REVISED FINAL WORK PLAN ADDENDUM AEROSPACE MUSEUM SITE NAS FORT WORTH TX

3/1/1999

FANNING, PHILLIPS AND MOLNAR

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NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS

ADMINISTRATIVE RECORD
COVER SHEET

AR File Number 455

RISK-BASED ASSESSMENT, MANAGEMENT, AND CLOSURE OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN AT NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE, CARSWELL AIR FORCE BASE, TEXAS

REVISED FINAL

WORK PLAN ADDENDUM AEROSPACE MUSEUM SITE

CDRL A004

Contract No. F41624-95-D-8003-0023
Project No. DDPF 98-8125

March 1999

Contractor Response to Aerospace Museum Site Comments from AFCEE

Item	Page	Section	AFCEE Comment	Contractor Response
1	ii	Table of Contents	It is recommended that the Contractor change the page number listing of Demographics from 2-12 to 2-6.	Revised, new page number is 2-7.
2	iv	List of Tables	It is recommended that the title listed for Table 2-3 should be the same as the title found on the actual table.	Revised.
3	iv	List of Figures	It is recommended that the Contractor include the Aerospace Museum as part of the title of Figure 3-1.	Revised.
4	1-1	1.0	Paragraph 2, sentence 2: It is recommended that the Contractor change the word "refine" to "refines" to agree with the other verbs in the sentence.	Revised.
5	1-1	1.0	Paragraph 3, sentence 4: The Contractor shall change the name "Mr. Charles Rice" to "Mr. Charles Pringle" to reflect the change in team chief.	Revised.
6	1-2	1.2	Paragraph 5, sentence 2: It is recommended that a new sentence begin at the word "lead".	Revised.
7	1-3	1.3.1	Paragraph 3, sentence 2: This sentence would be clarified if it were broken into two sentences at the "and". It is also recommended that "was" be changed to the plural "were" and the word "is" be changed to "are" to agree with the word "data".	Revised.
8	2-2	2.2.1	Paragraph 3: It is suggested that the Contractor define "proxy value" and explain its significance.	Revised for clarification.
9	3-3	3.6.2	The proposed sampling and analysis plan could impact holding times especially for VOCs and SVOCs. It is recommended that the Contractor address this problem.	Revised for clarification, added section 3.6.2.1, page 3-5.

Item	Page	Section	AFCEE Comment	Contractor Response
10	3-3	3.6.2	Paragraph 8: It is recommended that the Contractor should explain the course of action if C_{SPLP}>GW-Ind at 8 ft. below ground surface (bgs).	Revised for clarification.
11	3-4	3.6.2	Paragraph 1: It is recommended that the Contractor should explain the course of action if contamination is found 15 ft. from original boring.	Revised for clarification.
12	3-4	3.6.4	It is recommended that the Contractor include decon water in this section.	Revised.
13	3-4	3.6.4	It is recommended that the Contractor provide additional information in this section. For example, who will characterize the soil and who is contracted to dispose of both hazardous and non-hazardous soils.	Revised. Note that this is an Addenda and specific details, as stated in text, can be found in the Quality Program Plan to avoid duplication. FPM cannot select a contractor at this time to dispose of IDW since the selection process involves the potential contractor to submit costs based on the amount of IDW that is generated from the project. However, in the past, FPM has used the services of All Waste Recovery Systems to handle liquid waste and Phillip Services Corporation to handle solid waste. Both companies are from the Dallas/Ft Worth area.
14		Figure 3-1	It is recommended that the Contractor include an additional figure that would illustrate proposed initial sample locations.	Revised legend for clarification. The initial sample locations are the areas indicated on figure. As section 3.6 explains, samples will be taken in 2 feet vertical intervals at each location and radially out to 15 feet.

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Contractor Response to Aerospace Museum Site Comments from USEPA/TNRCC

Item	Page	Section	USEPA/TNRCC Comment	Contractor Response
13	3-1	3.4	The discussion in this paragraph seems to indicate a risk assessment will be completed for the attainment of Risk Reduction Standard Number 2 (RRS2). For clarification the Risk Reduction Rules do not require a risk assessment to close a site under RRS2.	Revised for clarification.
14		Table 3-1	No sample is shown for SVOCs at OT3804SA.	Revised.

RISK-BASED ASSESSMENT, MANAGEMENT, AND CLOSURE OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN AT NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE, CARSWELL AIR FORCE BASE, TEXAS

REVISED FINAL
WORK PLAN ADDENDUM
AEROSPACE MUSEUM SITE
CDRL A004

Contract No. F41624-95-D-8003-0023
Project No. DDPF 98-8125

Prepared for:
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March 1999

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AMS	Aerospace Museum Site
AOC	Area of Concern
bgs	below ground surface
CDRL	Contract Data Requirements List
COC	Contaminant of Concern
ERB	Environmental Restoration Base Realignment and Closure
FPM	Fanning Phillips Molnar
FSP	Field Sampling Plan
ft	feet
GW-Ind	Groundwater MSC for Industrial Use
GWP-Ind	Groundwater Protection for Industrial Use
HBL	Health Based Levels
IRP	Installation Restoration Program
JRB	Joint Reserve Base
LAW	Law Environmental, Inc.
MCL	Maximum Contaminant Level
MDLs	Method Detection Limits
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
MSC	Medium Specific Concentration
NAS	Naval Air Station
ND	Non-detect
POC	Point of Contact

ACRONYMS AND ABBREVIATIONS (Cont'd)

ppm	parts per million
PQL	Practical Quantitation Limit
RRS	Risk Reduction Standard
SAI-Ind	Soil/Air and Ingestion Standard for Industrial Use
SQL	Sample Quantitation Limit
SMWU	Soild Waste Management Unit
SPLP	Synthetic Precipitate Leaching Procedure
SVOC	semivolatile organic compound
TAC	Texas Administrative Code
TNRCC	Texas Natural Resource Conservation Commission
UST, Inc.	Unified Services of Texas, Inc.
VOC	volatile organic compound

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1.0 INTRODUCTION

This Work Plan is an addendum for the *Quality Program Plan for the Risk-Based Assessment, Management, and Closure of Solid Waste Management Units and Areas of Concern at Naval Air Station Fort Worth, Joint Reserve Base, Carswell Air Force Base, Texas*, henceforth known as *Quality Program Plan*, dated December 1998, prepared by Fanning, Phillips and Molnar. (FPM). Any required clarification or addenda to the scoping documents that constitute the *Quality Program Plan* are provided within the context of this work plan addendum.

The purpose of this work plan addendum is to document the tasks planned to perform the risk-based assessment, management, and closure of the Aerospace Museum Site (AMS), Area of Concern (AOC) 8 at Carswell Air Force Base (AFB), Fort Worth, Texas. The work plan addendum evaluates existing site data, **refines** conceptual site models, and identifies data gaps to allow for the risk-based closure of the site. The project will provide risk-based closure documentation that will determine site-specific target levels for contaminants and document attainment of those target levels.

The assessments will be conducted in accordance with provisions of the Basic Contract #F41624-95-D-8003 and Delivery Order Number 23. Mr. Rafael Vazquez is the Air Force Base Conversion Agency (AFBCA) Base Environmental Coordinator for Naval Air Station (NAS) Fort Worth, Joint Reserve Base (JRB), the former Carswell AFB. Mr. Alvin Brown is the AFBCA Field Engineer and Base Point of Contact (POC). **Mr. Charles Pringle** serves as the Air Force Center for Environmental Excellence (AFCEE)/Environmental Restoration Base Realignment and Closure team chief and as Contracting Officer's Representative.

The principal FPM personnel include Dr. Kevin J. Phillips, P.E., Program Manager; Mr. Gaby A. Atik, P.E., Project Manager; and Mr. Thomas P. Doriski, Branch Manager. Mr. Doriski will also act as Health and Safety Officer. Additional personnel will be selected from FPM staff as needed. Dr. Atul Salhotra of RAM Group will be the principal risk assessor.

1.1 THE U.S. AIR FORCE INSTALLATION RESTORATION PROGRAM

Refer to Section 1.1 of the *Quality Program Plan*, dated December 1998.

1.2 HISTORY OF PAST IRP WORK AT THE AEROSPACE MUSEUM SITE

The Aerospace Museum Site (AMS) (Figure 1-1) is located along Spur 341, west of the North-South primary instrument runway, south of AFP-4, and adjacent to Farmers Branch Creek. The site is currently covered with grass and slopes gently from northwest to southeast. This 12.5-acre museum site has been used for display of various aircraft, vehicles, and storage equipment. A record search indicated that an asphalt batching plant was previously located at the site. Also, a B-52 bomber was previously stored and dismantled at the site, resulting in small chips of aircraft

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B-52 bomber was previously stored and dismantled at the site, resulting in small chips of aircraft skin being buried in the surface soil. Carswell AFB personnel conducted a site survey on April 9, 1993, and reported the following:

- Several spots of stressed vegetation and dark oily spots near aircraft and ground vehicle displays.
- Stressed vegetation along the west fence line and randomly throughout the aircraft display area.
- A 55-gallon drum of material assumed to be waste grease.
- Discarded paint cans.
- A 55-gallon drum of an unknown cleaning compound.
- Several rusted and unidentifiable cans and drums.

In October 1994, representatives of AFCEE and Law Environmental, Inc. (LAW) met at the AMS and found that the debris listed above had been removed. Neither surface staining nor distressed vegetation were evident.

LAW conducted soil sampling activities at the AMS from October 22 to 24, 1995 as part of a Site Investigation/Site Characterization. Forty-nine surface soil samples were collected from 0 to 2 feet using stainless steel hand augers following a grid layout of the site. Sampling locations occurred at approximately 100-foot intervals. Samples were analyzed for metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). The Site Investigation/Site Characterization Technical Report (LAW, 1996) indicated that VOCs and SVOCs detected at the AMS were at concentrations less than the Texas Risk Reduction Standards (RRSs). The background data collected for metals at this site were determined to not be representative of basewide background concentrations; therefore, a comparison of detected metals concentrations at the site to background were inconclusive.

Unified Services of Texas, Inc. (UST, Inc.) demolished and removed nine small structures and concrete pads at the former AMS in May 1997. These removed structures included a wooden shed, an electrical equipment box, two old concrete blast shields, two concrete pads, one asphaltic concrete pad, a mobile fuel test system, soil piles, a rubble pile, and loose railroad ties. The site was restored with clean backfill, compacted, and reseeded with native grass.

In 1997, Jacobs compared the results reported in the LAW *Site Investigation/Site Characterization Technical Report for the Aerospace Museum Site and Grounds Maintenance Yard*, against background concentrations as reported in the *NAS Fort Worth JRB, Texas Basewide Background Study* (Jacobs, 1997). The evaluation indicated that toluene was detected throughout the AMS at relatively low concentrations, SVOCs were detected at concentrations below Soil/Air and Ingestion Standard for Industrial Use (SAI-Ind) Medium Specific Concentrations (MSCs). **Lead was the only inorganic analyte that required further**

evaluation. The evaluation indicated that toluene and polynuclear aromatic hydrocarbons concentrations likely represented anthropogenic background levels and hence, VOCs and SVOCs did not require further sampling. A single sample exceeded background concentrations and MSCs for lead. The evaluation recommended sampling for lead in the area of a rubble pile in the southeast portion of the site (subsequently removed by UST, Inc.).

In May 1997, Jacobs collected twenty-seven soil samples at the AMS in order to confirm the analytical results collected by LAW in October 1995. Samples were analyzed for selected metals, and were first prepared using the Synthetic Precipitate Leaching Procedure (SPLP). The data evaluation concluded that beryllium was detected below the Practical Quantitation Limit (PQL) but was thought to be a lab contaminant. Additionally, lead was detected above the PQL in one sample. The evaluation noted that the Method Detection Limit (MDL) for lead was 0.016 milligram per Liter (mg/L) compared to the RRS 2 of 0.015 mg/L.

1.3 DESCRIPTION OF CURRENT STUDY

1.3.1 Project Objectives

The overall goal of this project is to provide risk-based closure documentation for the AMS in accordance with Resource Conservation and Recovery Act Part B permit HW50289. Existing site data **were** evaluated against appropriate risk-based closure criteria. Areas where data required for risk-based closure **are** deficient were identified. Specific tasks required to achieve risk-based closure of the site include:

- Collection of soil samples for SPLP analysis to fill data gaps identified in the initial data evaluation.
- Collection of soil samples for horizontal and vertical delineation of localized areas that exceed site-specific target levels for closure.
- Implementation of incidental soil removal/interim removal actions to meet site-specific contaminant target levels that will allow for risk-based site closure.
- Preparation of closure documentation in accordance with RRS 2.

1.3.2 Project Scoping Documents

This document constitutes an addendum to the scoping documents (*Quality Program Plan*, December 1998) required by the Statement of Work for this contract and delivery order.

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2.0 SUMMARY OF EXISTING INFORMATION

2.1 INSTALLATION ENVIRONMENTAL SETTING

Refer to Section 2.1 of the *Quality Program Plan*, dated December 1998.

2.2 SITE-SPECIFIC ENVIRONMENTAL SETTING

Previous investigative activities described in Section 1.2 identified several contaminants above their PQLs and/or background levels. The following subsections provide a summary of available information and an analysis of available data.

2.2.1 Contaminant Sources and Contamination

This section provides an evaluation of available data against appropriate risk-based closure criteria.

Several metals and organic constituents were detected above their PQLs and/or background levels. Therefore, closure cannot be achieved under Risk Reduction Standard Number 1.

The attainment of RRS 2 requires the following criteria to be met:

- The excavation and removal or decontamination of all impacted media and solid waste management units (SWMUs) at the site or remediation of contaminated media to either PQLs, applicable RRS 2 MSCs or background concentrations, whichever is greater. Note that the applicable cleanup standard for soil is the lowest of the MSCs for (i) ingestion of soil, inhalation of vapors and particulates, and dermal contact with soil and (ii) soil concentrations protective of groundwater.

- Leachate obtained from soil samples using SPLP Method 1312 should not exceed the Maximum Contaminant Level (MCL) or Texas Water Quality Standard, whichever is lower.

- The soil vapor measured at the site should not be greater than 1000 parts per million (ppm) (either weight or volume basis).

Comparison of Site Concentrations with RRS 2 MSCs for Ingestion of Soil and Inhalation of Vapors and Particulates from Soil

Table 2-1 compares the maximum concentration of constituents measured in October 1995 with (i) the relevant RRS 2 MSCs for ingestion and inhalation of vapors and particulates from soil and dermal contact with soil (SAI-Ind), (ii) PQL, and (iii) the basewide background levels. Note that the highest of these is the applicable RRS 2. If the maximum concentration of a constituent of concern exceeded the RRS 2, all samples with detected concentrations in exceedance of the RRS 2 were identified and tabulated in Table 2-2. The following are the key findings of the data review:

- Lead concentration measured in OT3840SA exceeds the RRS 2 (SAI-Ind).
- Benzo(a)pyrene concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).
- Benz(a)anthracene concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).
- Benzo(b)fluoranthene concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).
- Dibenz(a,h)anthracene concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).
- Bis(2-chloroethyl)ether concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).
- N-Nitrosodi-n-propylamine concentration measured in OT3801SA exceeds the RRS 2 (SAI-Ind).

Concentrations of all the other constituents were below their respective RRS 2.

Non-detected results were considered along with the detected results in calculating the concentration term. A proxy value is assigned for non-detected contaminants when the contaminant is detected in some samples but not in others for the purpose of calculating the concentration term. Sample nomenclature above with the subscript "p" indicates a proxy value, which was assigned to a sample in accordance with the Texas Natural Resource Conservation Commission (TNRCC) memo dated July 23, 1998 and described below:

1. In cases where a chemical has been detected several times or is expected to be a contaminant of concern (COC) due to the nature of the site activities, the proxy value for the highest non-detected value should be determined by the following criteria:

If other detected data are above SQL,	Proxy = SQL
If other data are below SQL,	Proxy = ½ SQL
If all other data are non-detect (ND) and SQL< HBL	Proxy = 0

where,

SQL is sample quantitation limit,
MDL is method detection limit, and
HBL is health-based level.

2. In cases where a chemical is predominantly non-detect and there is no reason to believe the chemical is expected to be a COC due to the nature of the site activities, the MDL should be compared to the HBL and the proxy for the highest non-detected value should be determined as follows:

If MDL < or = 20% of HBL	Proxy = 0
If MDL is in the range of 20% - 100% of HBL	Proxy = ½ MDL
If MDL > HBL	Proxy = MDL

Comparison of Site Concentrations with RRS 2 MSCs Protective of Groundwater

Table 2-1 compares the maximum concentration of constituents measured in October 1995 with (i) the relevant RRS 2 MSCs for protection of groundwater-industrial scenario (GWP-Ind), (ii) PQLs, and (iii) the basewide background levels. Note that the highest of these three values is the applicable RRS 2. If the maximum concentration of a constituent of concern exceeded the RRS 2, then all samples with concentrations in exceedance of the RRS 2 were identified. These are also tabulated in Table 2-2. The following are the key findings of the data review:

- Beryllium concentrations measured in OT3824SA, OT3825SA, OT3827SA, OT3842SA and OT3844SA exceed the RRS 2 (basewide background).
- Lead concentrations measured in OT3801SA, OT3804SA, OT3807SA, OT3812SA, OT3814SA, OT3816SA, OT3822SA, OT3824SA, OT3832SA, OT3840SA, OT3846SA, OT3847SA, OT3848SA, OT3851SA, and OT3850SA exceed the RRS 2 (basewide background).
- Nickel concentrations measured in OT3801SA, OT3802SA, OT3806SA, OT3809SA, OT3811SA, OT3815SA, OT3817SA, OT3818SA, OT3821SA, OT3825SA, OT3826SA, OT3827SA, OT3828SA, OT3829SA, OT3833SA, OT3835SA, OT3836SA, OT3838SA, OT3840SA, OT3841SA, OT3842SA, OT3843SA, OT3844SA, OT3846SA, OT3847SA, OT3848SA, OT3849SA, and OT3850SA exceed the RRS 2 (basewide background).
- Chromium concentration measured in OT3801SA exceeds the RRS 2 (basewide background).
- Benz(a)anthracene concentrations measured in OT3801SA, OT3814SA, and OT3851SA exceed the RRS 2 (PQL).

- Benzo(a)pyrene concentration measured in OT3801SA, OT3814SA, and OT3851SA exceeds the RRS 2 (PQL).
- Benzo(b)fluoranthene concentrations measured in OT3801SA, OT3814SA, and OT3851SA exceed the RRS 2 (PQL).
- Benzo(k)fluoranthene concentrations measured in OT3801SA and OT3851SA exceed the RRS 2 (PQL).
- Bis(2-ethylhexyl)phthalate concentration measured in OT3801SA and OT3804SA exceeds the RRS 2 (GWP-Ind).
- 2,4-Dinitrotoluene concentrations measured in OT3801SA exceed the RRS 2 (PQL).
- 2,6-Dinitrotoluene concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- 3,3'-Dichlorobenzidine concentration measured in OT3801SA exceeds the RRS 2 PQL).
- Dibenz(a,h)anthracene concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- Hexachlorobenzene concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- Indeno(1,2,3-cd)pyrene concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- Pentachlorophenol concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- Bis(2-Chloroethyl)ether concentration measured in OT3801SA exceeds the RRS 2 (PQL).
- n-Nitrosodi-n-propylamine concentration measured in OT3801SA exceeds the RRS 2 (PQL).

Concentrations of other constituents are below their respective RRS 2.

Subsequent to the October 1995 sampling event, SPLP was conducted on several samples collected in close proximity to the October 1995 sampling locations to determine the leachability of the constituents of concern. The SPLP results (listed in Table 2-3) were below the RRS 2 for groundwater for several COCs at several locations indicating that soils from those locations were protective of groundwater and hence not of concern. The locations that satisfy this criteria and therefore eliminated from further consideration are:

- OT3801SA for Chromium due to AMS-014.

- Since SPLP results were below the GW-Ind standard at locations OT3848SA and OT3840SA where highest concentrations of lead were measured, it is reasonable to assume that the leaching of lead from all other locations at the site will also be protective of groundwater.

- Since SPLP results were below the GW-Ind standard at locations OT3848SA and OT3815SA where highest concentrations of nickel were measured, it is reasonable to assume that the leaching of nickel from all other locations at the site will also be protective of groundwater.

Locations that are not of concern due to Lead and Nickel by the arguments above have been identified with an asterisk ('*') in Table 2-2.

Locations where SPLP results were below the GW-Ind and therefore indicate that there is not threat to groundwater have been identified with a double asterisk ('**') in Table 2-2.

Concentrations of Beryllium detected at the site are slightly greater than the applicable RRS 2 for GWP-Ind (basewide background). Therefore, these concentrations are not expected to cause unacceptable risk by leaching to groundwater.

Summary of Data Analysis

The above process identified 7 areas of concern and 17 COCs within the AMS that exceed RRS 2 and therefore require further evaluation to attain closure as shown in Table 2-4. These areas of concern are listed below:

OT3840SA:

Ingestion and Inhalation of Vapors and Particulates: Lead.

OT3801SA:

Ingestion and Inhalation of Vapors and Particulates: Benzo(a)pyrene, Dibenz(a,h)anthracene, Benz(a)anthracene, Benzo(b)fluoranthene, and Bis(2-chloroethyl)ether.

Protection of Groundwater: Lead, 2,4-Dinitrotoluene, 2,6-Dinitrotoluene, 3,3'-Dichlorobenzidine, Hexachlorobenzene, Bis(2-Chloroethyl)ether, n-Nitrosodi-n-propylamine, Benzo(a)pyrene, Dibenz(a,h)anthracene, Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Indeno(1,2,3-cd)pyrene, Bis(2-Ethylhexyl)phthalate, and Pentachlorophenol.

OT3804SA:

Protection of Groundwater: Bis-(2-Ethylhexyl)phthalate.

OT3814SA:

Protection of Groundwater: Benz(a)anthracene, Benzo(b)fluoranthene, and Benzo(a)pyrene.

OT3851SA:

Protection of Groundwater: Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene,

2.2.2 Geology

Surficial soils were sampled to a depth of two feet (ft) at the site during previous investigations; however, the previous investigation reports provided no discussion of geologic features or soil descriptions. Borings and excavations planned as part of this investigation will be utilized to provide relevant information on the geologic setting at the site.

For a discussion of the Installation geologic setting, refer to Section 2.1.1 of the *Quality Program Plan*, dated December 1998.

2.2.3 Groundwater

Groundwater has not been characterized at the site. Soil contamination is believed to be limited to surface soils at the site, and all identified contaminants of concern at the site are considered to be relatively immobile in soil. The planned investigation is expected to demonstrate that soils are only impacted at shallow depths and are not leaching into groundwater. The investigation will be modified to address groundwater should contamination extend below eight feet in soils.

For a discussion of the Installation groundwater setting, refer to Section 2.1.2 of the *Quality Program Plan*, dated December 1998.

2.2.4 Surface Water

Farmers Branch borders the southwestern extremity of the site. An unnamed ditch borders the southern and eastern portion of the site. Farmers Branch serves as a drainage conduit for several facilities at the site. These surface water bodies are approximately 25 ft wide and flow in the southeast direction.

Refer to Section 2.1.3 of the *Quality Program Plan*, dated December 1998.

2.2.5 Biology

Refer to Section 2.1.4 of the *Quality Program Plan*, dated December 1998.

2.2.6 Demographics

The Aerospace Museum Site (AMS) is located along Spur 341, west of the North-South primary instrument runway, south of AFP-4, and adjacent to Farmers Branch Creek (Figure 1-1). The site is currently covered with grass and slopes gently from northwest to southeast.

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3.0 PROJECT TASKS

3.1 CONCEPTUAL SITE MODEL DEVELOPMENT

Refer to Section 3.1 of the *Quality Program Plan*, dated December 1998.

3.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IDENTIFICATION

The Texas Risk Reduction Rule (30 Texas Administrative Code (TAC) 335 Subchapter S) will be the primary guide for determining site-specific risk-based target cleanup levels for the AMS and for documenting that the site meets those levels as applicable.

3.3 CHARACTERIZATION OF BACKGROUND CONDITIONS

Jacobs Engineering Group Inc. conducted a basewide background study at the Naval Air Station Fort Worth, Joint Reserve Base, Carswell Field, Texas to establish background concentrations of inorganic constituents in various site media. Background concentrations were determined for 24 inorganic constituents in each of the following background populations: surface soil; subsurface soil; groundwater sampled via low-flow sampling techniques; groundwater sampled with a bailer; surface water; and sediment in the surface water drainages. The results of the study are presented in the *Final NAS Fort Worth JRB, Texas, Basewide Background Study*, dated September 1998, prepared by Jacobs Engineering Group Inc.

3.4 RISK REDUCTION STANDARDS

An evaluation shall be conducted to assess attainment of the risk reduction standard in accordance with the 31 TAC §335.555 for the attainment of Risk Reduction Standard Number 2 (RRS 2): Closure/remediation to health-based standards and criteria.

3.5 DATA NEEDS IDENTIFICATION

The objectives of the project are defined in Section 1.3.1 of this Work Plan Addendum. Existing site data have been evaluated against appropriate risk-based closure criteria. Data gaps identified during the initial data evaluation will guide additional data collection for this project. Data needed to accomplish the project objectives include:

- *Soil Contamination Data.* Soil contamination data are necessary to delineate localized areas that exceed site-specific target levels and to demonstrate attainment of cleanup levels.

- *Soil and Sediment Characteristics Data.* Soil characteristics data are necessary to understand the geologic conditions at the site. Lithologic data will be recorded during all sampling activities.

- *Land Survey Data.* Land survey data are necessary to accurately locate property boundaries, easements, and soil boring and sample locations. Survey data will be required to fulfill deed certification requirements for site closure under RRS 2.

3.6 FIELD INVESTIGATION TASKS

Field activities required to fulfill project objectives will include those identified as necessary to fill data gaps and implement selected interim actions to meet site-specific target cleanup levels. The initial data evaluation and risk-based closure evaluations based on the provisions of RRS 2 identified the following two types of areas and field tasks required to achieve the project objectives.

- **Type 1:** Areas that exceed the SAI-Ind and the GWP-Ind standards for one or more COC (OT3801SA) and (OT3840SA)
- **Type 2:** Areas that exceed only the GWP-Ind standards for one or more COC (OT3804SA, OT3814SA, OT3851SA)

These areas have also been identified in Table 2-4 and Figure 3-1.

To attain target cleanup levels for closure under RRS 2, the following activities are proposed:

- **Type 1 Area:** The horizontal and vertical delineation of the localized areas will be conducted prior to soil excavation to determine the extent of soil excavation and demonstrate attainment of cleanup levels for remaining soils. If the RRS 2 – Ind have been exceeded, soil will be excavated and disposed off-site.

- **Type 2 Area:** Collect surficial and subsurface soil samples and perform SPLP analysis on the surficial samples to determine whether the residual soil concentrations are protective of groundwater. If the SPLP results for the surficial soil exceed the RRS 2 for groundwater, the subsurface soil samples will be analyzed. Soil above the deepest sample that does not exceed the GWP-Ind (if any) will be excavated and disposed off-site.

Specific field investigation tasks required to achieve project objectives are described in the following subsections.

3.6.1 Mobilizaton

Mobilization activities will be coordinated between the Base POC, AFCEE Team Chief, and FPM prior to mobilization. Preparatory steps will include obtaining all necessary permits for ground penetration, an initial land survey, briefing personnel on field activities, field equipment procurements, and establishing a temporary field office.

3.6.2 Sampling and Analysis

A summary of the sampling analyses is provided in Table 3-1. For details regarding sampling analyses and field activity procedures, refer to the Field Sampling Plan (FSP), Quality Assurance Project Plan, and Health and Safety Plan provided in the *Quality Program Plan*, dated December 1998.

For Type 1 areas as described above, a soil boring will be drilled in the area of concern as close to the previous sampling location as possible. Soil samples will be collected from a depth of 2-4 ft, 4-6 ft, and 6-8 ft below ground surface (bgs).

Initially, the sample collected from 2-4 ft will be analyzed for the analytes of concern (analytes that exceeded SAI-Res at 0-2 ft bgs in previous sampling activities.). The results will be compared to the GWP-Ind RRS 2. The comparison will result in one of the following cases:

Case 1: Csoil > GWP-Ind

An SPLP analysis will be conducted on the sample and the results will be compared to GW-Ind. This will result in one of the following cases:

Case 1(a): C_{SPLP} < GW-Ind

Since this soil layer is protective of groundwater, the vertical extent has been defined and soil from above this layer will be excavated.

Case 1(b): C_{SPLP} > GW-Ind

Since the soil layer is not protective of groundwater, the next deeper sample will be analyzed and the results will be again be compared to the GWP-Ind RRS 2 (repeat entire process). The comparison will again result in one of two cases being described.

Case 2: Csoil < GWP-Ind

Since this soil layer is protective of groundwater, the vertical extent has been defined and soil from above this layer will be excavated.

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Therefore by sequential sampling at 2 ft intervals and comparison to RRS 2 will result in one of the two cases described above. The above procedure will require the collection of samples at multiple depths from each boring, all of which may or may not be analyzed. Sufficient soil will be collected at each depth and archived for analyses as needed within established holding times.

To determine the horizontal radial extent of Type 1 Area excavation, eight surface soil samples from 0-2 ft bgs will be collected at a distance of 10 ft and 15 ft from the boring in the north, south, east and west directions. The concentrations of relevant COCs in the samples from 10 ft will be analyzed and compared to the RRS 2. In cases where the concentrations are below the RRS 2, the lateral extent of excavation will extend to 10 ft. In the case that the concentrations are not below the RRS 2, the 15 ft samples will be analyzed and compared to the RRS 2 to determine the horizontal extent of the excavation. Therefore, the above procedure may require the collection of samples at multiple distances from each boring, all of which may or may not be analyzed. **The purpose of taking surficial soil samples in all directions of the boring is to determine local extent of contamination. The objective of the horizontal sampling is not to delineate the site, that has already been accomplished in previous studies. A 15 ft radius was chosen to define the probable boundary of horizontal delineation based on evaluation of past data and site descriptions.**

For Type 2 areas as described above, a soil boring will be drilled as close to the previous sampling location as possible. Soil samples will be collected from depths of 0-2 ft, 2-4 ft, and 4-6 ft bgs. To satisfy closure criteria for RRS 2, SPLP will be conducted on soil samples collected from 0-2 ft bgs at these locations. The SPLP results will be compared to the GW-Ind standard for the COCs. One of the following cases will result from the comparison:

Case 1: $C_{SPLP} < GW\text{-}Ind$

Since this soil layer is protective of groundwater, no further action is required and the area is considered to meet RRS 2.

Case 2: $C_{SPLP} > GW\text{-}Ind$

Since the soil layer is not protective of groundwater, the next deeper sample will be analyzed and the results will be compared to the GWP-Ind RRS 2. This procedure will again result in an area that needs excavation where the local extent will be determined as discussed previously in section 3.6.

Analysis and extensive review of past sampling data from the area indicate a trend where concentrations of contaminants are only slightly above RRSs and at shallow depths. Based on this analysis, it is not anticipated that C_{SPLP} will be greater than GW-Ind at 8 ft bgs. In the unlikely event that elevated levels are detected at 8 feet bgs, samples at deeper depths will be collected in a second round of sampling.

3.6.2.1 Order of Analysis

As mentioned in the previous paragraph, all initial vertical samples taken at 2-4 ft bgs will be analyzed within 7 days. Results obtained from the samples will be compared with the RRS as outlined above. If necessary, the remaining soil samples at a given location will be analyzed and compared with the RRS. The order in which the contract laboratory will perform the analysis will depend on the holding times, but in general the order of analysis will be:

Analysis	*Maximum Holding Times (Matrix:Soil)*
SVOCs	**14 days to extraction; 40 days after extraction**
Metals	**180 days**

3.6.3 Land Surveys

Field activity survey information will be recorded as described in detail in the FSP. For those sites submitted for closure under RRS 2, survey data outlining the property location and boundaries will be obtained to fulfill deed certification requirements.

3.6.4 Waste Management

Wastes that may be generated during the project activities include: (1) drill cuttings; (2) excavated soils; (3) expendable personal protective equipment;(4) **decon** water and (5) general trash. **Waste handling shall be dealt with on a site-by-site basis. Waste that is classified as non-investigative, such as litter and household garbage, shall be collected, containerized and transported to the designated landfill or collection bin. Investigation derived waste, such as drill cuttings, drill fluids, decontamination fluid and purged groundwater, shall be properly store in 55-gallon steel closed top drums and temporarily stored at a designated central location, prior to removal and disposal by a qualified contractor.**

Waste disposal activity will be coordinated with Carswell AFB authorities and they are responsible for signing all transportation manifests as the generator. Any hazardous waste disposal will be at a site selected by Carswell AFB authorities. Waste management practices will follow the guidelines established by the TNRCC. Detailed waste handling procedures are presented in the FSP.

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4.0 DATA ASSESSMENT, RECORDS, AND REPORTING REQUIREMENTS

4.1 DATA ASSESSMENT

Refer to Section 4.1 of the *Quality Program Plan*, dated December 1998.

4.2 RECORD KEEPING

Refer to Section 4.2 of the *Quality Program Plan*, dated December 1998.

4.3 REPORTING REQUIREMENTS

Refer to Section 4.3 of the *Quality Program Plan*, dated December 1998.

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5.0 PROJECT MANAGEMENT

Refer to Section 5.0 of the *Quality Program Plan*, dated December 1998.

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6.0 PROJECT SCHEDULE

Refer to Section 6.0 of the *Quality Program Plan*, dated December 1998.

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7.0 REFERENCES

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TABLES

TABLE 2-1 [Page 1 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Metals (SW6010/3050/7440/7471/7060/7420)						
Aluminum	OT3824SA	20800	50	1000000	10000	22035
Arsenic	OT3848SA	3.53	0.5	20	5	5.85
Barium	OT3835SA	6730	2	59000	200	233
Beryllium	OT3825SA	1.72	0.3	270	0.4	1.02
Calcium	OT3817SA	285000	5	NA	NA	167788
Cadmium	OT3806SA	0.972	1	410	0.5	0.556
Chromium	OT3801SA	40.8	5	1600	10	25.86
Cobalt	OT3806SA	18.7	5	110000	610	11.05
Copper	OT3801SA	24.8	5	74000	130	17.37
Iron	OT3840SA	20000	5	NA	NA	17717
Magnesium	OT3824SA	3200	25	NA	NA	3003
Manganese	OT3822SA	678	1	81000	1400	849.1

TABLE 2-1 [Page 2 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Molybdenum	OT3840SA	4.03	5	8100	51	NM
Sodium	OT3840SA	426	25	NA	NA	37300
Vanadium	OT3829SA	28.5	5	3000	72	46.26
Silver	OT3801SA	3.36	5	2900	51	0.213
Zinc	OT3848SA	204	1	410000	3100	38.8
Potassium	OT3824SA	2740	60	NA	NA	2895
Lead	OT3840SA	1030	0.5	1000	1.5	30.97
Antimony	OT3846SA	2.49	25	490	0.6	NM
Selenium	OT3830SA	0.143	0.5	9300	5	0.907
Nickel	OT3848SA	242	5	12000	10	14.6
VOCs (SW8240/3550)						
1,1,1-Trichloroethane	OT3804SA	<0.00643	0.005	3400	20	–
1,1,2,2-Tetrachloroethane	OT3804SA	<0.00643	0.005	9.8	1.4	–

TABLE 2-1 [Page 3 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
1,1,2-Trichloroethane	OT3804SA	<0.00643	0.005	17	0.5	–
1,1-Dichloroethane	OT3804SA	<0.00643	0.005	200000	1000	–
1,1-Dichloroethene	OT3804SA	<0.00643	0.005	1.1	0.7	–
1,2-Dichloroethane	OT3804SA	<0.00643	0.005	0.47	0.5	–
1,2-Dichloropropane	OT3804SA	<0.00643	0.005	25	0.5	–
2-Butanone	OT3804SA	<0.0129	0.01	NA	NA	–
2-Chloroethylvinylether	OT3804SA	<0.0129	0.01	NA	NA	–
2-Hexanone	OT3804SA	<0.0129	0.01	NA	NA	–
4-Methyl-2pentanone	OT3804SA	<0.0129	0.01	NA	NA	–
Acetone	OT3804SA	<0.0129	0.01	79000	1000	–
Benzene	OT3804SA	<0.00643	0.005	1.5	0.5	–
Bromodichloromethane	OT3804SA	<0.00643	0.005	92	10	–
Bromoform	OT3804SA	<0.00643	0.005	85	10	–

TABLE 2-1 [Page 4 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Bromomethane	OT3804SA	<0.0129	0.01	4.9	14	--
Carbon disulfide	OT3819SA	<0.00628	0.005	1500	1000	--
Carbon tetrachloride	OT3819SA	<0.00628	0.005	0.63	0.5	--
Chlorobenzene	OT3819SA	<0.00628	0.005	41000	10	--
Chloroethane	OT3804SA	<0.0129	0.01	17000	4100	--
Chloroform	OT3804SA	<0.00643	0.005	0.51	10	--
Chloromethane	OT3804SA	<0.0129	0.01	3.8	22	--
Dibromochloromethane	OT3804SA	<0.00643	0.005	680	10	--
Ethylbenzene	OT3804SA	<0.00643	0.005	6900	70	--
Methylene Chloride	OT3804SA	0.00628	0.005	16	0.5	--
Styrene	OT3804SA	<0.00643	0.005	23000	10	--
Tetrachloroethene	OT3804SA	<0.00643	0.005	17	0.5	--
Toluene	OT3851SA	0.0302	0.005	2400	100	--

TABLE 2-1 [Page 5 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Trichloroethene	OT3804SA	<0.0129	0.005	6.6	0.5	--
Vinyl acetate	OT3804SA	<0.0129	0.01	800	10000	--
Vinyl chloride	OT3804SA	<0.00643	0.01	0.007	0.2	--
Xylenes (total)	OT3804SA	<0.00643	0.005	3600	1000	--
dis-1,2-Dichloroethene	OT3804SA	<0.00643	0.005	20000	7	--
cis-1,3-Dichloropropene	OT3804SA	<0.00643	0.005	NA	NA	--
trans-1,2-Dichloroethene	OT3804SA	<0.00643	0.005	41000	10	--
trans-1,3-Dichloropropene	OT3804SA	<0.00643	0.005	NA	NA	--
SVOCs (SW8270/3550)						
1,2,4-Trichlorobenzene	OT3801SA	<3.51	0.333	6100	7	--
	Proxy	0	0.333	6100	7	
1,2-Dichlorobenzene	OT3801SA	<3.51	0.333	180000	60	--
	Proxy	0	0.333	180000	60	
1,3-Dichlorobenzene	OT3801SA	<3.51	0.333	NA	NA	--
1,4-Dichlorobenzene	OT3801SA	<3.51	0.333	2400	7.5	--
	Proxy	0	0.333	2400	7.5	

TABLE 2-1 [Page 6 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
2,4,5-Trichlorophenol	OT3801SA	<7.03	0.667	100000	1000	--
	Proxy	0	0.667	100000	1000	
2,4,6-Trichlorophenol	OT3801SA	<3.51	0.333	260	2.6	--
	Proxy	0	0.333	260	2.6	
2,4-Dichlorophenol	OT3801SA	<3.51	0.333	3100	31	--
	Proxy	0	0.333	3100	31	
2,4-Dimethylphenol	OT3801SA	<3.51	0.333	20000	200	--
	Proxy	0	0.333	20000	200	
2,4-Dinitrophenol	OT3801SA	<17.6	1.67	2000	20	--
	Proxy	0	1.67	2000	20	
2,4-Dinitrotoluene	OT3801SA	<3.51	0.333	4.2	0.042	--
	Proxy	2.09	0.333	4.2	0.042	
2,6-Dinitrotoluene	OT3801SA	<3.51	0.333	4.2	0.042	--
	Proxy	0.4	0.333	4.2	0.042	
2-Chloronapthalene	OT3801SA	<3.51	0.333	71000	820	--
	Proxy	0	0.333	71000	820	
2-Chlorophenol	OT3801SA	<3.51	0.333	10000	51	--
	Proxy	0	0.333	10000	51	
2-Methylnapthalene	OT3801SA	<3.51	0.333	36000	410	--
	Proxy	0	0.333	36000	410	
2-Methylphenol	OT3801SA	<3.51	0.333	NA	NA	--
2-Nitroaniline	OT3801SA	<17.6	1.67	NA	NA	--
2-Nitrophenol	OT3801SA	<3.51	0.333	NA	NA	--

TABLE 2-1 [Page 7 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
3,3'-Dichlorobenzidine	OT3801SA	<7.03	0.667	6.4	0.064	--
	Proxy	0.834	0.667	6.4	0.064	
3-Nitroaniline	OT3801SA	<17.6	1.67	NA	NA	--
4,6-Dinitro-2-methylphenol	OT3801SA	<17.6	1.67	NA	NA	--
4-Bromophenyl phenyl ether	OT3801SA	<3.51	0.333	NA	NA	--
4-Chloro-3-methylphenol	OT3801SA	<3.51	0.333	NA	NA	--
4-Chloroaniline	OT3801SA	<7.03	0.667	NA	NA	--
4-Chlorophenyl phenyl ether	OT3801SA	<3.51	0.333	NA	NA	--
4-Methylphenol	OT3801SA	<3.51	0.333	NA	NA	--
4-Nitroaniline	OT3801SA	<17.6	1.67	NA	NA	--
4-Nitrophenol	OT3801SA	<17.6	1.67	NA	NA	--
Acenapthene	OT3801SA	1.4	0.333	53000	610	--
Acenapthylene	OT3801SA	<3.51	0.333	53000	610	--
	Proxy	0	0.333	53000	610	
Anthracene	OT3801SA	2.24	0.333	270000	3100	--

TABLE 2-1 [Page 8 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Benz(a)anthracene	OT3801SA	3.6	0.333	3.4	0.039*	--
Benzo(a)pyrene	OT3801SA	2.37	0.333	0.34	0.02*	--
Benzo(b)fluoranthene	OT3801SA	4.81	0.333	3.4	0.039*	--
Benzo(g,h,i)perylene	OT3814SA	0.166	0.333	27000	310	--
Benzo(k)fluoranthene	OT3801SAp	3.51	0.333	34	0.39	--
Benzoic Acid	OT3801SA	<17.6	1.67	4100000	41000	--
	Proxy	0	1.67	4100000	41000	
Benzyl alcohol	OT3801SA	<7.03	0.667	310000	3100	--
	Proxy	0	0.667	310000	3100	
Butyl benzyl phthalate	OT3801SA	<3.51	0.333	200000	2000	--
	Proxy	3.51	0.333	200000	2000	
Chrysene	OT3801SA	3.32	0.333	340	3.9	--
Di-n-butylphthalate	OT3851SA	0.0282	0.333	100000	1000	--
		0	0.333	100000	1000	
Di-n-octylphthalate	OT3804SA	0.0266	0.333	20000	200	--
		0	0.333	20000	200	
Dibenz(a,h)anthracene	OT3801SA	<3.51	0.333	0.34	0.0039	--
	Proxy	3.51	0.333	0.34	0.0039	
Dibenzofuran	OT3801SA	1.04	0.333	NA	NA	--

TABLE 2-1 [Page 9 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Diethylphthalate	OT3801SA	<3.51	0.333	820000	8200	--
	Proxy	0	0.333	820000	8200	
Dimethylphthalate	OT3801SA	<3.51	0.333	NA	NA	--
Fluoranthene	OT3801SA	7.89	0.333	36000	410	--
Fluorene	OT3812SA	1.06	0.333	36000	410	--
Hexachlorobenzene	OT3801SA	<3.51	0.333	1.0	0.1	--
	Proxy	0.417	0.333	1.0	0.1	
Hexachlorobutadiene	OT3801SA	<3.51	0.333	32	2	--
	Proxy	0.417	0.333	32	2	
Hexachlorocyclopentadiene	OT3801SA	<3.51	0.333	5	5	--
	Proxy	0	0.333	5	5	
Hexachloroethane	OT3801SA	<3.51	0.333	750	10	--
	Proxy	0	0.333	750	10	
Indeno(1,2,3-cd)pyrene	OT3801SA	<3.51	0.333	3.4	0.039*	--
	Proxy	0.417	0.333	3.4	0.039*	
Isophorone	OT3801SA	<3.51	0.333	30000	300	--
	Proxy	0	0.333	30000	300	
Napthalene	OT3801SA	1.09	0.333	920	410	--
Nitrobenzene	OT3801SA	<3.51	0.333	510	5.1	--
	Proxy	0	0.333	510	5.1	
Pentachlorophenol	OT3801SA	<10.6	1.0	14	0.1	--
	Proxy	1.25	1.0	14	0.1	
Phenanthrene	OT3801SA	10.1	0.333	27000	310	--

TABLE 2-1 [Page 10 of 10]

MAXIMUM SITE CONCENTRATIONS AT THE AMS (OCT 1995)
COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Ind[1] [mg/kg]	GWP-Ind[2] [mg/kg]	Background[3] [mg/kg]
Phenol	OT3801SA	<3.51	0.333	610000	6100	--
	Proxy	0	0.333	610000	6100	
Pyrene	OT3801SA	8.51	0.333	27000	310	--
bis(2-Chloroethoxy)methane	OT3801SA	<3.51	0.333	NA	NA	--
bis(2-Chloroethyl)ether	OT3801SA	<3.51	0.333	0.32	0.026	--
	Proxy	0.417	0.333	0.32	0.026	
bis(2-Chloroisopropyl)ether	OT3801SA	<3.51	0.333	41000	410	--
	Proxy	0	0.333	41000	410	
bis(2-Ethylhexyl)phthalate	OT3801SA	<3.51	0.333	65	0.6	--
	Proxy	3.51	0.333	65	0.6	
n-Nitrosodi-n-propylamine	OT3801SA	<3.51	0.333	0.16	0.0041	--
	Proxy	0.417	0.333	0.16	0.0041	
n-Nitrosodiphenylamine	OT3801SA	<3.51	0.333	230	5.8	--
	Proxy	0	0.333	230	5.8	

1 MSC for ingestion of soil, inhalation of volatiles and particulates and dermal contact (industrial)

2 MSC for soil protective of groundwater (industrial)

3 Basewide Background

[ ] exceeded by maximum concentration

NA - no MSCs published or developed

-- levels are assumed to be non-detect

Values in **BOLD** are applicable RRS 2. In cases where one value is **BOLD**, that value is the applicable RRS 2 for both SAI and GWP pathways.

Proxy values were assigned to highest non-detected value according to TNRCC memo dated July 23, 1998.

TABLE 2-2
CONSTITUENTS OF CONCERN EXCEEDING RRS 2 MSCs AT THE AMS

Analyte	Sample	Concentration [mg/kg]	PQL [mg/kg]	RRS 2 MSC [mg/kg]	Basewide Background
Ingestion of Soil, Inhalation of Vapors and Particulates, and Dermal Contact with Soil					
Metals					
Lead	OT3840SA	1030	0.5	1000	30.97
SVOCs					
Benzo(a)pyrene	OT3801SA	2.37	0.333	0.34	--
Benz(a)anthracene	OT3801SA	3.6	0.333	3.4	--
Benzo(b)fluoranthene	OT3801SA	4.81	0.333	3.4	--
Dibenz(a,h)anthracene	OT3801SAp	3.51	0.333	0.34	--
bis(2-Chloroethyl)ether	OT3801SAp	0.417	0.333	0.32	--
n-Nitrosodi-n-propylamine	OT3801SAp	0.417	0.333	0.16	--
Protection of Groundwater					
Metals					
Beryllium	OT3825SA	1.72	0.3	0.4	1.02
	OT3824SA	1.18	0.3	0.4	1.02
	OT3827SA	1.62	0.3	0.4	1.02
	OT3842SA	1.58	0.3	0.4	1.02
	OT3844SA	1.66	0.3	0.4	1.02
Chromium	OT3801SA**	40.8	5	10	25.86
Lead	OT3840SA**	1030	0.5	1.5	30.97
	OT3801SA*	227	0.5	1.5	30.97
	OT3804SA*	33	0.5	1.5	30.97
	OT3807SA*	49.4	0.5	1.5	30.97
	OT3812SA*	32.9	0.5	1.5	30.97
	OT3814SA*	42.8	0.5	1.5	30.97
	OT3816SA*	52.2	0.5	1.5	30.97
	OT3822SA*	36.2	0.5	1.5	30.97
	OT3824SA*	62.2	0.5	1.5	30.97
	OT3832SA*	36	0.5	1.5	30.97
	OT3846SA*	38.4	0.5	1.5	30.97
	OT3847SA*	128	0.5	1.5	30.97
	OT3848SA**	651	0.5	1.5	30.97
	OT3851SA*	52.3	0.5	1.5	30.97
	OT3850SA*	96.3	0.5	1.5	30.97
Nickel	OT3802SA*	198	5	10	14.6
	OT3801SA**	214	5	10	14.6
	OT3806SA*	198	5	10	14.6
	OT3809SA**	205	5	10	14.6
	OT3811SA*	229	5	10	14.6
	OT3815SA**	229	5	10	14.6
	OT3817SA*	200	5	10	14.6
	OT3818SA*	58.6	5	10	14.6
	OT3821SA*	195.5	5	10	14.6
	OT3825SA*	63.1	5	10	14.6
	OT3826SA*	218	5	10	14.6
	OT3827SA*	218	5	10	14.6
Nickel (continued)	OT3828SA*	206	5	10	14.6

TABLE 2-2
CONSTITUENTS OF CONCERN EXCEEDING RRS 2 MSCs AT THE AMS

Analyte	Sample	Concentration [mg/kg]	PQL [mg/kg]	RRS 2 MSC [mg/kg]	Basewide Background
	OT3829SA*	224	5	10	14.6
	OT3833SA*	57.9	5	10	14.6
	OT3835SA*	196	5	10	14.6
	OT3836SA*	214	5	10	14.6
	OT3838SA*	220	5	10	14.6
	OT3840SA**	222	5	10	14.6
	OT3841SA*	203	5	10	14.6
	OT3842SA**	34.4	5	10	14.6
	OT3843SA*	59.1	5	10	14.6
	OT3844SA*	224	5	10	14.6
	OT3846SA*	206	5	10	14.6
	OT3847SA*	154	5	10	14.6
	OT3848SA**	230.5	5	10	14.6
	OT3849SA*	191	5	10	14.6
	OT3850SA*	230	5	10	14.6
SVOCs					
2,4-Dinitrotoluene	OT3801SAp	2.09	0.333	0.042	--
2,6-Dinitrotoluene	OT3801SAp	0.4	0.333	0.042	--
3,3-Dichlorobenzidine	OT3801SAp	0.834	0.667	0.064	--
Dibenz(a,h)anthracene	OT3801SAp	3.51	0.333	0.0039	--
Hexachlorobenzene	OT3801SAp	0.417	0.333	0.1	--
Indeno(1,2,3-cd)pyrene	OT3801SAp	0.417	0.333	0.039	--
Pentachlorophenol	OT3801SAp	1.25	1.0	0.1	--
bis(2-Chloroethyl)ether	OT3801SAp	0.417	0.333	0.026	--
n-Nitrosodi-n-propylamine	OT3801SAp	0.417	0.333	0.0041	--
Benz(a)anthracene	OT3801SA	3.6	0.333	0.039	--
	OT3814SA	0.41	0.333	0.039	--
	OT3851SA	0.45	0.333	0.039	--
Benzo(a)pyrene	OT3801SA	2.37	0.333	0.02	--
	OT3814SA	0.471	0.333	0.02	--
	OT3851SA	0.479	0.333	0.02	--
Benzo(b)fluoranthene	OT3801SA	4.81	0.333	0.039	--
	OT3851SA	0.442	0.333	0.039	--
	OT3814SA	0.658	0.333	0.039	--
Benzo(k)fluoranthene	OT3851SA	0.593	0.333	0.39	--
	OT3801SAp	3.51	0.333	0.39	--
bis(2-Ethylhexyl)phthalate	OT3804SA	1.09	0.333	0.6	--
	OT3801SAp	3.51	0.333	0.6	--

"p" indicates proxy value assigned in accordance with TNRCC memo dated July 23, 1998

* locations where SPLP analysis was not conducted but are not of concern

** locations where SPLP results were below RRS 2-GW

-- assumed non-detect

shaded box indicates remaining constituents of concern

TABLE 2-3
SPLP CONCENTRATIONS AT THE AMS (MAY 1997) COMPARED TO PQLs AND RRS 2 GROUNDWATER MSCs

Analyte	Sample*	Maximum [mg/L]	PQL [mg/L]	GW-Ind** [mg/L]
Metals				
Arsenic	All 1997	<0.049	0.1	0.05
Beryllium	AMS-018	0.0144	0.03	0.004
Chromium	All samples	<0.089	0.2	0.1
Lead	AMS-014FD	0.0629	0.05	0.015
Antimony	All samples	<0.02	0.05	0.006
Nickel	All samples	<0.02	0.1	0.1

indicates maximum concentration exceeds concentration

* All samples were prepared by the Standard Method 1312, Synthetic Precipitation Leaching Procedure (SPLP)

** GW-Ind Groundwater MSC for Industrial Use

TABLE 2-4
SUMMARY OF AREAS THAT EXCEED RRS 2 AT THE AMS

Analytes	TYPE 1 AREAS				TYPE 2 AREAS		
	OT3801SA		OT3840SA		OT3804SA	OT3814SA	OT3851SA
	SAI-Ind	GWP-Ind	SAI-Ind	GWP-Ind	GWP-Ind	GWP-Ind	GWP-Ind
Lead			x	x			
Hexachlorobenzene		x					
bis(2-Chloroethyl)ether	x	x					
n-Nitrosodi-n-propylamine		x					
Benz(a)anthracene	x	x				x	x
Benzo(a)pyrene	x	x				x	x
Benzo(b)fluoranthene	x	x				x	x
Benzo(k)fluoranthene		x					x
Dibenz(a,h)anthracene	x	x					
Indeno(1,2,3-cd)pyrene		x					
bis(2-Ethylhexyl)phthalate		x			x		
2,4-Dinitrotoluene		x					
2,6-Dinitrotoluene		x					
3,3-Dichlorobenzidine		x					
Pentachlorophenol		x					

X Exceeds the relevant standard

GWP-Ind Soil MSC for Industrial Use Based on Groundwater Protection

SAI-Ind Soil/Air and Ingestion Standard for Industrial Use

TYPE 1: Exceed SAI-Ind and GWP-Ind

TYPE 2: Exceed only GWP-Ind

TABLE 3-1
SUMMARY OF PROPOSED SAMPLING ACTIVITY AT THE AMS

Location	Matrix	Constituents	Method	Number of Samples					Field Duplicates	MS/MSD**	Total
				Subsurface			Surficial* (0-2 FT)				
				2-4 FT	4-6 FT	6-8 FT	10 FT	15 FT			
OT3801SA	Soil	SVOCs	SW 8270B	1	1	1	4	4	1	1	13
OT3840SA	Soil	Lead	SW 7421	1	1	1	4	4	1	1	13
OT3804SA	Soil	SVOCs	SW 8270B	1	1	1			1		4
OT3814SA	Soil	SVOCs	SW 8270B	1	1	1					3
OT3851SA	Soil	SVOCs	SW 8270B	1	1	1					3
									Subtotal		36
									Equipment		2
									Ambient	**Not required**	0
									Trip	**Not required**	0
									Total		38

* These samples will be collected in a 10 ft or 15 ft radius (north, south, east west) for local horizontal delineation

** MS/MSD Matrix Spike/ Matrix Spike Duplicate

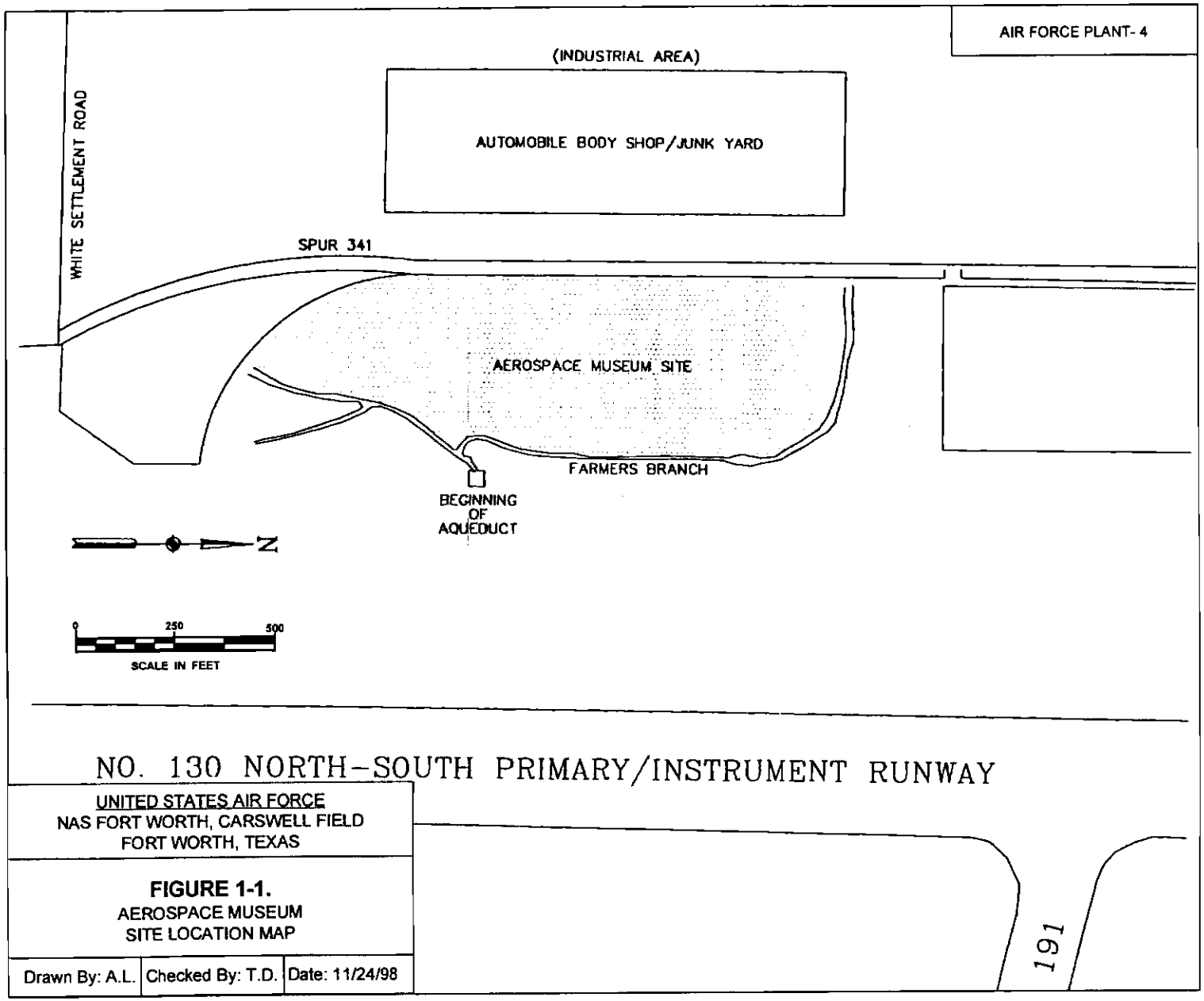
Note: Soil samples maybe analyzed for SPLP (EPA Method 1312) if required

Note: Soil samples collected at 4-6 and 6-8 foot depths will only be analyzed if RRS 2 is exceeded on the 2-4 foot sample. Duplicate numbers are reflective of the total number of possible samples

Blue denotes SPLP only analyses

Red denotes Total Levels and SPLP analyses.

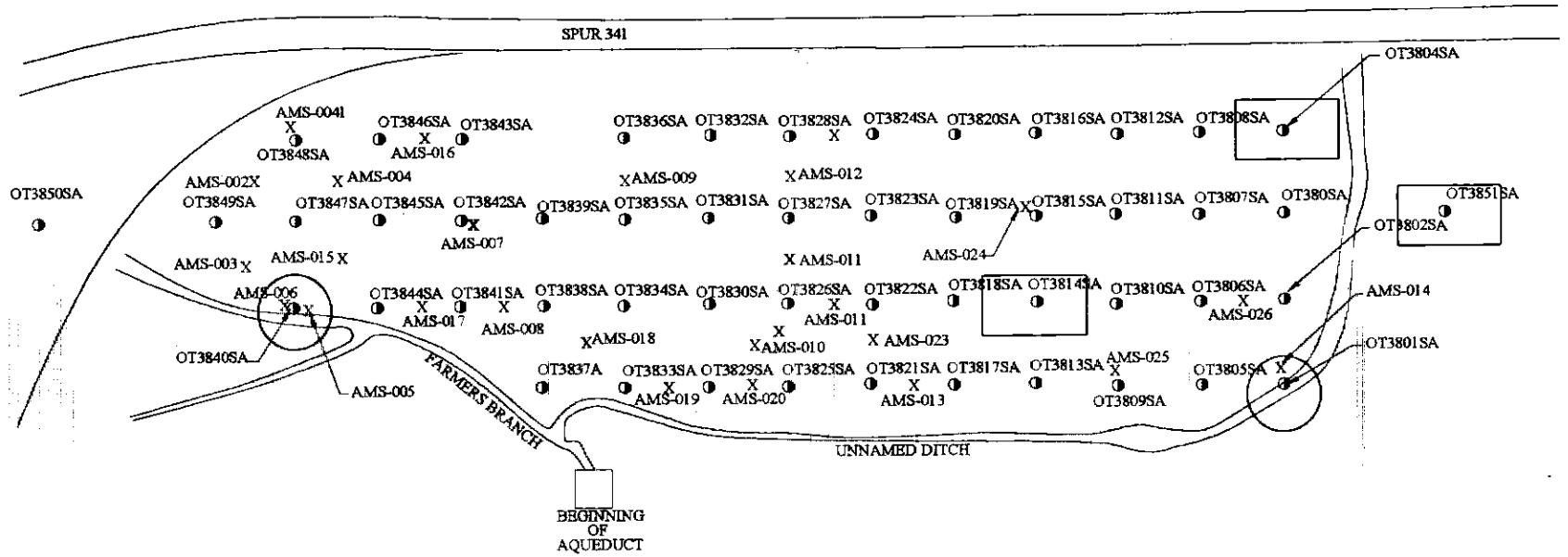
FIGURES



UNITED STATES AIR FORCE
NAS FORT WORTH, CARSWELL FIELD
FORT WORTH, TEXAS

FIGURE 1-1.
AEROSPACE MUSEUM
SITE LOCATION MAP

Drawn By: A.L.	Checked By: T.D.	Date: 11/24/98



LEGEND

- ◑ ORIGINAL INVESTIGATION SAMPLE LOCATION (OCTOBER 1995)
- X CONFIRMATION SAMPLE LOCATION (MAY 1997)
- FARMERS BRANCH OR UNNAMED DITCH

PROPOSED AREAS OF INVESTIGATIONS

- ○ TYPE 1 AREAS-EXCEED SAI-Ind AND GWP-Ind; samples at 4, 6, 8 ft bgs
- □ TYPE 2 AREAS-EXCEED GWP-Ind; samples at 2, 4, 6 ft bgs

UNITED STATES AIR FORCE
NAS FORT WORTH, CARSWELL FIELD
FORT WORTH, TEXAS

FIGURE 3-1.

PREVIOUS SAMPLING LOCATIONS & PROPOSED AREAS OF INVESTIGATIONS AT AMS

Drawn By: A.L.	Checked By: T.D.	Date: 10/22/98

FINAL PAGE

ADMINISTRATIVE RECORD

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