

N83447.AR.000426
NAS FORT WORTH
5090.3a

REVISED FINAL WORK PLAN ADDENDUM GROUNDS MAINTENANCE YARD 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 456

**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
GROUNDS MAINTENANCE YARD
CDRL A004**



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

March 1999

Contractor Response to Grounds Maintenance Yard Site Comments from AFCEE

Item	Page	Section	AFCEE Comment	Contractor Response
1	ii	Table of Contents	Section 2.2.5 Biology is listed on page 2-7. This should be changed to 2-6.	Not revised. Page numbering is correct.
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 title listed for Figures 1-1 and 3-1 should be the same as the title found on the actual figure.	Revised.
4	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.
5	2-2	2.2.1	Paragraph 3: It is suggested that the Contractor define "proxy value" and explain its significance.	Revised for clarification.
6	2-6	2.2.1	Paragraph 1, sentence 1: It is recommended that if the mentioned "residential standards" and "industrial standards" correspond to a specific risk reduction standard (RRS), it should be listed.	Not Revised. The sentence was stated as an observation made during the screening of the data that residential RRSs are more conservative than industrial standards and the logical thought process to determine which standard to base the evaluation of data. The contractor believes the tables presented in the text sufficiently point out the specific RRS that are applied in the evaluation of the data.

Item	Page	Section	Comment	Contractor Response
7	3-2	3.6	Paragraph 8, Type 1 Area: It is recommended that the paragraph should be changed to read, "The horizontal and vertical delineation of the localized areas will be conducted to determine the extent of necessary soil excavation and demonstrate attainment of cleanup levels for remaining soils. If the RRS2-SAI have been exceeded, soil will be excavated and disposed off-site."	Revised.
8	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.
9	3-3	3.6.2	Paragraph 6, Case 1(b): 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.
10	3-4	3.6.2	Paragraph 2, sentence 4: It is recommended that the Contractor should explain the course of action if contamination is found 15 ft. from original boring.	Revised for clarification.
11	3-5	3.6.4	It is recommended that the Contractor include decon water in this section.	Revised.

Item	Page	Section	AFCEE Comment	Contractor Response
12	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>
13		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.

Contractor Response to Grounds Maintenance Yard Site Comments from USEPA/TNRCC

Item	Page	Section	USEPA/TNRCC Comment	Contractor Response
9	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.
10	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.

**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
GROUNDS MAINTENANCE YARD
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

456 6A

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page i

This page intentionally left blank.

1

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 GROUNDS MAINTENANCE YARD	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.....	2-6
2.2.3 Groundwater	2-6
2.2.4 Surface Water.....	2-6
2.2.5 Biology.....	2-7
2.2.6 Demographics	2-7
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.....	3-5
3.6.4 Waste Management	3-5

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 the GMY (Oct 1995) Compared to PQLs, RRS 2 MSCs, and Basewide Background Levels |
| 2-2 | Constituents of Concern Exceeding RRS 2 MSCs at the GMY |
| 2-3 | SPLP Concentrations at the GMY (May 1997) Compared to PQLs and RRS 2 Groundwater MSCs |
| 2-4 | Summary of Areas that Exceed RRS 2 at the GMY |
| 3-1 | Summary of Proposed Sampling Activity at the GMY |

LIST OF FIGURES

FIGURE

- | | |
|-----|---|
| 1-1 | Grounds Maintenance Yard Site Location Map |
| 3-1 | Previous Sampling Locations & Proposed Areas of Investigation at GMY |

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
CDRL	Contract Data Requirements List
COC	Contaminant of Concern
FPM	Fanning Phillips and Molnar
FSP	Field Sampling Plan
ft	feet
GMY	Grounds Maintenance Yard
GWP-Ind	Groundwater Protection for Industrial Use
GWP-Res	Groundwater Protection for Residential Use
HBL	Health Based Levels
IRP	Installation Restoration Program
JACOBS	Jacobs Engineering Group, Inc.
JRB	Joint Reserve Base
LAW	Law Environmental, Inc.
MCL	Maximum Contaminant Level
MDLs	Method Detection Limits
mg/kg	milligrams per kilogram
MSC	Medium Specific Concentration
NAS	Naval Air Station
ND	Non-detect
PCB	polychlorinated biphenyl
POC	Point of Contact
ppm	parts per million
PQL	Practical Quantitation Limit

ACRONYMS AND ABBREVIATIONS (Cont'd)

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	Soild Waste Management Unit
SPLP	Synthetic Precipitation 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

7-20 800

456 11A

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
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 Grounds Maintenance Yard (GMY), Area of Concern (AOC) 5 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 that require data acquisition 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 0023. 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 GROUNDS MAINTENANCE YARD

The Grounds Maintenance Yard (GMY) (Figure 1-1) is located in the southeast corner of Carswell AFB near the Main Entrance. It is a predominantly graveled yard, with some areas of asphalt pavement, two small maintenance buildings, a pesticide storage shed, two 500-gallon above ground storage tanks located on a concrete containment pad, and two office trailers. A site walk through by LAW Environmental, Inc. (LAW) and AFCEE personnel in October 1994 found some soil staining and areas suspected to have formerly contained chemical storage sheds and/or

some soil staining and areas suspected to have formerly contained chemical storage sheds and/or petroleum storage tanks. Past operations at the GMY include storage and maintenance of grounds keeping equipment, and storage of pesticides, solvents, and fuels.

LAW conducted soil sampling activities at the GMY from October 22 to 24, 1995 as part of a Site Investigation/Site Characterization. Twenty-eight 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 60-foot intervals, but some locations were offset to include stained areas near the two maintenance buildings and former pesticide storage building, in the area of the petroleum storage tanks, and at locations where obvious soil staining was observed.

Unified Services of Texas, Inc. (UST, Inc.) demolished and removed one structure and one concrete pad at the GMY in May 1997. UST, Inc. also disposed of twenty-three transformers of varying sizes located on a concrete pad to the northeast of the GMY. Laboratory analysis indicated that three of the transformers contained polychlorinated biphenyl (PCB) oil in concentrations in excess of 50 parts per million (ppm). These three transformers were appropriately labeled and transported for disposal. The other twenty transformers contained PCB oil in concentrations less than 50 ppm and were transported to an approved disposal facility. The GMY was backfilled and compacted at removal areas.

Jacobs Engineering Group, Inc. (JACOBS) in 1997 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 arsenic was the only metal which exceeded the Soil/Air and Ingestion Standard for Industrial Use (SAI-Ind) Medium Specific Concentration (MSC). Arochlor 1254 was detected twice, and 4,4'-DDE, 4,4'-DDT, and dieldrin were each detected once at concentrations above the MSC. The evaluation recommended additional sampling.

In May 1997, JACOBS collected thirty-two soil and sediment samples at the GMY in order to confirm the analytical results collected by LAW in October 1995. Samples were analyzed for selected metals, pesticides, and PCBs. All samples were first prepared using the Synthetic Precipitate Leaching Procedure (SPLP). The data evaluation concluded that endrin was detected below the Risk Reduction Standard Number 2 (RRS 2) concentration, lead was detected above the Practical Quantitation Limit (PQL) in one sample, and beryllium was detected below the PQL but was thought to be a lab contaminant. The evaluation noted that the Method Detection Limits (MDLs) for antimony, lead, aldrin, and dieldrin were above the RRS 2 concentrations.

1.3 DESCRIPTION OF CURRENT STUDY

1.3.1 Project Objectives

The overall goal of this project was to provide risk-based closure documentation for the Grounds Maintenance Yard in accordance with Resource Conservation and Recovery Act Part B permit HW50289. Existing site data was evaluated against appropriate risk-based closure criteria and areas where data for risk based closure is 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 relevant target levels for closure.
- Implementation of incidental soil removal/interim removal actions to meet contaminant target levels that will allow for risk-based site closure.
- Preparation of closure documentation in accordance with RRS 2.

The work described in this addenda will be performed as described. However, as agreed upon in the 6 November 1998 BCT meeting, the focus of the investigation activities and report will be of a baseline establishment nature since the U. S. Navy is now using the site as a Grounds Maintenance Yard.

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.

456 14A

00 00

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
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 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 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 each constituent detected in soil at the site in October 1995 with (i) the relevant RRS 2 MSCs for Soil/Air and Ingestion Standard for Residential Use (SAI-Res), (ii) PQL, and (iii) the basewide background levels for soil. Note that the highest of the three values becomes the applicable RRS 2 concentration. If the maximum

concentration of a constituent of concern at the GMY exceeded the RRS 2, then 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:

- Arsenic concentration measured in OT3907SA exceeds the RRS 2 (RRS 2-MS).C).
- Mercury concentration measured in OT3912SAp exceeds the RRS 2 (PQL).
- Benz(a)anthracene concentration measured in OT3905SA exceeds the RRS 2 (SAI-Res).
- Benzo(a)pyrene concentrations measured in OT3905SA, OT3907SA and OT3912SAp exceed the RRS 2 (PQL).
- Benzo(b)fluoranthene concentration measured in OT3905SA exceeds the RRS 2 (SAI-Res).
- Dibenz(a,h)anthracene concentrations measured in OT3905SA and OT3912SAp exceed the RRS 2 (PQL).
- Indeno(1,2,3-cd)pyrene concentration measured in OT3905SA exceeds the RRS 2 (SAI-Res).
- Hexachlorobenzene concentration measured in OT3912SAp exceeds the RRS 2 (PQL).
- Bis(2-chloroethyl)ether concentration measured in OT3912SAp exceeds the RRS 2 (PQL).
- n-Nitrosodi-n-propylamine concentration measured in OT3912SAp exceeds the RRS 2 (PQL).

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

Non-detect results were considered 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 as 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 = 1/2 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 also compares the maximum concentration of each constituent detected in soil at the site in October 1995 with (i) the relevant RRS 2 MSCs for groundwater protection for residential use (GWP-Res), (ii) PQLs, and (iii) the basewide background levels for soil. Note that the highest of these three values becomes the applicable RRS 2 concentration. If the maximum concentration of a constituent of concern at the GMY exceeded the RRS 2, then 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 OT3907SA and OT3921SA exceed the RRS 2 (basewide background).
- Mercury concentration measured in OT3912SAp exceeds the RRS 2 (GWP-Res).
- Lead concentrations measured in OT3905SA, OT3907SA, OT3920SA, OT3923SA, and OT3928SA exceed the RRS 2 (basewide background).
- Nickel concentrations measured in OT3904SA, OT3905SA, OT3906SA, OT3907SA, OT3908SA, and OT3911 exceed the RRS 2 (basewide background).
- Chromium concentration measured in OT3905SA exceeds the RRS 2 (basewide background).
- 4,4'-DDE concentrations measured in OT3920SA and OT3928SA exceed the RRS 2 (GWP-Res).
- 4,4'-DDT concentration measured in OT3928SA exceeds the RRS 2 (GWP-Res).
- Dieldrin concentration measured in OT3926SA exceeds the RRS 2 (PQL).

- Benz(a)anthracene concentrations measured in OT3905SA, OT3907SA and OT3912SAp exceed the RRS 2 (PQL).
- Benzo(a)pyrene concentrations measured in OT3905SA, OT3907SA and OT3912SAp exceed the RRS 2 (PQL).
- Benzo(b)fluoranthene concentrations measured in OT3905SA, OT3907SA, OT3909SA and OT3912SAp exceed the RRS 2 (PQL).
- Benzo(k)fluoranthene concentrations measured in OT3905SA, OT3907SA and OT3912SAp exceed the RRS 2 (PQL).
- Dibenz(a,h)anthracene concentrations measured in OT3905SA and OT3912SAp exceed the RRS 2 (PQL).
- Chrysene concentration measured in OT3905SA exceeds the RRS 2 (GWP-Res).
- Indeno(1,2,3-cd)pyrene concentrations measured in OT3905SA, OT3907SA and OT3912SAp exceed the RRS 2 (PQL).
- bis(2-Ethylhexyl)phthalate concentration measured in OT3905SA exceeds the RRS 2 (GWP-Res).
- Hexachlorobenzene concentration measured in OT3912SAp exceeds the RRS 2 (PQL).
- Bis(2-chloroethyl)ether concentration measured in OT3912SAp exceeds the RRS 2 (PQL).
- n-Nitrosodi-n-propylamine concentration measured in OT3912SAp exceeds the RRS 2 (PQL).

Concentrations of all other constituents in all other soil samples 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 from several locations indicating that concentrations at those sample locations were protective of groundwater and hence not of concern. The sample locations and specific COCs that were eliminated from further consideration for groundwater protection include:

- OT3907SA and OT3921SA for Arsenic based on SPLP samples collected at GMY-004 and GMY-013 respectively.
- OT3907SA, OT3920SA and OT3923SA for Lead based on SPLP samples collected at GMY-004, GMY-018, and GMY-012 respectively.
- OT3905SA, OT3906SA, OT3907SA, and OT3908SA for Nickel based on SPLP samples collected at GMY-002, GMY-003, GMY-004, and GMY-020 respectively.

- OT3920SA for 4,4'-DDE based on SPLP samples collected at GMY-012.
- OT3926SA for Dieldrin based on SPLP samples collected at GMY-008.
- OT3905SA for Chromium based on SPLP samples collected at GMY-002.

These samples are identified with an asterisk ('*') in Table 2-2 and the shaded values are the remaining constituents of concern.

Summary of Data Analysis

The above process identified 7 areas of concern and 17 COCs within the GMY that exceed RRS 2 and therefore require further evaluation to attain closure. Table 2-4 presents by sample location the COCs and RRS 2 exceedances. These locations are also summarized below:

OT3905SA:

Ingestion and Inhalation of Vapors and Particulates: Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-cd)pyrene.

Protection of Groundwater: Lead, Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Dibenz(a,h)anthracene, Chrysene, Indeno(1,2,3-cd)pyrene, and bis(2-Ethylhexyl)phthalate.

OT3907SA:

Ingestion and Inhalation of Vapors and Particulates: Arsenic and Benzo(a)pyrene.

Protection of Groundwater: Benz(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, and Indeno(1,2,3-cd)pyrene.

OT3928SA:

Protection of Groundwater: Lead, 4,4'-DDE, and 4,4'-DDT.

OT3904SA and OT3911SA:

Protection of Groundwater: Nickel.

OT3909SA:

Protection of Groundwater: Benzo(b)fluoranthene.

OT3912SA:

Ingestion and Inhalation of Vapors and Particulates: Mercury, Hexachlorobenzene, Bis(2-chloroethyl)ether, n-Nitrosodi-n-propylamine, Benzo(a)pyrene, Dibenz(a,h)anthracene.

Protection of Groundwater: Mercury, 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.

For screening purposes, residential standards that are more conservative than industrial standards were used for the data evaluation against risk-based criteria. The initial evaluation against more conservative residential standards was based on future use of adjacent property as a public recreation area. The initial evaluation also revealed little difference between the two standards in the work required to attain site closure. However, after a discussion with regulatory representatives during a meeting on August 6, 1998, it was decided that future sample concentrations should be compared to industrial standards. The comparison with industrial standards is more appropriate for the site because the future land use is likely to be commercial.

2.2.2 Geology

Surficial soils were sampled to a depth of two feet 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 as necessary.

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

There are no surface water bodies associated with the site.

2.2.5 Biology

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

2.2.6 Demographics

The GMY is located in the southeast corner of Carswell AFB near the Main Entrance. The site is bordered on the west by a wooded area and the visitors center, and on the north by an electric substation. Wooded areas are adjacent to the south and east of the site. Further to the east is Installation Restoration Program Site SD-13 which includes the French Underdrain System (SWMU 64), a removed oil/water separator (SWMU 67) and unnamed stream (AOC 14). Adjacent property to the south and east of the site is included in an approximately 40-acre area known as the Stables/Horse Pasture which is slated for transfer to the public. Probable land use for the Stables/Horse Pasture area is public recreational land.

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 guide for determining site-specific risk-based target cleanup levels for the GMY 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 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 are necessary to delineate localized areas that exceed 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 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-SAI standards for one or more COCs (OT3905SA, OT3907SA, and OT3912SA).
- **Type 2:** Areas that exceed only the GWP-SAI standards for one or more COCs (OT3904SA, OT3909SA, OT3911SA, and OT3928SA).

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 – SAI 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 Groundwater Protection for Industrial use (GWP-SAI) (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 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 depths of 2-4 feet (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: $C_{SOIL} > GWP-Ind$

An SPLP analysis will be conducted on the sample and the results shall be compared to GW-Ind. This may 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 for levels of analytes of concern and the results will again be compared to the GWP-Ind RRS 2 (repeat entire process). The comparison will again result in either case 1(a) or case 1(b).

Case 2: $C_{SOIL} < GWP-Ind$

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

Therefore, 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 excavations, eight surface soil samples from 0-2 ft bgs will be collected at distances 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. Visual inspection of the area around former sample location OT3912SA will also be taken into consideration to determine the lateral extent of the excavation since soil staining was observed in this area near the diesel above ground storage tank. The above procedure will require the collection of samples at multiple distances from the original sampling location, 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(a): $C_{SPLP} < GW-Ind$

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

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 compared to the GWP-Ind 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. Since the likelihood of this event is unknown at this time, these samples were not included in the sample matrix in Table 3-1.

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 8 GW-Ind at 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 section, 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>
SVOCs, Herbicides, Pesticides	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.

25 204

456 26A

**Revised Final Work Plan Addendum
Carswell AFB, TX**

**Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 3-6**

This page intentionally left blank.

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.

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 4-2

This page intentionally left blank.

.5.0 PROJECT MANAGEMENT

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

This page intentionally left blank.

Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
Page 6-1

6.0 PROJECT SCHEDULE

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

456 29A

Revised Final Work Plan Addendum

Carswell AFB, TX

Risk-Based Assessment, Management, and Closure of Grounds Maintenance Yard (AOC 5)

Contract #F41624-95-D-8003 / Delivery Order 0023

March 1999

Page 7-2

This page intentionally left blank.

7.0 REFERENCES

A.T. Kearney, 1989, *RCRA Facility Assessment, Preliminary Review/Visual Site Inspection*.

CH2M Hill, 1984, *Installation Restoration Program Records Search for Carswell Air Force Base*.

Jacobs Engineering Group Inc., 1997, *Draft Basewide Background Study, Volume 1*.

Jacobs Engineering Group Inc., 1997, *Draft Letter Report, Results of Sampling at the Grounds Maintenance Yard, NAS Fort Worth, Texas*.

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

LAW Environmental, Inc., 1996, *Installation Restoration Program Final Site Investigation / Site Characterization Technical Report for the Aerospace Museum Site and Grounds Maintenance Yard for NAS Fort Worth, Carswell Field, Texas*.

Radian Corporation, 1986, *Installation Restoration Program Phase II, Confirmation / Quantification, Stage I, Volume I-Final Report*.

Radian Corporation, 1989, *Installation Restoration Program RI/FS, Stage II, Draft Final Technical Report, Carswell Air Force Base, Volume I*.

Texas Natural Resource Conservation Commission, 1993, Texas Administrative Code, Chapter 335 Industrial Solid Waste and Municipal Hazardous Waste, Risk Reduction Standards, Subchapters A and S.

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

United Services of Texas, Inc., *Final Report, Demolition and Removal of Structures/ Disposal of Transformers with PCB Oil*.

U.S. Air Force Center for Environmental Excellence, 1993, *The AFCEE Handbook for Installation Restoration Program Remedial Investigation and Feasibility Studies*.

TABLES

TABLE 2-1 [Page 1 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
<u>Metals (SW6010/3050/7440/7471/7060/7420)</u>						
Aluminum	OT3922SA	10800	50	150000	3700	22035
Arsenic	OT3907SA	169	0.5	20	15	5.85
Barium	OT3911SA	183	2	9100	200	233
Beryllium	OT3930SA	0.742	0.3	46	0.4	1.02
Calcium	OT3906SA	296000	5	NA	NA	167788
Cadmium	OT3911SA	<0.959	1	140	0.5	0.556
Chromium	OT3905SA	32.7	5	330	10	25.86
Cobalt	OT3917SA	3.94	5	15000	220	11.05
Copper	OT3906SA	24.8	5	10000	130	17.37
Iron	OT3901SA	10800	5	NA	NA	17717
Magnesium	OT3929SA	3140	25	NA	NA	3003
Manganese	OT3911SA	493	1	16000	170	849.1
Molybdenum	OT3914SA	<4.64	5	1100	18	NM
Sodium	OT3917SA	550	25	NA	NA	37300

TABLE 2-1 [Page 2 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Thallium	OT3911SA	<24	25	20	0.2	NM
Vanadium	OT3902SA	17.4	5	480	26	46.26
Silver	OT3911SA	<4.8	5	470	18	0.213
Zinc	OT3911SAdup	122	60	59000	1100	38.8
Potassium	OT3929SA	2290	60	NA	NA	2895
Lead	OT3928SA	86	0.5	500	1.5	30.97
Antimony	OT3922SA	3.17	25	72	0.6	NM
Selenium	OT3903SA	<2.35	0.5	1300	5	0.907
Mercury	OT3912SA	<0.302	0.185	0.11	0.2	0.14
	Proxy	0.302	0.185	0.11	0.2	0.14
Nickel	OT3911SA	257	5	1900	10	14.6
<u>Pesticides (SW8080)</u>						
4,4'-DDD	OT3928SA	0.0342	0.00333	2.5	0.0355	-
4,4'-DDE	OT3928SA	0.143	0.00333	1.7	0.025	-
4,4'-DDT	OT3928SA	0.176	0.00333	1.7	0.025	-

TABLE 2-1 [Page 3 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
AR-1016	OT3907SA	<0.0414	0.0333	6.3	0.2	-
AR-1221	OT3913SA	<0.0427	0.0333	6.3	0.2	-
AR-1232	OT3913SA	<0.0427	0.0333	6.3	0.2	-
AR-1242	OT3913SA	<0.0427	0.0333	6.3	0.2	-
AR-1248	OT3913SA	<0.0427	0.0333	6.3	0.2	-
AR-1254	OT3916SA	0.181	0.0333	6.3	0.2	-
Dieldrin	OT3926SA	0.00331	0.00556	0.032	0.00532	-
Methoxychlor	OT3928SA	0.0129	0.0166	770	4	-
Chlordane	OT3920SA	0.11	0.0166	1.6	0.2	-
Endosulfan I	OT3913SA	<0.00214	0.00166	930	22	-
Endosulfan II	OT3913SA	<0.00171	0.00133	NA	NA	-
Endosulfan sulfate	OT3913SA	<0.00427	0.00333	NA	NA	-
Endrin	OT3913SA	<0.00256	0.002	2.1	0.2	-
Endrin Aldehyde	OT3913SA	<0.00427	0.00333	NA	NA	-
Heptachlor Epoxide	OT3913SA	<0.00214	0.00166	0.056	0.02	-

TABLE 2-1 (Page 4 of 12)

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

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Heptachlor	OT3913SA	<0.00128	0.000999	0.096	0.04	--
Methoxychlor	OT3913SA	<0.0214	0.0166	770	4	--
Toxaphene	OT3913SA	<0.0854	0.0666	0.46	0.3	--
alpha-BHC	OT3913SA	<0.00128	0.000999	NA	NA	--
beta-BHC	OT3913SA	<0.00214	0.00166	NA	NA	--
delta-BHC	OT3913SA	<0.00214	0.00166	NA	NA	--
gamma-BHC	OT3913SA	<0.00171	0.00133	NA	NA	--
<u>Chlorinated Herbicides (SW8151)</u>						
2,4,5-T	OT3913SA	<0.00508	0.004	NA	NA	--
2,4,5-TP (Silvex)	OT3913SA	<0.00508	0.004	NA	NA	--
2,4-D	OT3913SA	<0.00508	0.004	NA	NA	--
2,4-DB	OT3913SA	<0.0762	0.06	NA	NA	--
Dalapon	OT3913SA	<0.178	0.14	NA	NA	--
Dicamba	OT3913SA	<0.00508	0.004	4600	110	--

TABLE 2-1 [Page 5 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Dichloroprop	OT3913SA	<0.0508	0.04	NA	NA	-
Dinoseb	OT3913SA	<0.0178	0.014	150	0.7	-
MCPA	OT3913SA	<3.81	3	NA	NA	-
MCPP	OT3905SA	4.05	3	NA	NA	-
<u>VOCs (SW8240/3550)</u>						
1,1,1-Trichloroethane	OT3923SA	<0.00635	0.005	2300	20	-
1,1,2,2-Tetrachloroethane	OT3923SA	<0.00635	0.005	5.1	0.43	-
1,1,2-Trichloroethane	OT3923SA	<0.00635	0.005	9.7	0.5	-
1,1-Dichloroethane	OT3923SA	<0.00635	0.005	27000	370	-
1,1-Dichloroethene	OT3923SA	<0.00635	0.005	0.6	0.7	-
1,2-Dichloroethane	OT3923SA	<0.00635	0.005	0.27	0.5	-
1,2-Dichloropropane	OT3923SA	<0.00635	0.005	9.4	0.5	-
2-Butanone	OT3917SA	0.0266	0.01	NA	NA	-
2-Chloroethylvinylether	OT3923SA	<0.0127	0.01	NA	NA	-
2-Hexanone	OT3923SA	<0.0127	0.01	NA	NA	-

TABLE 2-1 [Page 6 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
4-Methyl-2-pentanone	OT3923SA	<0.0127	0.01	NA	NA	-
Acetone	OT3917SA	0.107	0.01	21000	370	-
Benzene	OT3923SA	<0.00635	0.005	0.86	0.5	-
Bromodichloromethane	OT3923SA	<0.00635	0.005	10	10	-
Bromoform	OT3923SA	<0.00635	0.005	34	10	-
Bromomethane	OT3923SA	<0.00635	0.01	3.5	5.11	-
Carbon disulfide	OT3923SA	<0.00635	0.005	1000	370	-
Carbon tetrachloride	OT3923SA	<0.00635	0.005	0.35	0.5	-
Chlorobenzene	OT3923SA	<0.00635	0.005	5500	10	-
Chloroethane	OT3923SA	<0.0127	0.01	11000	1500	-
Chloroform	OT3923SA	<0.00635	0.005	0.31	10	-
Chloromethane	OT3923SA	<0.0127	0.01	2.3	6.6	-
Dibromochloromethane	OT3923SA	<0.00635	0.005	76	10	-
Ethylbenzene	OT3923SA	<0.00635	0.005	4300	70	-

TABLE 2-1 [Page 7 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Methylene Chloride	OT3921SA	0.0271	0.005	8.7	0.5	--
Styrene	OT3923SA	<0.00635	0.005	13000	10	--
Tetrachloroethene	OT3930SA	0.00358	0.005	6	0.5	--
Toluene	OT3925SA	0.0336	0.005	1700	100	--
Trichloroethene	OT3923SA	<0.00635	0.005	3.7	0.5	--
Vinyl acetate	OT3923SA	<0.0127	0.01	570	3700	--
Vinyl chloride	OT3923SA	<0.0127	0.01	0.0041	0.2	--
Xylenes (total)	OT3917SA	0.00296	0.005	2500	1000	--
cis-1,2-Dichloroethene	OT3923SA	<0.00635	0.005	2700	7	--
cis-1,3-Dichloropropene	OT3923SA	<0.00635	0.005	NA	NA	--
trans-1,2-Dichloroethene	OT3923SA	<0.00635	0.005	5500	10	--
trans-1,3-Dichloropropene	OT3923SA	<0.00635	0.005	NA	NA	--
SVOCs (SW8270/3550)						
1,2,4-Trichlorobenzene	OT3912SA	<20.4	0.333	1400	7	--
	Proxy	0	0.333	1400	7	--
1,2-Dichlorobenzene	OT3912SA	<20.4	0.333	25000	60	--

TABLE 2-1 (Page 8 of 12)
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
1,3-Dichlorobenzene	Proxy OT3912SA	0 <20.4	0.333 0.333	25000 NA	60 NA	-
1,4-Dichlorobenzene	OT3912SA	<20.4	0.333	270	7.5	-
2,4,5-Trichlorophenol	Proxy OT3912SA	0 <40.8	0.333 0.667	270 15000	7.5 370	-
2,4,6-Trichlorophenol	Proxy OT3912SA	0 <20.4	0.667 0.333	15000 46	370 0.774	-
2,4-Dichlorophenol	Proxy OT3912SA	0.2 <20.4	0.333 0.333	46 460	0.774 11	-
2,4-Dimethylphenol	Proxy OT3912SA	0 <20.4	0.333 0.333	460 3100	11 73	-
2,4-Dinitrophenol	Proxy OT3912SA	0 <102	0.333 1.67	3100 310	73 7.3	-
2,4-Dinitrotoluene	Proxy OT3912SA	1 <20.4	1.67 0.333	310 0.75	7.3 0.013	-
2,6-Dinitrotoluene	Proxy OT3912SA	0.2 <20.4	0.333 0.333	0.75 0.75	0.013 0.013	-
2-Chloronaphthalene	Proxy OT3912SA	0.2 <20.4	0.333 0.333	0.75 11000	0.013 290	-
2-Chlorophenol	Proxy OT3912SA	0 <20.4	0.333 0.333	11000 1400	290 18	-
2-Methylnaphthalene	Proxy OT3906SA	0 12.2	0.333 0.333	1400 5500	18 150	-
2-Methylphenol	OT3912SA	<20.4	0.333	NA	NA	-
2-Nitroaniline	OT3912SA	<102	1.67	NA	NA	-

TABLE 2-1 [Page 9 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
2-Nitrophenol	OT3912SA	<20.4	0.333	NA	NA	-
3,3'-Dichlorobenzidine	OT3912SA	<40.8	0.667	1.1	0.019	-
	Proxy	0.8	0.667	1.1	0.019	-
3-Nitroaniline	OT3912SA	<102	1.67	NA	NA	-
4,6-Dinitro-2-methylphenol	OT3912SA	<102	1.67	NA	NA	-
4-Bromophenyl phenyl ether	OT3912SA	<20.4	0.333	NA	NA	-
4-Chloro-3-methylphenol	OT3912SA	<20.4	0.333	NA	NA	-
4-Chloroaniline	OT3912SA	<40.8	0.667	NA	NA	-
4-Chlorophenyl phenyl ether	OT3912SA	<20.4	0.333	NA	NA	-
4-Methylphenol	OT3912SA	<20.4	0.333	NA	NA	-
4-Nitroaniline	OT3912SA	<102	1.67	NA	NA	-
4-Nitrophenol	OT3912SA	<102	1.67	NA	NA	-
Acenaphthene	OT3912SA	<20.4	0.333	8200	220	-
Acenaphthylene	Proxy	0	0.333	8200	220	-
	OT3912SA	<20.4	0.333	8200	220	-
Anthracene	Proxy	0	0.333	8200	220	-
	OT3905SA	0.57	0.333	41000	1100	-
Benz(a)anthracene	OT3905SA	3.98	0.333	0.65	0.012*	-

TABLE 2-1 [Page 10 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Benzo(a)pyrene	OT3905SA	4.58	0.333	0.065	0.02*	--
Benzo(b)fluoranthene	OT3905SA	6.11	0.333	0.65	0.012*	--
Benzo(g,h,i)perylene	OT3905SA	3.48	0.333	4100	110*	--
Benzo(k)fluoranthene	OT3905SA	2.11	0.333	6.5	0.12*	--
Benzoic Acid	OT3912SA Proxy	<102 0	1.67 1.67	620000 620000	15000 15000	-- --
Benzyl alcohol	OT3912SA Proxy	<40.8 0	0.667 0.667	46000 46000	1100 1100	-- --
Butyl benzyl phthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	31000 31000	730 730	-- --
Chrysene	OT3905SA	3.51	0.333	65	1.2	--
Di-n-butylphthalate	OT3905SA Proxy	0.07 0	0.333 0.333	15000 15000	370 370	-- --
Di-n-octylphthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	3100 3100	73 73	-- --
Dibenz(a,h)anthracene	OT3905SA	0.93	0.333	0.065	0.0012*	--
Dibenzofuran	OT3912SA	<20.4	0.333	NA	NA	--
Diethylphthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	120000 120000	2900 2900	-- --
Dimethylphthalate	OT3912SA	<20.4	0.333	NA	NA	--

TABLE 2-1 [Page 10 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Benzo(a)pyrene	OT3905SA	4.58	0.333	0.065	0.02*	-
Benzo(b)fluoranthene	OT3905SA	6.11	0.333	0.65	0.012*	-
Benzo(g,h,i)perylene	OT3905SA	3.48	0.333	4100	110*	-
Benzo(k)fluoranthene	OT3905SA	2.11	0.333	6.5	0.12*	-
Benzoic Acid	OT3912SA Proxy	<102 0	1.67 1.67	620000 620000	15000 15000	-
Benzyl alcohol	OT3912SA Proxy	<40.8 0	0.667 0.667	46000 46000	1100 1100	-
Butyl benzyl phthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	31000 31000	730 730	-
Chrysene	OT3905SA	3.51	0.333	65	1.2	-
Di-n-butylphthalate	OT3905SA Proxy	0.07 0	0.333 0.333	15000 15000	370 370	-
Di-n-octylphthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	3100 3100	73 73	-
Dibenz(a,h)anthracene	OT3905SA	0.93	0.333	0.065	0.0012*	-
Dibenzofuran	OT3912SA	<20.4	0.333	NA	NA	-
Diethylphthalate	OT3912SA Proxy	<20.4 0	0.333 0.333	120000 120000	2900 2900	-
Dimethylphthalate	OT3912SA	<20.4	0.333	NA	NA	-

TABLE 2-1 [Page 11 of 12]
 MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
Fluoranthene	OT3905SA	4.83	0.333	5500	150	-
Fluorene	OT3912SA	2.53	0.333	5500	150	-
Hexachlorobenzene	OT3912SA	<20.4	0.333	0.26	0.1	-
	Proxy	0.4	0.333	0.26	0.1	-
Hexachlorobutadiene	OT3912SA	<20.4	0.333	16	0.73	-
	Proxy	0.2	0.333	16	0.73	-
Hexachlorocyclopentadiene	OT3912SA	<20.4	0.333	3.6	5	-
	Proxy	0	0.333	3.6	5	-
Hexachloroethane	OT3912SA	<20.4	0.333	150	3.7	-
	Proxy	0	0.333	150	3.7	-
Indeno(1,2,3-cd)pyrene	OT3905SA	3.01	0.333	0.65	0.012*	-
Isophorone	OT3912SA	<20.4	0.333	5300	90	-
	Proxy	0	0.333	5300	90	-
Napthalene	OT3912SA	3.27	0.333	600	150	-
Nitrobenzene	OT3912SA	<20.4	0.333	77	1.8	-
	Proxy	0.2	0.333	77	1.8	-
Pentachlorophenol	OT3912SA	<61.3	1	3.2	0.1	-
	Proxy	1.2	1	3.2	0.1	-
Phenanthrene	OT3912SA	5	0.333	4100	110	-
Phenol	OT3912SA	<20.4	0.333	93000	2200	-
	Proxy	0	0.333	93000	2200	-
Pyrene	OT3905SA	6.29	0.333	4100	110	-
bis(2-Chloroethoxy)methane	OT3912SA	<20.4	0.333	NA	NA	-

TABLE 2-1 [Page 12 of 12]
**MAXIMUM SITE CONCENTRATIONS AT THE GMY (OCT 1995)
 COMPARED TO PQLs, RRS 2 MSCs, AND BASEWIDE BACKGROUND LEVELS**

Analyte	Sample	Maximum [mg/kg]	PQL [mg/kg]	SAI-Res ¹ [mg/kg]	GWP-Res ² [mg/kg]	Background ³ [mg/kg]
bis(2-Chloroethyl)ether	OT3912SA	<20.4	0.333	0.15	0.00774	-
	Proxy	0.4	0.333	0.15	0.00774	-
bis(2-Chloroisopropyl)ether	OT3912SA	<20.4	0.333	6200	150	-
	Proxy	0	0.333	6200	150	-
bis(2-Ethylhexyl)phthalate	OT3905SA	2.35	0.333	19	0.6	-
	Proxy	0.2	0.333	19	0.6	-
n-Nitrosodi-n-propylamine	OT3912SA	<20.4	0.333	0.045	0.00122	-
	Proxy	0.4	0.333	0.045	0.00122	-
n-Nitrosodiphenylamine	OT3912SA	<20.4	0.333	64	1.7	-
	Proxy	0.4	0.333	64	1.7	-

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

2 MSC for soil protective of groundwater (residential)

3 Basewide Background

exceeded by maximum concentration

NA - no MSCs published or developed

Values in **BOLD** are applicable RRS 2. In cases where only 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.

- levels are assumed to be non-detect

TABLE 2-2 (Page 1 of 2)
 CONSTITUENTS OF CONCERN EXCEEDING RRS 2 MSCs AT THE GMY

Chemical/ Metal	Sample	Concentration [mg/kg]	PQL [mg/kg]	RRS 2 MSCs [mg/kg]	Basewide Background
Ingestion of Soil, Inhalation of Vapors and Particulates, and Dermal Contact with Soil					
Metals					
Arsenic	OT3907SA	169	0.5	20	5.85
Mercury	OT3912SAp	0.302	0.185	0.11	0.14
SVOCs					
Hexachlorobenzene	OT3912SAp	0.8	0.333	0.26	NA
bis(2-Chloroethyl)ether	OT3912SAp	0.4	0.333	0.15	NA
n-Nitrosodi-n-propylamine	OT3912SAp	0.4	0.333	0.045	NA
Benz(a)anthracene	OT3905SA	3.98	0.333	0.65	NA
Benzo(a)pyrene	OT3905SA	4.58	0.333	0.065	NA
	OT3907SA	0.667	0.333	0.065	NA
	OT3912SAp	0.4	0.333	0.065	NA
Benzo(b)fluoranthene	OT3905SA	6.11	0.333	0.65	NA
Dibenz(a,h)anthracene	OT3905SA	0.93	0.333	0.065	NA
	OT3912SAp	0.4	0.333	0.065	NA
Indeno(1,2,3-cd)pyrene	OT3905SA	3.01	0.333	0.65	NA
Protection of Groundwater					
Metals					
Arsenic	OT3907SA*	169	0.5	5	5.85
	OT3921SA*	14.2	0.5	5	5.85
Mercury	OT3912SAp	0.302	0.185	0.2	0.14
Lead	OT3928SA	86	0.5	1.5	30.97
	OT3905SA	71.9	0.5	1.5	30.97
	OT3907SA*	44.6	0.5	1.5	30.97
	OT3920SA*	46.7	0.5	1.5	30.97
	OT3923SA*	33.1	0.5	1.5	30.97
Nickel	OT3911SA	267	5	10	14.6
	OT3904SA	235	5	10	14.6
	OT3905SA*	242	5	10	14.6
	OT3906SA*	153	5	10	14.6
	OT3907SA*	239	5	10	14.6
OT3908SA*	243	5	10	14.6	
Chromium	OT3905SA	32.7	5	10	25.86
Pesticides					
4,4'-DDE	OT3928SA	0.143	0.00133	0.025	NA
	OT3920SA*	0.043	0.00133	0.025	NA
4,4'-DDT	OT3928SA	0.178	0.00333	0.025	NA
Dieldrin	OT3926SA*	0.0033 f	0.000666	0.000532	NA
SVOCs					
Hexachlorobenzene	OT3912SAp	0.4	0.333	0.1	NA
bis(2-Chloroethyl)ether	OT3912SAp	0.4	0.333	0.00774	NA
n-Nitrosodi-n-propylamine	OT3912SAp	0.4	0.333	0.00122	NA
Benz(a)anthracene	OT3905SA	3.98	0.333	0.012	NA
	OT3907SA	0.62	0.333	0.012	NA
	OT3912SAp	0.40	0.333	0.012	NA

TABLE 2-2 [Page 2 of 2]
 CONSTITUENTS OF CONCERN EXCEEDING RRS 2 MSCs AT THE GMY

Chemical/ Metal	Sample	Concentration [mg/kg]	PQL [mg/kg]	RRS 2 MSCa [mg/kg]	Basewide Background
Benzo(a)pyrene	OT3905SA	4.58	0.333	0.02	NA
	OT3907SA	0.667	0.333	0.02	NA
	OT3912SAp	0.4	0.333	0.02	NA
Benzo(b)fluoranthene	OT3905SA	5.11	0.333	0.012	NA
	OT3907SA	0.668	0.333	0.012	NA
	OT3909SA	0.488	0.333	0.012	NA
	OT3912SAp	0.40	0.333	0.012	NA
Benzo(k)fluoranthene	OT3905SA	2.11	0.333	0.12	NA
	OT3907SA	0.513	0.333	0.12	NA
	OT3912SAp	0.40	0.333	0.12	NA
Dibenz(a,h)anthracene	OT3905SA	0.93	0.333	0.0012	NA
	OT3912SAp	0.40	0.333	0.0012	NA
Chrysene	OT3905SA	3.51	0.333	1.2	NA
Indeno(1,2,3-cd)pyrene	OT3905SA	3.01	0.333	0.012	NA
	OT3907SA	0.362	0.333	0.012	NA
	OT3912SAp	0.40	0.333	0.012	NA
bis(2-Ethylhexyl)phthalate	OT3905SA	2.35	0.333	0.6	NA

p indicates proxy value assigned in accordance with TNRC memo dated July 23, 1988.

* locations where SPLP results were below RRS 2-GW

 shaded box = remaining constituents of concern

TABLE 2-3 [Page 1 of 2]
 SPLP CONCENTRATIONS AT THE GMY (MAY 1997)
 COMPARED TO PQLs AND RRS 2 GROUNDWATER MSCs

Analyte	Sample*	Maximum [mg/L]	PQL [mg/L]	GW-Res [mg/L]
<u>Metals</u>				
Arsenic	All 1997	<0.049	0.1	0.05
Beryllium**	GMY-017	0.0166	0.03	0.004
Chromium	All 1997	<0.089	0.2	0.1
Lead	GMY-002	0.0238	0.05	0.015
Antimony	All 1997	<0.02	0.05	0.006
Nickel	All 1997	<0.02	0.1	0.1
<u>Pesticides</u>				
Aldrin	All 1997	<0.000016	0.0002	0.000005
alpha-BHC	All 1997	<0.000038	0.0001	NA
beta-BHC	All 1997	<0.0000210	0.0001	NA
delta-BHC	All 1997	<0.000007	0.0001	NA
gamma-BHC	All 1997	<0.000033	0.0001	0.002
alpha-Chlordane	All 1997	<0.000008	0.0001	0.002
gamma-Chlordane	All 1997	<0.000004	0.0001	0.002
4,4'-DDD	All 1997	<0.000022	0.0002	0.000355
4,4'-DDE	All 1997	<0.00001	0.0002	0.00025
4,4'-DDT	All 1997	<0.000015	0.0002	0.00025
Dieldrin	All 1997	<0.000024	0.0002	0.0000053
Endosulfan I	All 1997	<0.000014	0.0001	0.00183

TABLE 2-3 [Page 2 of 2]

**SPLP CONCENTRATIONS AT THE GMY (MAY 1997)
COMPARED TO PQLs AND RRS 2 GROUNDWATER MSCs**

Analyte	Sample*	Maximum [mg/L]	PQL [mg/L]	GW-Res [mg/L]
Endosulfan II	All 1997	<0.000008	0.0002	0.00183
Endosulfan sulfate	All 1997	<0.0000730	0.0002	0.00183
Endrin	GMY-017	0.0000714	0.0002	0.002
Endrin Aldehyde	All 1997	<0.000012	0.0002	NA
Heptachlor Epoxide	All 1997	<0.000006	0.0001	0.0002
Heptachlor	All 1997	<0.000032	0.0001	0.0004
Methoxychlor	All 1997	<0.000096	0.0008	0.04
Toxaphene	All 1997	<0.000349	0.001	0.003
PCBs				
PCB-1016	All 1997	<0.00022	0.001	0.005
PCB-1221	All 1997	<0.00021	0.001	0.005
PCB-1232	All 1997	<0.00024	0.001	0.005
PCB-1242	All 1997	<0.00018	0.001	0.005
PCB-1248	All 1997	<0.00033	0.001	0.005
PCB-1254	All 1997	<0.00018	0.001	0.005
PCB-1260	All 1997	<0.00012	0.001	0.005

☐ exceeded by maximum concentration

* all samples were prepared by the Standard Method 1312, Synthetic Precipitation Leaching Procedure

** Beryllium was detected in all field blanks, hence the results are inconclusive

GW-Res protective of ingestion of groundwater

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

Analytes	TYPE 1 AREAS						TYPE 2 AREAS							
	OT3905SA		OT3907SA		OT3912SA		OT3904SA		OT3909SA		OT3911SA		OT3928SA	
	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res	SAI-Res	GWP-Res
Arsenic														
Mercury														
Lead		x												x
Nickel														
4,4'-DDE														x
4,4'-DDT														x
Hexachlorobenzene														
bis(2-Chloroethoxy)ether														
n-Nitrosodi-n-propylamine														
Benz(a)anthracene														
Benzo(a)pyrene														
Benzo(b)fluoranthene														
Benzo(k)fluoranthene														
Dibenz(a,h)anthracene														
Chrysene														
Indeno(1,2,3-cd)pyrene														
bis(2-Ethylhexyl)phthalate														

X Exceeds the relevant standard

GWP-Res Soil protective of groundwater standard

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

TYPE 1: Exceed SAI-Res and GWP-Res

TYPE 2: Exceed GWP-Res

**TABLE 3-1
SUMMARY OF PROPOSED SAMPLING ACTIVITY AT THE GMY**

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				
OT3905SA	Soil	Lead	SW 7421	1	1	1				1	5	
	Soil	SVOCs	SW 8270B	1	1	1	4	4		1	13	
OT3907SA	Soil	Arsenic	SW 6020	1	1	1	4	4		2	14	
		SVOCs	SW 8270B	1	1	1	4	4		1	13	
OT3912SA	Soil	Mercury	SW 7470/7471	1	1	1	4	4		2	14	
		SVOCs	SW 8270B	1	1	1	4	4		1	12	
OT3904SA	Soil	Nickel	SW 6010A	1	1	1				1	5	
OT3909SA	Soil	SVOCs	SW 8270B	1	1	1				1	4	
OT3911SA	Soil	Nickel	SW 6010A	1	1	1					3	
OT3928SA	Soil	Lead	SW 7421	1	1	1				1	4	
		4,4'-DDE/4,4'-DDT	SW 8080A	1	1	1				1	5	
Subtotal											92	
Equipment											4	
Ambient											Not required	0
Trip											Not required	0
Total											96	

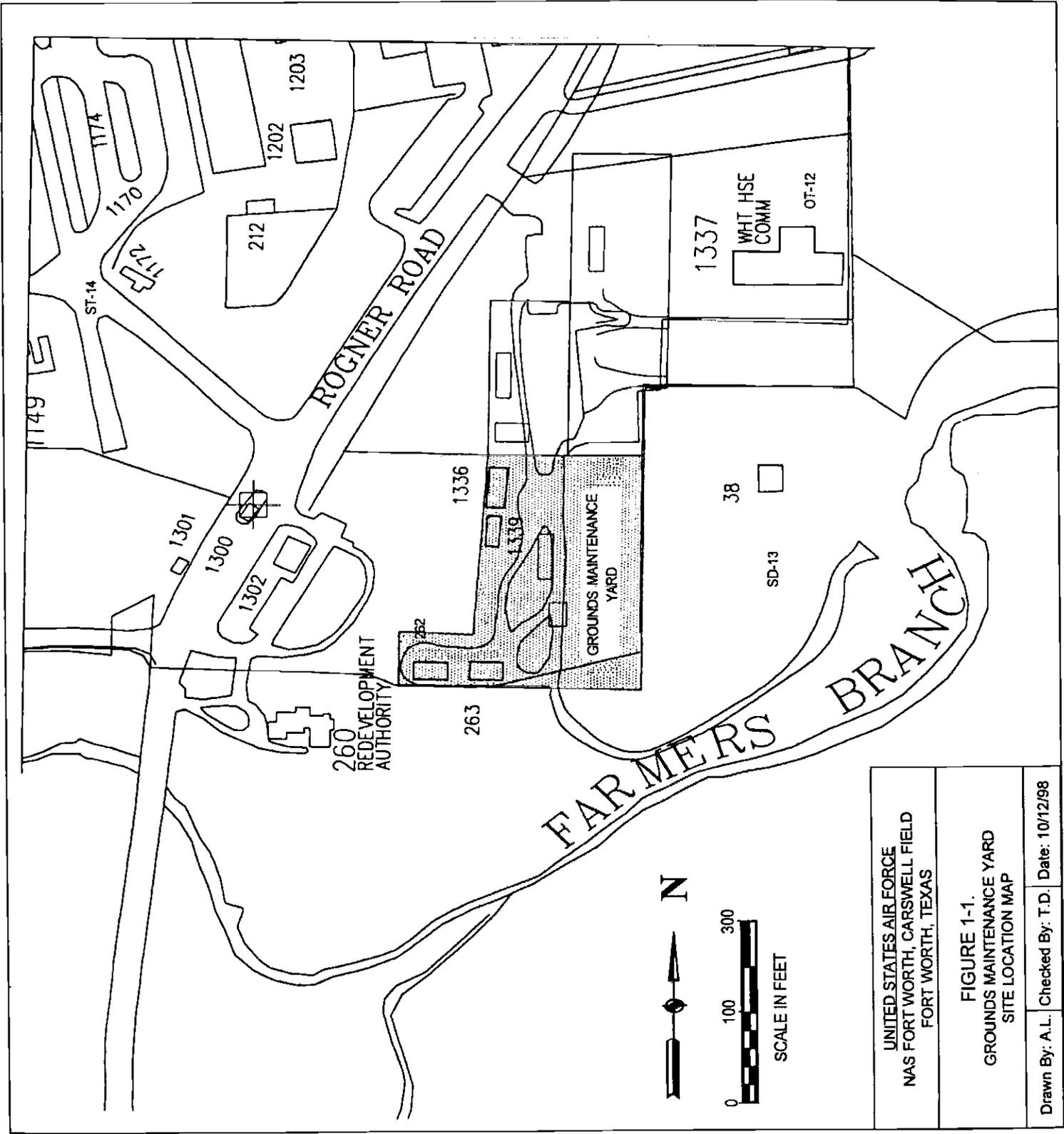
* These samples will be collected in a 10 ft or 15 ft radius (north, south, east, west) for local horizontal delineation

** MS/MSD Matrix Spike/Matrix Spike Duplicate

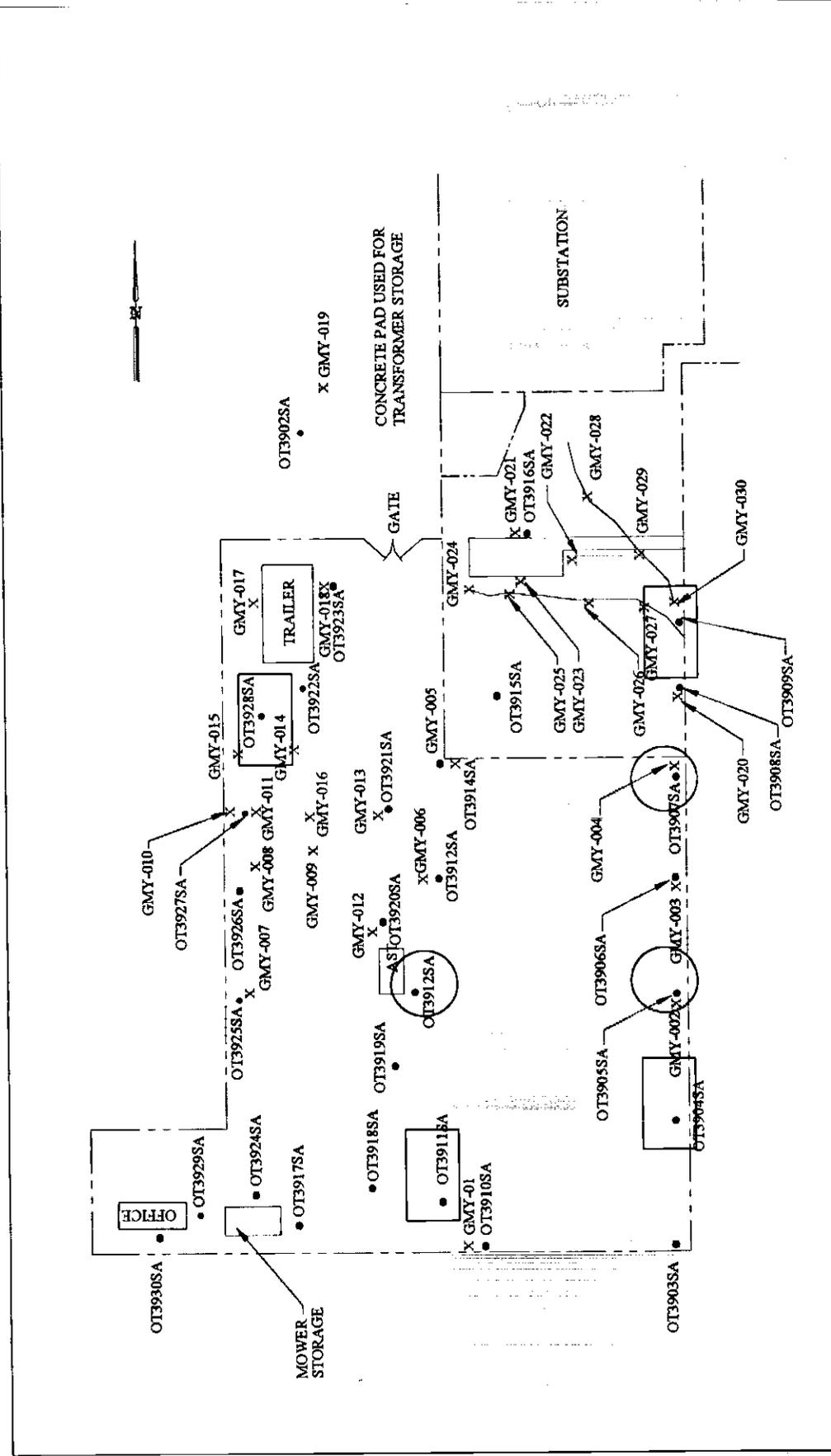
Note: Soil samples may be analyzed for SPLP (EPA Method 1312) if required, as discussed in Section 3.6.

Note: Soil samples collected at 4-6 and 6-8 foot depths will only be analyzed if RRS2 is exceeded on the 2-4 foot samples Duplicate numbers are reflective of the total number of possible samples. Blue denotes SPLP only analyses. Red denotes Total Levels analyses.

FIGURES



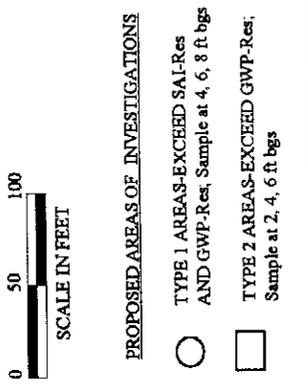
UNITED STATES AIR FORCE NAS FORT WORTH, CARSWELL FIELD FORT WORTH, TEXAS		
FIGURE 1-1. GROUNDS MAINTENANCE YARD SITE LOCATION MAP		
Drawn By: A.L.	Checked By: T.D.	Date: 10/12/98



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

FIGURE 3-1.
 PREVIOUS SAMPLING LOCATIONS &
 PROPOSED AREAS OF INVESTIGATION AT GMY

Drawn By: L.G. Checked By: T.D. Date: 10/09/98



LEGEND

- ORIGINAL INVESTIGATION (OCTOBER 1995)
- CONFIRMATION SAMPLING (MAY 1997)
- ~ INTERMITTENT DRAINAGE
- - - FENCE LINE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE