazardous waste operations and emergency response regulations, there are other ancillary safety and health regulations governing certain training aspects for these projects. These additional training requirements include:

a. Respiratory Protection (29 CFR 1910.134).
b. Hearing Conservation (29 CFR 1910.95).
c. Hazard Communication (29 CFR 1910.1200 / 1926.59).
d. Bloodborne Pathogens (29 CFR 1910.1030).

5.1.2 *Initial Training*

Field personnel Have completed 40 hours of off-site instruction, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.

5.1.3 *Supervisory Training*

The Field Team Lead/SSHO Has completed 8 additional hours of specialized training on managing such operations.

5.1.4 *Refresher Training*

All site workers will complete 8 hours of off-site refresher training annually on the items covered in the 40-hour initial training program.

5.1.5 *Site-Specific Training*

Site-specific training covering site Hazards, procedures, and contents of the SSHP to all personnel, including those assigned only to the Support Zone who Have met the requirements of 29 CFR 1926.65. Training will be conducted prior to job start-up and as needed thereafter. The PSHO or SSHO will conduct initial site-specific training to ensure that employees have a thorough understanding of the SSHP, standard operating procedures (SOPs), and physical, safety, biological, radiological, and chemical Hazards of the site.

5.1.6 *Daily Tailgate Safety Meetings*

All personnel who enter the exclusion and contamination reduction zones will attend the daily tailgate safety meeting. This meeting, conducted by the SSHO and/or contractor, will cover specific health and safety issues, site activities, changes in site conditions, and will review topics covered in the initial health and safety meeting as they apply to daily activities.

5.1.7 *Respiratory Protection*

Respiratory protection training is included in the initial 40-hours and 8-hour update HAZWOPER training.

5.1.8 *Hazard Communication*

In accordance with the OSHA Hazard Communication standard (29 CFR 1910.1200 / 29 CFR 1926.59), copies of all material safety data sheets (MSDS), container labeling, and chemical health Hazards for Hazardous chemical materials brought onto any project site and used during site operations will be available. Site-specific training on the chemicals of concern will be provided. General Hazard communication training will be conducted during the HAZWOPER training.

5.1.9 *Bloodborne Pathogens and CPR/First Aid*

Selected employees have been trained in CPR and first aid for emergency use only. An introduction to the Bloodborne Pathogens standard will be provided during the CPR/First Aid Training.

5.1.10 *Hearing Conservation*

Hearing conservation is included in the initial 40-hour and 8-hour refresher HAZWOPER training classes.

5.1.11 *Confined Space Entry*

Confined space entry is not anticipated nor permitted without a revision to this SSHP. General awareness of confined space entry training in provided in the 40-hour initial and 8-hour refresher HAZWOPER training classes. Under no circumstance will employees not specifically trained in confined space safety be permitted to enter a confined space.

5.1.12 *Excavation and Trenching*

Excavating and trenching will not be conducted by contractors or SPK personnel.

5.1.13 *Emergency Response Procedures*

All employees will be made aware of the project emergency assistance network and the most probable route of evacuation in the event of an emergency.

5.1.14 *Site-Specific Rules and Disciplinary Procedures*

Prior to the initiation of field activities, employees will be instructed in specific safety rules. Employees will be instructed in the use of the "buddy" system; the buddy system will be used at all times when employees are within an exclusion or contamination reduction zone.

5.1.15 *Documentation of Training*

Documentation of training is the responsibility of SPK's SOH.

5.1.16 *First Aid / CPR*

At least two SPK, or contractor persons trained in a minimum of both American Red Cross first-aid techniques and CPR will be on site whenever activities occur.

6.0 PERSONAL PROTECTIVE EQUIPMENT

6.1 Personal Protective Equipment Program

SPK will develop a site-specific PPE program. This program will supplement SPK's Protective Clothing and Equipment program, SPK OM 385-1-1, Appendix J. The program will address the elements of 29 CFR 1926.65(g)(5), 29 CFR 1910.132 (General Requirements) and 29 CFR 1910.134 (Respiratory Protection).

6.2 PPE Ensemble

SPK will specify minimum PPE ensembles (including respirators) necessary for each task/operation based on the Hazard/risk analysis, including potential heat stress and associated safety Hazards.

6.2.1 *Site-Specific Personal Protective Equipment*

Based on the Hazard assessment, including the review of the existing analytical data and related toxicological information, proposed activities, performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and durations, it is anticipated that Level D is the initial level of protection during SPK tasks. Personnel shall use the PPE ensemble as described in the contractor's SSHP when conducting contractor audits.

6.2.2 *Level D*

Level D consists of the following:

a. Long pants and sleeved shirts with collars.

b. Safety boots/shoes meeting the specifications of American National Standards Institute (ANSI) Z41.
c. Safety glasses (may be tinted for outdoors work). All approved eye protection must meet the specifications of ANSI Z87.1. The use of contact lenses is discouraged during Level D operations, but not prohibited. Safety glasses will be used in addition to the contact lenses.
d. Impervious gloves will be worn during all site activities that could result in direct contact with potentially contaminated soil or other items.
e. Hearing protection (if required). The protective device must Have a noise reduction rating capable of providing the wearer with enough protection so as to reduce the received noise level to below 85 dBA.

Because of recent concerns of Hantavirus, which has resulted in several deaths in the Southwestern part of the United States, respirators may be worn by site personnel in Level D ensembles. For this reason, air purifying respirators (APR), Half-faced or full-faced, with either a dust filter or high efficiency particulate air (HEPA) filter (P100) will be made available. The dust filter will suffice, as the Hantavirus is typically transported via dust particles.

6.2.3 *Level C*

Level C protective equipment will be designated by SPK Personnel and may consist of the following:
a. Chemical-resistant coveralls. This may include polyethylene coated Tyvek, or Saranex.
b. Safety shoes with disposable boots covers or, Chemical-resistant steel toed boots, meeting the specifications of ANSI Z41.
c. Chemical resistant gloves. This includes: disposable inner and outer gloves, such as polyvinyl alcohol and 4H or Silver Shield.
d. Work gloves as necessary to prevent cuts, scrapes, and pinches.
e. Half-faced or full-faced APR with HEPA (P100) cartridges, Safety glasses, goggles or face shield when wearing a Half-face APR, meeting the specifications of ANSI Z87.1. There is no longer an OSHA prohibition for the use of contact lenses with respiratory protective devices. Individuals who feel that the contact lens provides them superior vision and comfort may use them with respirators.
f. Hardhat meeting the specifications of ANSI Z89.1.
g. Cuffs sealed to boots or gloves with duct tape, or equivalent.
h. Hearing protection as necessary depending on measured decibel readings in the field.
i. Reflective traffic vests.

6.2.4 *Level B and Level A*

SPK personnel will not use Level B and Level A PPE.

6.2.5 *Modification of PPE*

Based on actual field conditions and on-site monitoring activities, modification in the PPE may be necessary. Modifications may include PPE upgrades to a higher degree of protection, downgrades, or substitutions such as use of engineering controls. The SSHO may modify the initial levels of PPE in response to additional site information, with the approval of the PSHO.

6.3 Fit-For-Duty

Site personnel will Have a current medical "fit-for-duty" clearance to use respiratory and other PPE.

6.4 Respirator Protective Program

All respiratory protective equipment will be National Institute for Occupational Safety and Health (NIOSH) approved. SPK maintains a written respiratory protective equipment program detailing selection, fit testing, use, cleaning, maintenance, and storage of respiratory protective equipment, as well as medical approval for individual use.

7.0 Medical Surveillance

7.1 General

Personnel performing on-site HTRW activities participate in an ongoing medical surveillance program meeting the requirements of 29 CFR 1926.65 and ANSI Z-88.2.

7.2 Medical Surveillance Coordinator

SPK's SOH has contracted the services of a Board-Certified Occupational Physician at DFOH to provide the bi-annual (more frequent on physicians recommendation) medical surveillance exams. The physician will review all medical examinations and will be available for medical consultation on an "as-needed" basis.

7.3 Medical Examinations

On-site SPK personnel have successfully completed a pre-placement or periodic/updated physical examination. The medical surveillance provided to the employee includes a judgment by the medical examiner of the ability of the employee to use negative-pressure respiratory equipment. Any employee found to have a medical condition that could directly or indirectly be aggravated by exposure to the COPC or by the use of respiratory equipment will not be employed for the project.

7.3.1 *Contents of Medical Examination*

SPK's SOH in consultation with the DFOH has established the minimum content of the medical examination based upon probable HTRW site conditions, potential occupational exposures and required protective equipment.

7.3.2 *Injury or Illness*

Any injury or illness (whether on or off the job) may require work restrictions after the employee returns to work. If the injury or illness required seeing a physician, either the attending physician or the physician giving the employment physical will be involved in the decision of when the employee will return to work, and if any work restrictions will apply.

7.3.3 *Certification of Participation*

The SOH will maintain the certification of employee participation in the medical surveillance program and the written opinion from the attending physician.

7.4 Medical Records

Personnel Medical records will be maintained by DFOH.

7.4.1 *Project Specific Medical Monitoring*

There are no HAAF specific medical monitoring elements.

7.5 Emergency Medical Assistance and First Aid

Prior to work start-up, an emergency medical assistance network will be established. The Fire Department, ambulance service, and clinic or hospital emergency room are identified. A vehicle will be available on-site during all work activities to transport injured personnel to the identified emergency medical facility. At least two field team members (SPK, HAAF or contractor) will be certified to render both CPR and First Aid. A first aid kit, including necessary protection against bloodborne pathogens, will be available. An adequate supply of fresh potable water for emergency eye wash purposes or a portable emergency eyewash, also will be available depending on the site hazards. A map and directions indicating the fastest route to the hospital emergency room will be posted.

8.0 RADIATION DOSIMETRY

Radiological hazards are not anticipated for this project.

9.0 EXPOSURE MONITORING/AIR SAMPLING PROGRAM

9.1 General

Exposures to the COPCs above their PEL/TLV are not anticipated for these SPK outdoor tasks; there will be no direct-reading or integrated personal monitoring. If conditions are not as anticipated, work will stop until a monitoring program is established and monitoring equipment is obtained. Contractor may monitor intrusive activities that they conduct.

9.2 Dust Control

SPK activities will not require dust control.

9.3 Heat or Cold Stress Monitoring

Heat or cold stress will be monitored qualitatively. Personnel will not conduct strenuous activities that will require heat stress monitoring. Personnel will take breaks in air-conditioned vehicles.

10.0 HEAT / COLD STRESS MONITORING

10.1 General

Heat and cold stress will be monitored qualitatively.

10.2 Heat Stress

The stress of working in a hot environment can cause a variety of illnesses including heat exhaustion or heat stroke; the latter can be fatal. Use of personal protective equipment can significantly increase heat stress. To reduce or prevent heat stress, SPK will implement scheduled rest periods and require controlled beverage consumption to replace body fluids and salts.

10.2.1 *Monitoring for Heat Stress*

Personnel are trained to recognize the symptoms of heat stress and the appropriate action to take upon recognition.

10.3 Cold Stress

During the winter months, cold stress may be an occupational stress. Frostbite and hypothermia are the primary concerns. Personnel will take breaks in a heated vehicle.

11.0 STANDARD OPERATING SAFETY PROCEDURES, ENGINEERING CONTROLS AND WORK PRACTICES

SPK will develop and implement applicable and feasible engineering and work practice controls to reduce and maintain employee exposure at or below the OSHA PELs for the COPCs. SPK will develop and implement, as applicable, standard operating procedures (SOP), to include but not limited to:

a. Site rules/prohibitions (buddy system, eating/drinking/smoking restrictions).
b. Work permit requirements (e.g., radioactive work, excavation, hot work, confined space). Not applicable for SPK tasks.
c. Material Handling procedures (soils, liquids, radioactive material). Not applicable for SPK tasks.
d. Drum/container Handling procedures and precautions (opening, sampling, overpacking). Not applicable for SPK tasks.
e. Confined space entry procedures. Not applicable
f. Hot work, sources of ignition, fire protection/prevention. Not applicable.
g. Electrical safety (ground-fault protection, overhead power line avoidance). Not applicable for SPK tasks.
h. Excavation and trenching safety. Not applicable for SPK tasks.
i. Guarding of machinery and equipment. Not applicable for SPK tasks.
j. Lockout/Tagout. Not applicable for SPK tasks.
k. Fall protection. Not applicable for SPK tasks.
l. Hazard Communication.
m. Illumination. Work will be conducted during daylight hours.
n. Sanitation. Work breaks, eating, and drinking will be in the field vehicle or other suitable location outside the restricted area.
o. Engineering controls.
p. Process Safety Management. Not applicable.
q. Signs and labels. Not applicable for SPK tasks.

11.1 Field Safety Requirements
The field safety requirements and procedures applicable to this project include safe work practices, work zones, site control, safety meetings, safety inspections, accident reporting and investigations, sanitation, and housekeeping.

11.2 Hearing Conservation
A hearing conservation program will be implemented at the site when noise exposures equal or exceed an 8-hour TWA of 85 A-weighted decibels (dBA). Audiometric testing is part of the medical surveillance program. Hearing protection will be worn by personnel working with or around heavy equipment.

11.3 Heavy Equipment Operations
Personnel will stay clear of contractor's operating equipment. Personnel will approach operating equipment only from the operator's angle of view and only after making eye contact with the operator. Personnel will wear reflective traffic vests.

11.4 Weather
SPK activities will be suspended during severe weather conditions.

11.5 Slips, Trips, Falls
These potential Hazards are likely due to slippery surfaces and uneven terrain. SPK personnel will watch where they walk.

11.6 Cuts and Scrapes
The potential for jagged-edged objects and general cuts and scrapes exist. SPK personnel will wear appropriate PPE.

11.7 Buried / Overhead Utilities
This is a contractor responsibility.

12.0 SITE CONTROL MEASURES
Currently there is no site control in progress for the HAAF site.

12.1 Work Zones
SPK tasks will be conducted in restricted areas; the 3-work zones will not be required. The contractors will establish work zones (Exclusion (EZ), Contamination Reduction (CRZ), and Support (SZ), including restricted and regulated areas) at HTRW sites based on the contamination characterization data and the hazard/risk analysis.

12.2 Authorized Personnel
Only authorized personnel will enter regulated areas associated with the field activities. The SSHO will establish the bounds of the regulated areas. The following measures will be taken to assure site security. All workers entering the regulated areas will be subject to the provisions of the SSHP. The SSHO will have the responsibility and authority to enforce this requirement.

12.3 Communication Systems

Two types of communications systems will be available for workers assigned to field projects. One system will ensure adequate communication between site personnel, and the other will ensure the ability to contact personnel and emergency assistance off the site.

13.0 PERSONAL HYGIENE AND DECONTAMINATION

A formal decontamination station is not applicable for SPK activities. Decontamination will occur within the gravel firing range area. Wet-wipes will be used as an alternative procedure before eating and drinking.

14.0 EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated between sampling locations. Disposable equipment will be containerized and removed from the area. No heavy equipment will be used by SPK personnel.

15.0 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The following items, as appropriate, will be available for on-site use:

a. First aid equipment and supplies.
b. Emergency Eyewashes/showers (ANSI Z-358-1) (determined by SSHO)
c. Fire Extinguishers (determined by SSHO)

Contractors may have additional emergency equipment at their job sites.

16.0 EMERGENCY RESPONSE AND CONTINGENCY PROCEDURES

16.1 Local Fire / Police / Rescue

Local fire/police/rescue authorities having jurisdiction and nearby medical facilities that could be utilized for emergency treatment of injured personnel will be contacted to notify them of upcoming site activities and potential emergency situations, to ascertain their response capabilities, and to obtain a response commitment.

16.2 General

This section contains emergency response procedures specific to this project, including telephone numbers for the closest medical facilities capable of providing emergency service for hazardous waste site workers, a map showing the locations of these medical facilities. Additionally, telephone numbers for the Poison Control Center, local police, fire department (including emergency rescue squad), and SPK management contacts have been provided. The SSHO will be responsible for taking necessary action and contacting the appropriate emergency contacts and SPK personnel in case of emergency.

16.3 Spill and Discharge Control

Not applicable for SPK activities

16.4 Emergency Response Plan and Contingency Procedures

SPK personnel will be prepared to respond and act quickly in the event of an emergency. Pre-planning measures will include employee training, fire and explosion prevention and protection, chemical spill and discharge prevention and protection, and safe work practices to avoid personal injury or exposure.

16.4.1 *Medical Emergency Response*

In the event of severe physical or chemical injury, emergency response personnel will be summoned for emergency medical treatment and ambulance service. The emergency medical responders will be utilized to provide care to severely injured personnel. Transportation routes and maps will be posted in each vehicle prior to the initiation of on-site activities.

16.4.2 *Emergency Response Contacts*

Field Team Leader/SSHO	Kim Emerick	(916) 557-7319
	On-Site Cell	(916) 261-9499
Project Safety and Health Officer	Donna Maxey	(916) 557-7437
Chief SHO	A.R. Smith	(916) 557-6973
Public Health Service (PHS)	Marion Conley, RN	(916) 930-2290
Occupational Physician (PHS)	Dr. Lee Wugfoski, MD	(415) 556-2975
SPK District 24 Hr Answering Service		(916) 452-1535
Rancho Springs Medical Center 25500 Medical Center Drive Murrieta, CA 92562-5965		(909) 696-6000
Poison Control Center		(800) 222-1222
Fire/Police Emergency		911

16.4.3 *Personal Exposure or Injury*

The SSHO will call for emergency assistance if needed. As soon as practical, the SSHO will contact the Section Supervisor. Staff assigned to this project will be briefed on procedures.

16.4.4 *Emergency Equipment*

The SSHO will have a cell phone at the site; the SSHO will determine if it functions at the individual sites. The SSHO will assure communication with HAAF security.

17.0 ACCIDENT PREVENTION

17.1 Daily Safety and Health Inspections

Daily safety and health inspections will be conducted by the SSHO to determine if site operations are in accordance with the approved SSHP, OSHA, and USACE requirements.

17.2 Accident or Incident

In the event of an accident or incident, the SSHO will immediately notify the Technical Team Lead and the employee's supervisor. Within three working days of any reportable accident/injury/illness, the employee and their supervisor will complete and submit to the SOH Office an Accident Report on ENG Form 3394, CA-1 and/or CA-2, and other applicable forms. The PM will complete and submit DA Form 285 for all Class A and B accidents.

17.3 Accident Investigations

All injuries, occupational illnesses, vehicle accidents, and incidents with potential for injury or loss will be investigated, appropriate corrective measures taken to prevent recurrence, and continually improve the safety and health of the work site.

18.0 LOGS, REPORTS, AND RECORDKEEPING

The following logs, reports, and records will be developed, retained, and submitted to the PM:

a. Daily safety inspection logs (may be part of the Daily QC Reports).
b. Employee/visitor register.
c. Environmental and personal exposure monitoring/sampling results (contractor provided).

18.1 Recordkeeping

The PM will maintain reports generated by the Field Team Leader.

18.2 Accident Reporting and Investigation

All SPK personnel are required to report all near misses, injuries, illnesses, and accidents to their immediate supervisor. The supervisor will immediately arrange appropriate medical care as required. Once immediate medical care for the injured personnel has been accomplished, the supervisor will complete and submit the appropriate report forms required by the SOH Office and Human Resources. All near misses, injuries, illnesses, and accidents shall be investigated. The supervisor of the injured employee will investigate the conditions that led to the accident with the assistance of the Chief, SOH. They will document how the accident occurred and identify unsafe acts or conditions what occurred or existed at the time of the accident. Corrective actions will be determined and implemented to prevent recurrence of the accident, and responsibility for implementation of corrective actions will be assigned.

ACTIVITY: Site Visit/Sampling

Principal Steps	Potential Hazards	Recommended Controls
1. Non-intrusive visits 2. Soil Sampling	Chemical Hazards: See Tables 1 Radiological Hazards: None anticipated Biological Hazards: Rattlesnakes, insects, spiders, ticks, fleas Physical Hazards: 1. Cuts, scrapes, and pinch points from Hand Augers 2. Slip/trip/fall on slippery surfaces and uneven terrain 3. Heat stress 4. Noise from heavy equipment 5. Struck by or against a piece of heavy equipment 6. Contact with overhead and underground utilities.	Chemical Hazards 1. Level D PPE, upgrade to Level C as determined by SPK Personnel. Radiological Hazards: None Biological Hazards: Observe field conditions. Physical Hazards 1. Watch where you step, be aware that sticks, rocks or other items can be concealed by leaves and grass, causing you to trip. 2. Only qualified and trained personnel will operate equipment. 3. Equipment must be inspected by a competent person and operated in accordance with the manufacturer's instructions. 4. Moving equipment must have properly functioning back-up alarms. 5. Equipment shall not run unattended. 6. Frequent breaks and replacement fluids to prevent heat stress.
Equipment to be Used	**Inspection Requirements**	**Training Requirements**
1. None	1. None	1. None

Table 1: See NIOSH Pocket Guide for Chemicals of Concern (Attached at the end of the SSHP)

EMPLOYEE ACKNOWLEDGMENT

The above project requires the following: that you be provided with and complete formal and site-specific training; that you be supplied with proper personal protective equipment including respirators; that you be trained in its use; and that you receive a medical examination to evaluate your physical capacity to perform your assigned work tasks, under the environmental conditions expected, while wearing the required personal protective equipment. These things are to be done at no cost to you. By signing this certification, you are acknowledging that the Corps of Engineers has met these obligations to you.

I Have Reviewed, Understand and Agree to Follow this Site Safety and Health in addition to the Contractor's SSHPs at HAAF.

Printed Name	Signature	Organization	Date

TRAINING ACKNOWLEDGMENT FORM

By signing this certificate, you are acknowledging that you have completed the following formal training:

SITE-SPECIFIC TRAINING: I have completed the SPK/contractor site-specific training
________________Employee Initials

RESPIRATORY PROTECTION: I have been trained in accordance with SPK's Respiratory Protection Program, SPK OM 385-1-1. I have been trained in the proper work procedures and use and limitations of the respirator(s) I will potentially wear. I Have been trained in and will abide by the facial hair policy. SPK employees will evacuate the site if conditions require an upgrade to EPA/OSHA Level C PPE (which includes respiratory protection) if not trained, medically evaluated or provided a respirator.
_______________Employee Initials

MEDICAL EXAMINATION: I have had a medical examination within the [last twelve months] [two years] which was paid for by the Corps of Engineers. The examination included: health history, pulmonary function tests and may have included an evaluation of a chest x-ray. A physician made a determination regarding my physical capacity to perform work tasks on the project while wearing protective equipment including a respirator. I was personally provided a copy and informed of the results of that examination. The Chief of SOH Office evaluated the medical certification provided by the physician. The physician determined that there:

a. Were no limitations to performing the required work tasks;
   _______________ Employee Initials
b. Were identified physical limitations to performing the required work tasks.
   ______________ Employee Initials

Employee's Signature ____________________________ Date ____________

Employee's Name ______________________________
(Printed)