

N83447.AR.000428
NAS FORT WORTH
5090.3a

REVISED FINAL WORK PLAN ADDENDUM UNNAMED STREAM NAS FORT WORTH TX
3/1/1999
FANNING, PHILLIPS AND MOLNAR



**NAVAL AIR STATION
FORT WORTH JRB
CARSWELL FIELD
TEXAS**

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 458

**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
UNNAMED STREAM
CDRL A004**



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

March 1999

Contractor Response to Unnamed Stream Site Comments from AFCEE

Item	Page	Section	Comment	Contractor Response
1	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.
2	2-2	2.2.1	Paragraph 2: It is suggested that the Contractor define "proxy value" and explain its significance.	Revised for clarification.
3	2-5	2.2.4	There is a discrepancy between the location description and the site map (Fig 1.2). Farmer's Branch is said to be located on the southeastern border of the site and flow SE. This is not shown correctly on the map. Please revise.	Revised text for clarification.
4	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.
5	3-3	3.6.2	Paragraph 4: It is recommended that the Contractor should explain the course of action if $C_{SPL,r} > GW-Ind$ at 8 ft. below ground surface (bgs).	Revised for clarification.
6	3-4	3.6.2	Paragraph 5: It is recommended that the Contractor should explain the course of action if contamination is found 15 ft. from original boring.	Revised for clarification.
7	3-5	3.6.4	It is recommended that the Contractor include decon water in this section.	Revised.

Item	Page	Section	Comment	Contractor Response
8	3-5	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.	<p>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.</p> <p>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.</p>
9		Figure 1-2	It is recommended that the figure include the waterfall to serve as a landmark.	Not revised. There are two monitoring wells on the figure that can be used as landmarks.
10		Figure 1-2	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 the figure. As section 3.6 explains, samples will be taken in 2 feet vertical intervals at each location and radially out to 15 feet.

In addition to the above revisions, horizontal delineation at UN04 and UN05 have been eliminated. Both of these sample locations are in the culvert area and the Unnamed Stream channel discharge area (steep sided valley), where the width is limited to a 3 feet. Vertical delineation should be sufficient to allow for decisions on closure issues. Excavation at the Unnamed Stream is not expected. The site has already been excavated. Groundwater protection is the issue and it is expected that the SPLP results will show the levels in soil are protective of groundwater standards. Recent groundwater data from the monitoring well at the mouth of the Unnamed Stream indicates no detections of Arsenic, Barium, or the detected SVOCs. Text has been added to Section 3.6 regarding the French Underdrain.

Contractor Response to Unnamed Stream Site Comments from USEPA/TNRCC

Item	Page	Section	USEPA/TNRCC Comment	Contractor Response
1	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.
2	3-2	3.6	This indicates that sampling will not be conducted at the excavation unless soil staining is observed. Since this drain pipe is described as a metal pipe with holes drilled in the bottom, samples should be collected from just below the pipe to determine if a release could have occurred from the drain. These samples should be collected even if no soil staining is observed along the excavation.	Revised and expanded section 3.6 regarding excavation of French Underdrain and pre-excavation sampling.
3	3-3	3.6.2	The description of the different Case examples does not appear to delineate vertical and horizontal extent to background or PQLs. If the intent is to delineate the extent of contamination above RRS2 for removal and assuming that the extent of contamination, to either background or PQL has been previously determined, then this method will be adequate.	Revised for clarification.
4	3-4	3.6.2	The work plan proposes to collect eight surface soil samples and only analyze some of the samples if needed, this may impact holding times for the SVOCs samples. Also, in Table 3-1 it is not clear if you plan to collect samples for SVOC analysis, since one sample is shown for metals but nothing for SVOCs.	Revised. Added section 3.6.2.1 to clarify handling and analysis of samples. Revised Table 3-1. SVOCs are being analyzed only at the locations where previous SVOC exceedances of one or more SVOCs occurred.

Item	Page	Section	USEPA/TNRCC Comment	Contractor Response
5	Tables and Figures		<p>It is not clear from the tables at what depth the previous UN-xx samples were collected from. Since the Unnamed stream has been excavated and relined with rock in some areas, I am not sure why the surface samples need to be collected from these areas to determine extent for removal.</p>	<p>FPM concurs. UN- samples will be analyzed primarily for groundwater protection issues since the area was excavated and relined and no longer are there inhalation, dermal contact, and ingestion issues. The data analysis portion of the text and associated tables in this work plan addenda will be left as worded and Table 3-1 revised accordingly.</p>
6	General		<p>My comments on this work plan have been based upon the following: I am assuming that nothing is currently draining to the Unnamed Stream, all OWS have been removed and the only OWS in the area drains to a sanitary sewer. Does the Grounds Maintenance Yard drain to this area? Based upon the close location of the two sites it would appear that surface drainage could occur through this area which would suggest the need to sample for pesticides and PCBs.</p>	<p>The assumptions are correct. An inspection was performed on 11 February 1999 of the area between the Unnamed Stream and the Ground Maintenance Yard. The Grounds Maintenance Yard does not drain to the Unnamed Stream Area. The areas in the GMY that have surface runoff leaving the site are being sampled as part of the GMY work plan.</p>

**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
UNNAMED STREAM
CDRL A004**

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

**Prepared for:
AFCEE/ERB
3207 North Road
Brooks AFB, TX 78235-5673**

**Prepared by:
Fanning, Phillips and Molnar
9311 San Pedro Avenue, Ste. 700
San Antonio, TX 78216**

March 1999

458 6A

**Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page i**

This page intentionally left blank.

TABLE OF CONTENTS

SECTIONS	PAGE
LIST OF TABLES AND FIGURES	iv
ACRONYMS AND ABBREVIATIONS	v
1.0 INTRODUCTION	1-1
1.1 THE U.S. AIR FORCE INSTALLATION RESTORATION PROGRAM	1-1
1.2 HISTORY OF PAST IRP WORK AT THE INSTALLATION	1-1
1.3 DESCRIPTION OF CURRENT STUDY.....	1-3
1.3.1 Project Objectives.....	1-3
1.3.2 Project Scoping Documents	1-3
2.0 SUMMARY OF EXISTING INFORMATION	2-1
2.1 INSTALLATION ENVIRONMENTAL SETTING	2-1
2.2 SITE-SPECIFIC ENVIRONMENTAL SETTING.....	2-1
2.2.1 Contaminant Sources and Contamination.....	2-1
2.2.2 Geology.....	2-5
2.2.3 Groundwater	2-5
2.2.4 Surface Water.....	2-5
2.2.5 Biology.....	2-5
2.2.6 Demographics	2-5
3.0 PROJECT TASKS	3-1
3.1 CONCEPTUAL SITE MODEL DEVELOPMENT.....	3-1
3.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IDENTIFICATION	3-1
3.3 CHARACTERIZATION OF BACKGROUND CONDITIONS.....	3-1
3.4 RISK REDUCTION STANDARDS.....	3-1
3.5 DATA NEEDS IDENTIFICATION.....	3-1
3.6 FIELD INVESTIGATION TASKS	3-2
3.6.1 Mobilization	3-3
3.6.2 Sampling and Analysis.....	3-3
3.6.2.1 Order of Analysis.....	3-5
3.6.3 Land Surveys	3-6
3.6.4 Waste Management	3-6

TABLE OF CONTENTS (cont'd)

SECTIONS	PAGE
4.0 DATA ASSESSMENT, RECORDS, AND REPORTING REQUIREMENTS	4-1
4.1 DATA ASSESSMENT.....	4-1
4.2 RECORD KEEPING	4-1
4.3 REPORTING REQUIREMENTS.....	4-1
5.0 PROJECT MANAGEMENT.....	5-1
6.0 PROJECT SCHEDULE.....	6-1
7.0 REFERENCES.....	7-1

LIST OF TABLES

TABLE

- | | |
|------------|---|
| 2-1 | Maximum Site Concentrations at Unnamed Stream (Oct 1995) Compared to PQLs, RRS 2 MSCs, and Basewide Background Levels |
| 2-2 | Constituents of Concern Exceeding RRS 2-MSCs at Unnamed Stream |
| 2-3(a)&(b) | Summary of Areas that Exceed RRS 2 at Unnamed Stream |
| 3-1 | Summary of Proposed Sampling Activity at Unnamed Stream |

LIST OF FIGURES

FIGURE

- | | |
|-----|---|
| 1-1 | Site Map for Unnamed Stream |
| 1-2 | Previous Sampling Locations & Proposed Areas of Investigation at the Unnamed Stream |

ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AOC	Area of Concern
bgs	below ground surface
BRAC	Base Realignment and Closure
CDRL	Contract Data Requirements List
COC	Contaminant of Concern
DERA	Defense Environmental Restoration Account
ERB	Environmental Restoration Base Realignment and Closure
FPM	Fanning, Phillips and Molnar
FSP	Field Sampling Plan
ft	feet
GW-Res	Groundwater MSC for Residential Use
GWP-Res	Soil MSC for Residential use Based on Groundwater Protection
HBL	Health Based Levels
IRP	Installation Restoration Program
JRB	Joint Reserve Base
MCL	Maximum Contaminant Level
MDLs	Method Detection Limits
mg/kg	milligram per kilogram
MSC	Medium Specific Concentration
NAS	Naval Air Station
ND	Non-detect
OWS	oil/water separator

ACRONYMS AND ABBREVIATIONS (Cont'd)

PAH	polynuclear aromatic hydrocarbons
PID	Photoionization Detector
POC	Point of Contact
ppm	parts per million
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
RRS	Risk Reduction Standard
SAI-Ind	Soil/Air and Ingestion Standard for Industrial Use
SAI-Res	Soil/Air and Ingestion Standard for Residential Use
SQL	Sample Quantitation Limit
SMWU	Solid Waste Management Unit
SPLP	Synthetic Precipitate Leaching Procedure
SVOC	semi-volatile organic compound
TAC	Texas Administrative Code
TNRCC	Texas Natural Resource Conservation Commission
TPH	total petroleum hydrocarbons
UNS	Unnamed Stream
UST	underground storage tank
VOC	volatile organic compound

458 11A

**Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page vii**

This page intentionally left blank.

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 Unnamed Stream Site (UNS) (Installation Restoration Program (IRP) site SD-13) at Carswell Air Force Base (AFB), Fort Worth, Texas. The project will evaluate existing site data, refine conceptual site models, and identify 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 UNNAMED STREAM

The Resource Conservation Recovery Act (RCRA) Part B Permit for Carswell AFB describes IRP site SD-13 (Figure 1-1) as consisting of 4 parts divided into (i) a gas station abandoned in the early 70s, (ii) the French Underdrain (Soil Waste Management Unit (SWMU) 64), (iii) the Oil/Water Separator (OWS) (SWMU 67), and (iv) the Unnamed Stream (Area of Concern (AOC 14)).

The Unnamed Stream is formed by the effluent from the former OWS. Water from the former OWS then flowed approximately 200 feet (ft) into Farmers Branch. The OWS was connected to a French Underdrain System which was constructed to remove fuels from the groundwater flowing either from the tank-farm or from the abandoned gas station. The OWS and portions of the French Underdrain System were removed in 1996-1997.

The abandoned gas station is currently a paved parking lot. The Underground Storage Tanks (USTs) and underground piping may still be present at the site. Currently, the only visible evidence of the station is the concrete pump-island. The abandoned gas station is part of the Defense Environmental Restoration Account (DERA) program and is not part of this work plan. For the purposes of this addendum, the site refers to the part of the SWMU-64 south-southeast of the abandoned gas station. The soil and groundwater impacts within the abandoned gas station area will be addressed as a DERA project.

The previous soil sampling activities conducted at the site are as follows:

- 1984: Four hand-augered borings 16D, 16E, 16G, and 16F were drilled located along the unnamed stream (see Figure 1-2) and one soil sample was collected from each boring.
- 1991: Four soil samples were collected from each of two borings that were later completed as monitoring wells SD13-MW06 and SD13-MW07 (Figure 1-2).
- 1993: Two soil borings (SD13-SB02 and SD13-SB03) were drilled to the east and west of the oil/water separator and one soil sample was collected from each boring (Figure 1-2).
- June 1996: Excavation activity was undertaken to identify the location and construction of the French Underdrain. The underdrain was found to be a 6 inch-diameter galvanized, corrugated metal pipe perforated with single rows of 0.25 inch holes drilled along the bottom of the pipe at an approximate spacing of 8 holes per foot. Several sections (a total of 52 ft) of the pipe were removed and several others (a total of 11 ft) were disconnected and the remainder was left in place. The excavated areas were back filled with impermeable material to minimize groundwater flow. The OWS area was also excavated, the OWS removed and confirmatory samples were collected. However, data from these samples is not included in this work plan because the entire unnamed stream and OWS separator area was over-excavated in 1997 (described below).
- 1997: Remedial actions conducted by Geo-Marine, Inc. included over-excavation of the entire Unnamed Stream channel for a width of six feet and to a depth of no less than one foot, and over-excavation of the west and south walls of the previously removed OWS. Confirmation sampling was performed as part of the project (UN-01, UN-02, UN-03, UN-04, UN-05, and OWSS-01 and OWSS-02, see Figure 1-2).

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 portion of the French Underdrain System on Base Realignment and Closure (BRAC) property, the Unnamed Stream, and the former OWS in accordance with RCRA Part B permit HW50289. Existing site data has been collected and evaluated against appropriate risk-based closure criteria, and site-specific contaminant target levels to attain closure have been determined. Specific objectives needed to achieve risk-based closure of the site include:

- Collect soil samples for Synthetic Precipitate Leaching Procedure (SPLP) analysis to fill data gaps identified in the initial data evaluation.
- Collect soil samples for horizontal and vertical delineation of localized areas that exceed site-specific target levels for closure.
- Implement soil removal/interim removal actions to meet site-specific contaminant target levels that will allow for risk-based site closure.
- Locate and remove the remaining portions of the French Underdrain within the BRAC site boundary as shown in Figure 1-1.
- Prepare closure documentation in accordance with Risk Reduction Standard Number 2 (RRS 2).

1.3.2 Project Scoping Documents

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

458 14A

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 1-4

This page intentionally left blank.

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 Practical Quantitation Limits (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 Medium Specific Concentrations (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 and 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 with (i) the relevant RRS 2 MSCs for ingestion and inhalation of vapors and particulates from soil and dermal contact with soil based on residential use (SAI-Res), (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. These are tabulated in Table 2-2. The following are the key findings of the review:

- Barium concentration measured in WP-2 exceeds the RRS 2 (basewide background).
- Hexachlorobenzene concentrations measured in UN-01, UN-04, and UN-05 exceed the RRS 2 (PQL).
- n-Nitrosodi-n-propylamine concentrations measured in UN-01, UN-04, and UN-05 exceed the RRS 2 (PQL).

Concentrations of all the other constituents in all other soil samples 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
 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 each constituents detected with (i) the relevant RRS 2 MSCs for residential use based on protection of groundwater (GWP-Res), (ii) PQLs, 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 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:

- Arsenic concentrations measured in OWS01, OWS02, WP2, UN-01, UN-04, UN-05, SD13MW06D, SD13MW07E, and SD1302SBA exceed the RRS 2 (basewide background).
- Barium concentration measured in UN-01 and WP2 exceeds the RRS 2 (basewide background).
- Cadmium concentrations measured in SD1303SBA, SD13MW06A, SD13MW06D, SD13MW07B, SD13MW07E, SD1302SBA, SD1303SBC, SD1303SBC exceed the RRS 2 (PQL).
- Chrysene concentration measured in UN-05 exceeds the RRS 2 (GWP-Res).
- Hexachlorobenzene concentration measured in UN-01, UN-04, and UN-05 exceed the RRS 2 (PQL).
- N-Nitrosodi-n-propylamine concentration measured in UN-01, UN-04, and UN-05 exceed the RRS 2 (PQL).

Concentrations of all other constituents in all other soil samples are below their respective RRS 2.

Summary of Data Analysis

The above process identified 10 areas of concern and 6 COCs within the UNS that exceed RRS 2 and therefore require further evaluation to attain closure. Table 2-3 presents by sample location the COCs and RRS 2 exceedances, which are summarized below:

WP2:

Ingestion and Inhalation of Vapors and Particulates: Barium.

Protection of Groundwater: Barium and Arsenic.

OWS01:

Protection of Groundwater: Arsenic.

OWS02:

Protection of Groundwater: Arsenic.

SD1302SB:

Protection of Groundwater: Arsenic and Cadmium.

SD1303SB:

Protection of Groundwater: Cadmium.

SD13MW06:

Protection of Groundwater: Arsenic and Cadmium.

SD13MW07:

Protection of Groundwater: Arsenic and Cadmium.

UN-01:

Ingestion and Inhalation of Vapors and Particulates: Hexachlorobenzene and n-Nitrosodi-n-propylamine.

Protection of Groundwater: Arsenic, Barium, Hexachlorobenzene, and n-Nitrosodi-n-propylamine.

UN-04:

Ingestion and Inhalation of Vapors and Particulates: Hexachlorobenzene and n-Nitrosodi-n-propylamine.

Protection of Groundwater: Arsenic, Hexachlorobenzene, and n-Nitrosodi-n-propylamine.

UN-05:

Ingestion and Inhalation of Vapors and Particulates: Hexachlorobenzene and n-Nitrosodi-n-propylamine.

Protection of Groundwater: Arsenic, Chrysene, Hexachlorobenzene, and n-Nitrosodi-n-propylamine.

2.2.2 Geology

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 been characterized at the site. The planned investigation is expected to demonstrate that impacted soils will not leach to groundwater. The groundwater issues will be addressed as part of a basewide effort.

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 **southeastern** extremity of the site. The **Unnamed Stream is on the eastern portion of the site. Farmers Branch serves as a drainage conduit for several facilities at the site. The Unnamed Stream is 10 ft wide and flows in a southeast direction. Farmers Branch at the site location flows north then changes to an east 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*, Texas, dated December 1998.

2.2.6 Demographics

The Unnamed Stream is located east of the Grounds Maintenance Yard, and flows into Farmer's Branch Creek (Figure 1-1). The site has thick vegetation cover and is surrounded by woods.

**Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 2-6**

This page intentionally left blank.

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 guidance for determining site-specific risk-based target cleanup levels for the UNS 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: 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 has 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 is 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 is necessary to understand the geologic conditions at the site. Lithologic data will be recorded during all sampling activities.
- *Land Survey Data.* Land survey data is 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-Res and the GWP-Res standards for one or more COC (UN-01, UN-04, UN-05, WP2)
- **Type 2:** Areas that exceed only the GWP-Res standards for one or more COC (OWS01, OWS02, SD13MW06, SD13MW07, SD1302SB, SD1303SB)

These areas have also been identified in Table 2-3(a) and 2-3(b) and Figure 1-2.

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 – Res 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 the groundwater, the subsurface soil samples will be analyzed. Soil above the deepest sample that does not exceed the Groundwater Protection for Residential use (GWP-Res) (if any) will be excavated and disposed off-site.
- **Excavation of French Underdrain:** The portion of the French Underdrain that remains on BRAC property will be located and removed. **Two direct-push borings will be performed into the materials underlying the French Underdrain prior to removal of the French Underdrain. Continuous sampling will be performed with a Macro Sampler from**

grade to bedrock. These samples will be inspected for visible signs of petroleum contamination and will be screened with a Photoionization Detector (PID). A sample of the material from the zone beneath the French Underdrain System at each borehole will be retained for VOC and SVOC analysis. If there is petroleum contamination evident below the French Underdrain System as determined by visual inspection, olefactory inspection, and PID screening, then additional probe holes will be performed at a horizontal distance of 20 ft on either location, as necessary. It is not expected that any of the soil above the French Underdrain System will exhibit petroleum contamination.

After evaluation of the data, the excavation of the remaining portions of the French Underdrain and contaminated unsaturated bedding material, if any, will be performed.

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

3.6.1 Mobilization

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). The results will be compared to the GWP-Ind RRS 2. The comparison will result in one of the following cases:

Case 1: $C_{soil} > SAI-Res$, $C_{soil} > GWP-Res$

Since the soil layer is not protective of inhalation, ingestion, and dermal contact, the next deeper sample will be analyzed and the results will be again be compared to the SAI-Res RRS 2 (repeat entire process).

Case 2: $C_{soil} > SAI-Res$, $C_{soil} < GWP-Res$

Since the soil layer is not protective of inhalation, ingestion, and dermal contact, the next deeper sample will be analyzed and the results will be again be compared to the SAI-Res RRS 2 (repeat entire process).

Case 3: $C_{soil} < SAI-Res$, $C_{soil} > GWP-Res$

Since the soil layer is not protective of groundwater, an SPLP analysis will be conducted on the sample and the results will be compared to Groundwater MSC for residential use (GW-Res). This will result in one of the following cases:

Case 3(a): $C_{SPLP} < GW-Res$

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

Case 3(b): $C_{SPLP} > GW-Res$

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 RRS 2 (repeat entire process). The comparison will again result in one of two cases being described.

Case 4: $C_{soil} < SAI-Res$, $C_{soil} < GWP-Res$

Since this soil layer is protective of inhalation, ingestion, and dermal contact as well as groundwater, the vertical extent has been defined and soil from above this layer will be excavated. The comparison will again result in one of four cases being described.

Therefore, by sequential sampling at 2 ft intervals and comparison to RRS 2 will result in Case 1 or Case 2 two as 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.

To determine the horizontal radial extent of Type 1 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 4 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-Res standard for the COCs. One of the following cases will result from the comparison:

Case 1: $C_{SPLP} < GW-Res$

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

Case 2: $C_{SPLP} > GW-Res$

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-Res RRS 2. This procedure will again result in an area that needs excavation where the 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.

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:

<i>Analysis</i>	<i>Maximum Holding Times (Matrix:Soil)</i>
VOCs	14 days to extraction
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 stored 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. Waste management practices will follow the guidelines established by the TNRCC. Detailed waste handling procedures are presented in the FSP.

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.

This page intentionally left blank.

5.0 PROJECT MANAGEMENT

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

458 27A

12 802

**Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 5-2**

This page intentionally left blank.

6.0 PROJECT SCHEDULE

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

63 003

458 28A

**Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 6-2**

This page intentionally left blank.

REFERENCES

Geo-Marine, Inc., 1998, *Soil Removal and Site Restoration via Soil Replacement for the Unnamed Stream, Carswell Air Force Base.*

LAW Environmental, Inc., 1994, *Analytical Informal Technical Information Report for Oil/Water Separator Assessment.*

LAW Environmental, Inc., 1995, *Installation Restoration Program – Oil/Water Separator Assessment Report.*

LAW Environmental, Inc., 1995, *Installation Restoration Program – RCRA Facility Investigation Report.*

Parsons Engineering Science, Inc., 1996, *Field Activity Report (TNRCC Form 0017) – Implementation of Remedial Actions at Site ST14 and Site SD13.*

Parsons Engineering Science, Inc., 1997, *Final Remedial Action Plan for the Risk-Based Remediation of Site ST14 (SWMU 68) LPSTID 104819; the Former Base Refueling Area (AOC7); the French Underdrain System (SWMU 64); and the North Oil/Water Separator (SWMU 67).*

Texas Natural Resource Conservation Commission, 1993, Texas Administrative Code, Chapter 336 Industrial Solid Waste and Municipal Hazardous Waste, Risk Reduction Standards, Subchapters A and S.

Texas Natural Resource Conservation Commission, 1995, Letter limited RFI approval Notice to Proceed.

Texas Natural Resource Conservation Commission, 1998, Memorandum, Subject: Implementation of the Existing Risk Reduction Rules.

United States Environmental Protection Agency, 1994, Letter comments from EPA on the Work Plan and Sampling and Analyses Addendum for the proposed oil;/water separator assessment.

United States Air Force Center for Environmental Excellence, 1994, Letter to Mr. Gary Baumgarten, EPA Region VI.

United States Air Force Center for Environmental Excellence, 1997, Memorandum for TNRCC on Collection of Free Product from AOC7.

United States Air Force Center for Environmental Excellence, 1995, Memorandum for TNRCC, Subject: Response to 26 Jul 95 TNRCC letter to Unnamed Stream Draft RFI Report, December 1994.

458 29 A

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Unnamed Stream
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 7-2

This page intentionally left blank.

TABLES

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Aluminum	SD1303SBB	4-6	4/24/94	12000	50	150000	3700	22035
Arsenic	SD1302SBA	0-2	4/24/98	18	0.5	20	5	5.85
Barium	WP2	-	10/30/97	9801	2	9100	200	233
Beryllium	SD13MW07E	8-10	3/24/94	<1.9	0.3	46	0.4	1.02
	Proxy			0.17	0.3	46	0.4	1.02
Calcium	SD1302SBA	0-2	4/24/94	260000	5	NA	NA	167788
Cadmium	SD1303SBB	4-6	4/24/94	3.9	1	140	0.5	0.556
Chromium	SD1303	0-2	4/26/94	18	5	330	10	25.86
Cobalt	SD1303SBB	4-6	4/24/94	5.5	5	15000	220	11.05
Copper	SD13MW05B	2-4	3/25/94	66	5	10000	130	17.37
Iron	SD1303SBB	4-6	4/24/94	13000	5	NA	NA	17717
Magnesium	SD1303SBB	4-6	4/24/94	2600	25	NA	NA	3003
Manganese	SD13MW07E	8-10	3/24/94	360	1	16000	170	849.1
Molybdenum	SD13MW07E	8-10	3/24/94	<3.3	5	1100	18	NM
Sodium	SD13MW07E	4-8	3/24/94	290	25	NA	NA	37300

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Thallium	SD13MW07E	4-8	3/24/94	<6.7	25	20	0.2	NM
Vanadium	SD13MW07B	2-4	3/24/94	23	5	480	26	46.26
Silver	UN-01	-	10/30/97	<7	5	470	18	0.213
Zinc	SD13MW06D	6-8	3/24/94	33	1	59000	1100	38.8
Potassium	SD1303SBB	4-6	4/24/94	1700	60	NA	NA	2895
Lead	SD13MW06D	6-8	3/24/94	14	0.5	500	1.5	30.97
Antimony	SD13MW07E	8-10	3/24/94	<5.2	25	72	0.6	NM
Selenium	WP3-1	-	4/17/98	4.0	0.5	1300	5	0.907
Mercury	UN01, 04, 05	-	10/30/97	<0.1	0.185	0.11	0.2	NM
Nickel	SD13MW06A	0-2	3/24/94	7.6	5	1900	10	14.6
<u>VOCs</u>								
1,1,1-Trichloroethane	SD13MW07E	8-10	3/24/94	<1.6	0.005	2300	20	-
	Proxy			0	0.005	2300	20	-
1,1,2,2-Tetrachloroethane	SD13MW07E	8-10	3/24/94	<1.6	0.005	5.1	0.426	-
	Proxy			0	0.005	5.1	0.426	-
1,1,2-Trichloroethane	SD13MW07E	8-10	3/24/94	<1.6	0.005	9.7	0.5	-
	Proxy			0	0.005	9.7	0.5	-
1,1-Dichloroethane	SD13MW07E	8-10	3/24/94	<1.6	0.005	27000	370	-
	Proxy			0	0.005	27000	370	-

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
1,1-Dichloroethene	SD13MW07E Proxy	8-10	3/24/94	<1.6	0.005	0.6	0.7	--
1,2-Dichloroethane	SD13MW07E Proxy	8-10	3/24/94	<1.6	0.005	0.6	0.7	--
1,2-Dichloropropane	SD13MW07E Proxy	8-10	3/24/94	0	0.005	0.27	0.5	--
2-Chloroethylvinylether	SD13MW07E Proxy	8-10	3/24/94	<0.31	0.005	0.27	0.5	--
2-Hexanone	SD13MW07E	8-10	3/24/94	<3.1	0.01	NA	NA	--
Acetone	SD13MW06D	6-8	3/24/94	<1.6	0.01	NA	NA	--
Benzene	SD13MW07E Proxy	8-10	3/24/94	0.034	0.01	21000	370	--
Bromodichloromethane	SD13MW07E Proxy	8-10	3/24/94	<0.31	0.005	0.86	0.5	--
Bromoform	SD13MW07E Proxy	8-10	3/24/94	0	0.005	0.86	0.5	--
Bromomethane	SD13MW07E Proxy	8-10	3/24/94	<0.31	0.005	10	10	--
Carbon disulfide	SD13MW07E Proxy	8-10	3/24/94	0	0.005	10	10	--
Carbon tetrachloride	SD13MW07E Proxy	8-10	3/24/94	<1.6	0.005	34	10	--
Chlorobenzene	SD13MW07E Proxy	8-10	3/24/94	0	0.005	34	10	--
Chloroethane	SD13MW07E Proxy	8-10	3/24/94	<0.31	0.01	3.5	5.11	--
Chloroform	SD13MW07E Proxy	8-10	3/24/94	0	0.01	3.5	5.11	--
				<1.6	0.005	1000	370	--
				0	0.005	1000	370	--
				<1.6	0.005	0.35	0.5	--
				0	0.005	0.35	0.5	--
				<1.6	0.005	5500	10	--
				<1.6	0.01	11000	1500	--
				0	0.01	11000	1500	--
				<1.6	0.005	0.31	10	--

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Chloromethane	Proxy SD13MW07E	8-10	3/2/494	0	0.005	0.31	10	--
	Proxy SD13MW07E	8-10	3/2/494	<0.31	0.01	2.3	6.6	--
Dibromochloromethane	Proxy SD13MW07E	8-10	3/2/494	0	0.01	2.3	6.6	--
	Proxy SD13MW07	8-10	3/2/494	<1.6	0.005	76	10	--
Ethylbenzene	Proxy SD13MW07	8-10	3/2/494	0	0.005	76	10	--
	SD1303SBB	4-6	4/24/94	30	0.005	4300	70	--
Methylene Chloride	SD1303SBB	4-6	4/24/94	0.019	0.005	8.7	0.5	--
Styrene	SD13MW07E	8-10	3/2/494	<1.6	0.005	13000	10	--
	Proxy SD13MW07E	8-10	3/2/494	0	0.005	13000	10	--
Tetrachloroethene	Proxy SD13MW07E	8-10	3/2/494	<1.6	0.005	6	0.5	--
	Proxy SD13MW06	6-8	3/24/94	0	0.005	6	0.5	--
Toluene	SD13MW06	6-8	3/24/94	0.013	0.005	1700	100	--
Trichloroethene	SD13MW07E	8-10	3/2/494	<1.6	0.005	3.7	0.5	--
	Proxy SD13MW07E	8-10	3/2/494	0	0.005	3.7	0.5	--
Vinyl acetate	Proxy SD13MW07E	8-10	3/2/494	<3.1	0.01	570	3700	--
	Proxy SD13MW07E	8-10	3/2/494	0	0.01	570	3700	--
Vinyl chloride	Proxy SD13MW07E	8-10	3/2/494	<0.63	0.01	0.0041	0.2	--
	Proxy SD13MW07	8-10	3/24/94	0.0025	0.01	0.0041	0.2	--
Xylenes (total)	SD13MW07	8-10	3/24/94	29	0.005	2500	1000	--
	SD13MW07E	8-10	3/2/494	<0.31	0.005	NA	NA	--
trans-1,2-Dichloroethene	SD13MW07E	8-10	3/2/494	<1.6	0.005	5500	10	--
	Proxy SD13MW07E	8-10	3/2/494	0	0.005	5500	10	--
trans-1,3-Dichloropropene	SD13MW07E	8-10	3/2/494	<1.6	0.005	NA	NA	--

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
<u>SVOCs</u>								
1,2,4-Trichlorobenzene	UN-01	-	10/30/97	<0.398	0.333	1400	7	--
1,2-Dichlorobenzene	UN-01	-	10/30/97	<0.398	0.333	25000	60	--
1,3-Dichlorobenzene	UN-01	-	10/30/97	<0.398	0.333	NA	NA	--
1,4-Dichlorobenzene	UN-01	-	10/30/97	<0.398	0.333	270	7.5	--
2,4,5-Trichlorophenol	UN-01	-	10/30/97	<0.398	0.667	15000	370	--
2,4,6-Trichlorophenol	UN-01	-	10/30/97	<0.398	0.333	46	0.774	--
2,4-Dichlorophenol	UN-01	-	10/30/97	<0.266	0.333	460	11	--
2,4-Dimethylphenol	UN-01	-	10/30/97	<0.266	0.333	3100	73	--
2,4-Dinitrophenol	UN-01	-	10/30/97	<0.266	1.67	310	7.3	--
2,4-Dinitrotoluene	UN-01	-	10/30/97	<0.398	0.333	0.75	0.013	--
	Proxy			0.398	0.333	0.75	0.013	
2,6-Dinitrotoluene	UN-01	-	10/30/97	<0.398	0.333	0.75	0.013	--
	Proxy			0.398	0.333	0.75	0.013	
2-Chloronaphthalene	UN-01	-	10/30/97	<0.398	0.333	11000	290	--
2-Chlorophenol	UN-01	-	10/30/97	<0.398	0.333	1400	18	--
2-Methylnaphthalene	UN-01	-	10/30/97	<0.398	0.333	5500	150	--

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
2-Methylphenol	UN-01	-	10/30/97	<0.398	0.333	NA	NA	--
2-Nitroaniline	UN-01	-	10/30/97	<0.266	1.67	NA	NA	--
2-Nitrophenol	UN-05	-	10/30/97	<0.266	0.333	NA	NA	--
3,3-Dichlorobenzidine	UN-05	-	10/30/97	<0.531	0.667	1.1	0.019	--
3-Nitroaniline	UN-05	-	10/30/97	<0.266	1.67	NA	NA	--
4,6-Dinitro-2-methylphenol	UN-05	-	10/30/97	<0.266	1.67	NA	NA	--
4-Bromophenyl phenyl ether	UN-05	-	10/30/97	<0.398	0.333	NA	NA	--
4-Chloro-3-methylphenol	UN-05	-	10/30/97	<0.266	0.333	NA	NA	--
4-Chloroaniline	UN-05	-	10/30/97	<0.266	0.667	NA	NA	--
4-Chlorophenyl phenyl ether	UN-05	-	10/30/97	<0.398	0.333	NA	NA	--
4-Methylphenol	UN-05	-	10/30/97	<0.266	0.333	NA	NA	--
4-Nitroaniline	UN-05	-	10/30/97	<0.398	1.67	NA	NA	--
4-Nitrophenol	UN-05	-	10/30/97	<0.398	1.67	NA	NA	--
Acenaphthene	UN-05	-	10/30/97	<0.398	0.333	8200	220	--

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Acenaphthylene	UN-05	-	10/30/97	<0.398	0.333	8200	220	-
Anthracene	UN-05	-	10/30/97	<0.398	0.333	41000	1100	-
Benzoic Acid	UN-05	-	10/30/97	<0.531	1.67	620000	15000	-
Benzyl alcohol	UN-05	-	10/30/97	<0.266	0.667	46000	1100	-
Butyl benzyl phthalate	UN-05	-	10/30/97	<0.398	0.333	31000	730	-
Chrysene	UN-05	-	10/30/97	2.52	0.333	65	1.2	-
Di-n-butylphthalate	UN-05	-	10/30/97	<0.398	0.333	15000	370	-
Dibenzofuran	UN-05	-	10/30/97	<0.398	0.333	NA	NA	-
Diethylphthalate	UN-05	-	10/30/97	<0.531	0.333	120000	2900	-
Dimethylphthalate	UN-05	-	10/30/97	<0.531	0.333	NA	NA	-
Flouranthene	UN-05	-	10/30/97	5.46	0.333	5500	150	-
Flourene	UN-05	-	10/30/97	<0.398	0.333	5500	150	-
Hexachlorobenzene	UN-05	-	10/30/97	<0.398	0.333	0.26	0.1	-
Hexachlorobutadiene	Proxy UN-05	-	10/30/97	0.398 <0.398	0.333 0.333	0.26 16	0.1 0.73	-
Hexachlorocyclopentadiene	UN-05	-	10/30/97	<0.133	0.333	3.6	5	-

TABLE 2-1
 MAXIMUM SITE CONCENTRATIONS AT UNNAMED STREAM (Oct 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Chemical/ Metal	Sample	Depth [ft]	Date	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Hexachloroethane	UN-05	-	10/30/97	<0.398	0.333	150	3.7	--
Isophorone	UN-05	-	10/30/97	<0.398	0.333	5300	90	--
Naphthalene	UN-05	-	10/30/97	<0.266	0.333	600	150	--
Nitrobenzene	UN-05	-	10/30/97	<0.398	0.333	77	1.8	--
Pentachlorophenol	UN-05	-	10/30/97	<0.266	1	3.2	0.1	--
Phenanthrene	UN-05	-	10/30/97	5.3	0.333	4100	110	--
Phenol	UN-05	-	10/30/97	<0.398	0.333	93000	2200	--
bis(2-Chloroethoxy)methane	UN-05	-	10/30/97	<0.266	0.333	NA	NA	--
bis(2-Chloroethyl)ether	UN-05 Proxy	-	10/30/97	<0.266	0.333	0.15	0.00774	--
bis(2-Chloroisopropyl)ether	UN-05	-	10/30/97	<0.266	0.333	6200	150	--
bis(2-Ethylhexyl)phthalate	UN-05 Proxy	-	10/30/97	<0.398	0.333	19	0.6	--
n-Nitrosodi-n-propylamine	UN-05 Proxy	-	10/30/97	<0.398	0.333	0.045	0.00122	--
n-Nitrosodiphenylamine	UN-05	-	10/30/97	<0.398	0.333	0.045	0.00122	--
				<0.398	0.333	64	1.7	--

1 MSC for ingestion of soil, inhalation of volatiles and particulates (residential) and dermal contact 2 MSC for soil protective of groundwater (residential) 3 Basewide Background
 -- Background levels are non-detect Values exceeded by maximum concentration NA No MSCs published or developed - Sample Depth not known
 values in **BOLD** are applicable RR2 standards. In cases where one value is **BOLD**, that value is the applicable RR2 Standard for both pathways.
 Proxy values were assigned to highest non-detected value according to TNPRCC memo dated July 23, 1998

TABLE 2-2
 CONSTITUENTS OF CONCERN EXCEEDING RRS 2 MSCs AT UNNAMED STREAM

Chemical	Sample	Depth [ft]	Date	Concentration [mg/kg]	PQL [mg/kg]	RR2 MSCs [mg/kg]	Basewide Background
<u>Ingestion and Inhalation of Vapors and Dermal Contact</u>							
<u>Metals</u>							
Barium	WP2	-	10/30/97	9801	2	9100	233
<u>SVOCs</u>							
Hexachlorobenzene	UN-01p	-	11/6/97	0.398	0.333	0.26	-
	UN-04p	-	11/6/97	0.398	0.333	0.26	-
	UN-05p	-	11/6/97	0.398	0.333	0.26	-
n-Nitrosodi-n-propylamine	UN-01p	-	10/30/97	0.398	0.333	0.045	-
	UN-04p	-	10/30/97	0.398	0.333	0.045	-
	UN-05p	-	10/30/97	0.398	0.333	0.045	-
<u>Protection of Groundwater</u>							
Arsenic	OWS01	-	10/30/97	10	0.5	5	5.85
	OWS02	-	10/30/97	10	0.5	5	5.85
	WP2	-	10/30/97	9.9	0.5	5	5.85
	UN-01	-	10/30/97	10	0.5	5	5.85
	UN-04	-	10/30/97	10	0.5	5	5.85
	UN-05	-	10/30/97	10	0.5	5	5.85
	SD13MW06D	6-8	3/2/94	12	0.5	5	5.85
	SD13MW07E	8-10	3/24/94	12	0.5	5	5.85
	SD1302SBA	0-2	4/2/94	18	0.5	5	5.85
Barium	WP2	-	10/30/97	9801	2	200	233
	UN-01	-	10/30/97	727	2	200	233
Cadmium	SD13MW06A	0-2	3/24/94	1.2	1	0.5	0.556
	SD13MW06D	6-8	3/24/94	1.2	1	0.5	0.556
	SD13MW07B	2-4	3/24/94	1.3	1	0.5	0.556
	SD13MW07E	8-10	3/24/94	1	1	0.5	0.556
	SD1302SBA	0-2	4/24/94	1.8	1	0.5	0.556
	SD1303SBB	4-6	4/24/94	3.9	1	0.5	0.556
	SD1303SBC	2-4	4/24/94	2.1	1	0.5	0.556
<u>SVOCs</u>							
Chrysene	UN-05	-	10/30/97	2.52	0.333	1.2	-
Hexachlorobenzene	UN-05p	-	10/30/97	0.398	0.333	0.1	-
	UN-01p	-	10/30/97	0.398	0.333	0.1	-
	UN-04p	-	10/30/97	0.398	0.333	0.1	-
n-Nitrosodi-n-propylamine	UN-01p	-	10/30/97	0.398	0.333	0.0012	-
	UN-04p	-	10/30/97	0.398	0.333	0.0012	-
	UN-05p	-	10/30/97	0.398	0.333	0.0012	-

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

TABLE 2-3(a)
SUMMARY OF AREAS THAT EXCEED RRS 2 AT UNNAMED STREAM

Analytes	TYPE 1 AREAS									
	UN-01		UN-04		UN-05		WP-2			
	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res		
Arsenic		x		x			x		x	
Barium		x						x		
Cadmium										
n-Nitrosodi-n-propylamine	x		x		x					
Hexachlorobenzene	x		x		x					
Chrysene									x	

TYPE 1: Exceed SAI-Res and GWP-Res

X Exceeds the relevant standard

GWP-Res soil protective of groundwater standard

SAI-Res soil protective of ingestion, inhalation and dermal contact

TABLE 2-3(b)
SUMMARY OF AREAS THAT EXCEED RRS 2 AT UNNAMED STREAM

Analytes	TYPE 2 AREAS							
	OWS01	OWS02	SD13MW06	SD13MW07	SD1302SB	SD1303SB		
	GWP-Res	GWP-Res	GWP-Res	GWP-Res	GWP-Res	GWP-Res	GWP-Res	GWP-Res
Arsenic	x	x		x			x	
Barium								
Cadmium								
n-Nitrosodi-n-propylamine								x
Hexachlorobenzene								
Chrysene								

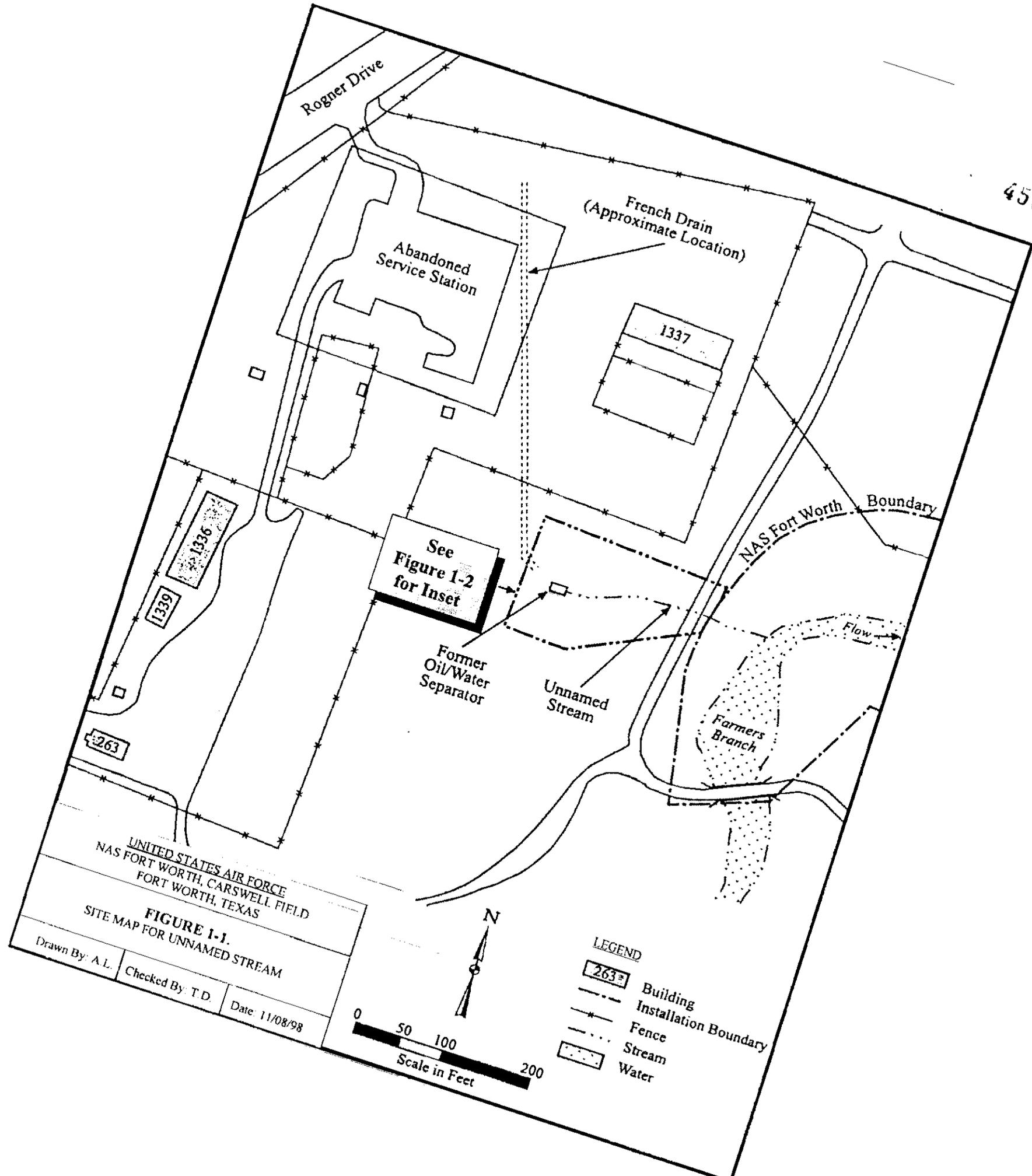
TYPE 2: Exceed only GWP-Res
 X Exceeds the relevant standard
 GWP-Res soil protective of groundwater standard

TABLE 3-1
SUMMARY OF PROPOSED SAMPLING ACTIVITY AT UNNAMED STREAM

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)	2 FT	4 FT			
UN-01	Soil	Arsenic Barium SVOCs	SW 6020	1	1	1					
			SW 6010A	1	1	1					
			SW 8270B	1	1	1					
UN-04	Soil	Arsenic Barium SVOCs	SW 6020	1	1	1					
			SW 6010A	1	1	1					
			SW 8270B	1	1	1					
UN-05	Soil	Arsenic Barium SVOCs	SW 6020	1	1	1					
			SW 6010A	1	1	1					
			SW 8270B	1	1	1					
WP-2	Soil	Arsenic Barium	SW 6020	1	1	1					
			SW 6010A	1	1	1					
OWS01	Soil	Arsenic	SW 6020	1	1	1					
			SW 6020	1	1	1					
SD13MW06	Soil	Arsenic Cadmium	SW 6020	1	1	1					
			SW 6010A	1	1	1					
SD13MW07	Soil	Arsenic Cadmium	SW 6020	1	1	1					
			SW 6010A	1	1	1					
SD13SB02	Soil	Arsenic Cadmium	SW 6020	1	1	1					
			SW 6010A	1	1	1					
SD13SB03	Soil	Arsenic Cadmium	SW 6020	1	1	1					
			SW 6010A	1	1	1					
Along French Underdrain	Soil	Arsenic Barium Cadmium VOCs SVOCs	SW 6020			2					
			SW 6010A			2					
			SW 6010A			2					
			SW 8260A			2					
			SW 8270B			2					
				Subtotal							101
				Equipment							4
				Ambient							1
				Trip							1
				Total							107

* These samples will be collected in a 2 ft or 4 ft radius for horizontal delineation
 ** MS/MSD Matrix Spike/Matrix Spike Duplicate
 * Red indicates total and SPI Paralysis
 Note: Soil samples may be analyzed for SPLP (EPA Method 1312) if required, as discussed in Section 3.6
 Note: Soil samples collected at 4-8 and 6-8 foot depths will only be analyzed if RRS 2 is exceeded on the 2-4 foot samples
 Duplicate numbers are reflective of the total number of possible samples

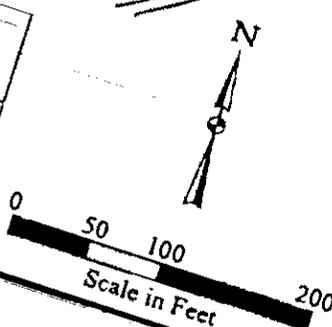
FIGURES



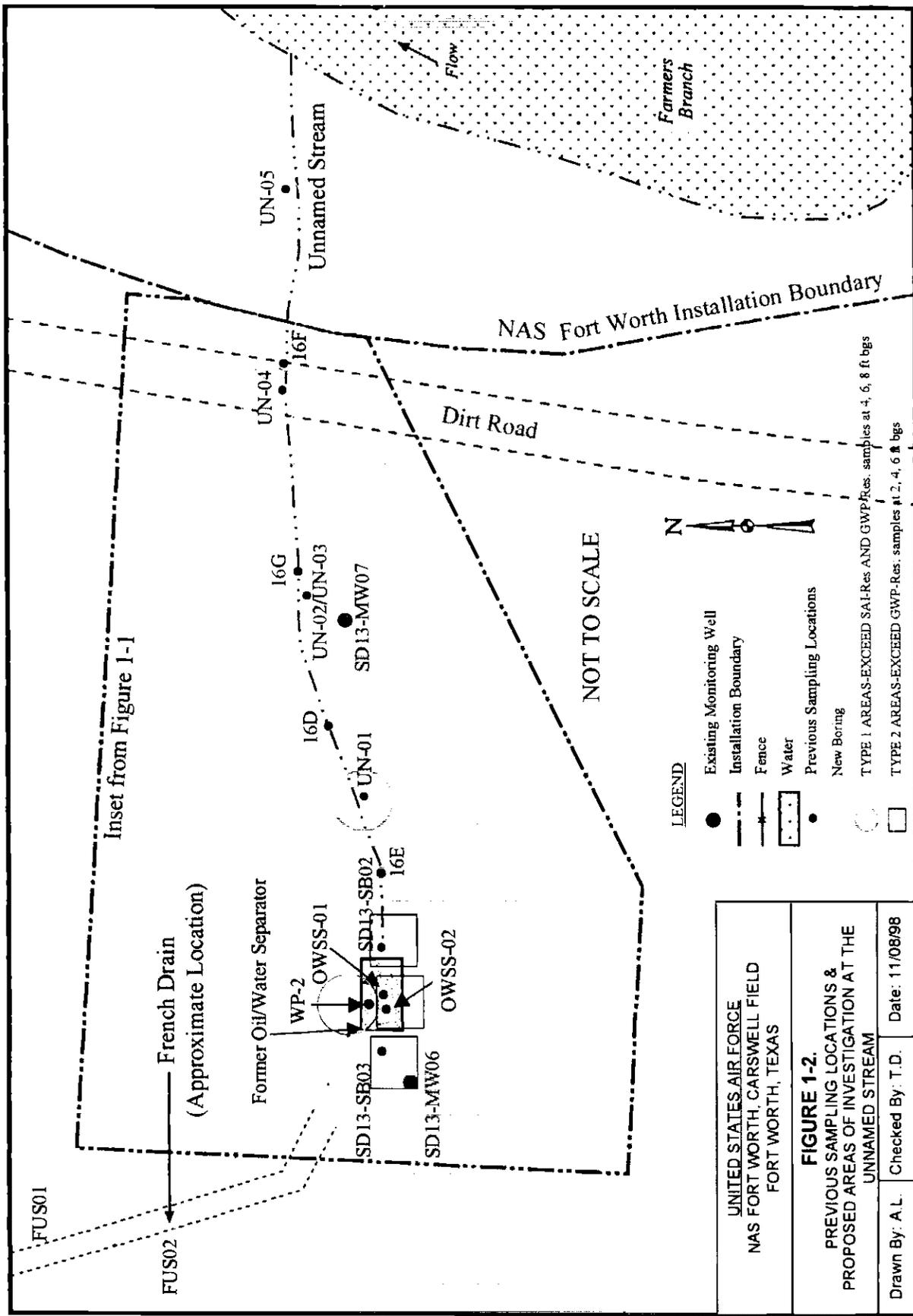
UNITED STATES AIR FORCE
 NAS FORT WORTH, CARSWELL FIELD
 FORT WORTH, TEXAS

FIGURE 1-1.
 SITE MAP FOR UNNAMED STREAM

Drawn By: A.L. Checked By: T.D. Date: 11/08/98



- LEGEND**
- Building
 - Installation Boundary
 - Fence
 - Stream
 - Water



UNITED STATES AIR FORCE NAS FORT WORTH, CARSWELL FIELD FORT WORTH, TEXAS	
FIGURE 1-2. PREVIOUS SAMPLING LOCATIONS & PROPOSED AREAS OF INVESTIGATION AT THE UNNAMED STREAM	
Drawn By: A.L.	Checked By: T.D. Date: 11/08/98

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE