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FIELD INVESTIGATION SAMPLING AND REMOVAL OF INSTALLATION RESTORATION PROGRAM DRUMS FINAL ASSESSMENT WITH TRANSMITTAL LETTER NAS FORT WORTH TX
9/1/1994
LAW ENGINEERING AND ENVIRONMENTAL

NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 238

11-3517-0115

INSTALLATION RESTORATION PROGRAM (IRP)
FIELD INVESTIGATION, SAMPLING AND REMOVAL OF IRP DRUMS

FINAL ASSESSMENT REPORT

Carswell Air Force Base, Fort Worth, Texas

September 1994

Final

PREPARED FOR

AIR FORCE BASE CONVERSION AGENCY (AFBCA/OL-H)
CARSWELL AIR FORCE BASE, TEXAS 76127

UNITED STATES AIR FORCE
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
BASE CLOSURE RESTORATION DIVISION (HQ AFCEE/ERB)
BROOKS AIR FORCE BASE, TEXAS 78235-5328

September 23, 1994

Air Force Center for Environmental Excellence
HQ AFCEE/ESB
8001 Inner Circle Drive
Suite 2
Brooks Air Force Base, TX 78235-5328

Attention: Mr. Chris Hobbins (Team Chief)

Subject: **Carswell Air Force Base**
Field Investigation, Sampling, and Removal of IRP Drums
Final Assessment Report
Contract No. F33615-90-D-4008
Delivery Order No. 0015
Law Project No. 11-3517-0115

Dear Mr. Hobbins:

Law Environmental, Inc., Government Services Division is pleased to submit the enclosed eight copies of the Final Assessment Report for Field Investigation, Sampling, and Removal of IRP Drums to the Air Force Center for Environmental Excellence (AFCEE) for approval. Also enclosed is one camera ready copy of the Final Assessment Report.

If you have questions or comments, please contact us at (404) 499-6800.

Sincerely,

LAW ENVIRONMENTAL, INC.

John F. O'Brien
Project Manager

E. Fred Sharpe, Jr., P.E.
Principal

JFO/EFS:nap

3517-0115.09

INSTALLATION RESTORATION PROGRAM (IRP)

FIELD INVESTIGATION, SAMPLING, AND REMOVAL OF IRP DRUMS

FINAL ASSESSMENT REPORT

FOR

CARSWELL AFB

FORT WORTH, TEXAS 76127-5000

September 1994

Prepared by:

Law Environmental, Inc.

114 TownPark Drive

Kennesaw, Georgia 30144

CONTRACTOR CONTRACT NO. F33615-90-D-4008 DELIVERY ORDER NO. 0015

United States Air Force
Air Force Center for Environmental Excellence
Base Closure Restoration Division (HQ AFCEE/ESB)
Brooks Air Force Base, Texas 78235-5328
Mr. Chris Hobbins (HQ AFCEE/ESB)

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This Final Assessment Report has been prepared for the United States Air Force by Law Environmental, Inc., (LAW) for the purpose of aiding in the implementation of a final remedial action plan under the Air Force Installation Restoration Program (IRP). As the report relates to actual or possible releases of potentially hazardous substances, its release prior to an Air Force final decision on remedial action may be in the public's interest. The limited objectives associated with this document and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this document, since subsequent facts may become known which may make this document premature or inaccurate. Acceptance of this document in performance of the contract under which it is prepared does not mean that the United States Air Force adopts the conclusions, recommendations or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of the United States Air Force.

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REPORT DOCUMENTATION PAGE

Form Approved OMB No. 0704-0188 238 5

1. AGENCY USE ONLY (*Leave blank*)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	SEPTEMBER 1994	FINAL

4. TITLE AND SUBTITLE
INSTALLATION RESTORATION PROGRAM
FIELD INVESTIGATION, SAMPLING AND REMOVAL OF IRP DRUMS
WORK PLAN ADDENDUM

5. FUNDING NUMBERS
CONTRACT NO.
F33615-90-D-4008/0015

6. AUTHOR(S)
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8. PERFORMING ORGANIZATION REPORT NUMBER
(N/A)

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AIR FORCE CENTER FOR ENVIRONMENTAL EXCELLENCE
ENVIRONMENTAL RESTORATION DIVISION (AFCEE/ESRT)
BROOKS AFB, TEXAS 78235-5000

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
(N/A)

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT
APPROVED FOR PUBLIC RELEASE;
DISTRIBUTION UNLIMITED

12b. DISTRIBUTION CODE

13. ABSTRACT (*Maximum 200 words*)

LAW ENVIRONMENTAL INC., (LAW), WILL CONDUCT A FIELD INVESTIGATION OF STORAGE DRUMS LOCATED AT CARSWELL AIR FORCE BASE, TEXAS, UNDER THE AIR FORCE INSTALLATION RESTORATION PROGRAM (IRP). THE PROJECT FOLLOWS THE REQUIREMENTS OF IRP AND THE WORK DESCRIBED IN THIS WORK PLAN ADDENDUM IS DESIGNED TO PROPERLY CONFIRM THE IDENTIFICATION AND QUANTITY OF DRUMMED MATERIAL AND DISPOSE OF THE DRUMMED MATERIAL IN ACCORDANCE WITH APPROPRIATE GUIDANCE AND REGULATIONS. IN ADDITION, SOIL ASSOCIATED WITH THE STORAGE OF DRUMS AT BUILDING 1337 WILL BE INVESTIGATED TO EVALUATE THE PRESENCE OR ABSENCE OF CONTAMINANTS USING SOIL BORINGS AND CHEMICAL ANALYSES.

14. SUBJECT TERMS
FIELD INVESTIGATION, SAMPLING AND REMOVAL OF IRP DRUMS

15. NUMBER OF PAGES
25

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED	UL

PREFACE

Law Environmental, Inc., (LAW) was contracted by the U.S. Air Force Center For Environmental Excellence (AFCEE) to perform a field investigation and disposal of stored 55-gallon drums containing materials from oil/water separator maintenance and subsurface investigations at Carswell AFB, Texas. The primary objectives of this field investigation were to:

1. Sample and characterize the contents of storage drums for disposal located at Building 1337 Storage Yard. The Building 1337 storage drums contained investigative derived waste (IDW) as a result of past Installation Restoration Program (IRP) investigations conducted at the Carswell AFB facility.

2. Based on the results of the drum characterization, arrange for the proper transportation and disposal of the Building 1337 drummed material.

3. Drill three soil borings in the Building 1337 Storage Yard to collect soil samples for chemical analysis. Based on the results of the soil analysis, assess whether the storage drums located at Building 1337 released contaminants to site soils.

4. Arrange for proper transportation and disposal of drummed oil/water separator sludge originating from oil/water separator sludge disposal operations. The drummed oil/water separator sludge was stored at Buildings 1190 and 1346.

Mr. John O'Brien is the Project Manager for this investigation. Members of the field team were selected prior to commencement of field activities.

This Assessment Report was prepared by the LAW project team for Carswell AFB and reviewed by Mr. John O'Brien and Mr. Fred Sharpe. The efforts of Mr. Chris Hobbins (AFCEE Team Chief) and personnel at Carswell AFB are greatly appreciated.

John F. O'Brien
Project Manager

E. Fred Sharpe, Jr., P.E.
Principal

Louis S. Karably, P.E.
Program Manager

LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	American Society for Testing and Materials
CDAP	Chemical Data Acquisition Plan
CME	Central Mining Equipment
DOD	Department of Defense
DQE	Data Quality Evaluation
DQO	Data Quality Objective
GC/ECD	Gas Chromatograph/Electron Capture Detector
GC/MS	Gas Chromatography/Mass Spectroscopy
GC/FID	Gas Chromatograph/Flame Ionization Detector
GC	Gas Chromatograph
GFAA	Graphite Furnace Atomic Absorption
GWP-Ind	Soil-to-Ground Water Cross-media Protection Concentration
HTW	Hazardous Toxic Waste
ICP	Inductively Coupled Plasma Atomic Emission Spectroscopy
ID	Inner Diameter
IDW	Investigative Derived Wastes
IRP	Installation Restoration Program
LAW	Law Environmental, Inc.
LCS	Laboratory Control Sampler
LENL	Law Environmental National Laboratories
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDL	Method Detection Limit
MS	Matrix Spike
MSCs	Medium Specific Concentrations
MSD	Matrix Spike Duplicate
OSWER	Office of Solid Waste and Emergency Response
PARCC	Precision, Accuracy, Representativeness, Completeness, and Comparability

LIST OF ACRONYMS AND ABBREVIATIONS
(Continued)

PID	Photoionization Detector
POL	Petroleum, Oils, and Lubricants
PPE	Personal Protective Equipment
PQL	Practical Quantification Limit
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RPD	Relative Percent Difference
SAI-Ind	Soil/Air and Ingestion Standard for Industrial Land Use
SB	Soil Boring
SOP	Standard Operating Procedures
SOW	Statement of Work
TNRCC	Texas Natural Resource Conservation Commission
TRPH	Total Recoverable Petroleum Hydrocarbons
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USDA	United States Department of Agriculture
USGS	United States Geological Survey
VOC	Volatile Organic Compound

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EXECUTIVE SUMMARY

The drummed material stored at Buildings 1337, 1190, and 1346 were identified as non-hazardous material, except for the five drums of "benzene" contaminated drums stored at Building 1346, which was determined to be hazardous due to the presence of elevated levels of benzene. The storage drums were characterized, transported, and disposed in accordance with federal and state regulations.

The results of the soil sampling conducted at the Building 1337 Storage Yard indicate volatile organic compounds and metals are present in site soil. Based on comparison of soil constituent concentrations to the Texas Risk Reduction Standards, volatile organic compounds do not present a risk to human health or the environment. However, the concentration of metals detected (i.e., arsenic, cadmium, lead, and nickel) compared to the Texas Risk Reduction Standards were found to exceed Medium-Specific Concentrations (MSC) and therefore pose a potential health-based risk.

Further soil sample collection and analysis is recommended to more clearly define the horizontal and vertical extent of metal contamination at the Building 1337 Storage Yard.

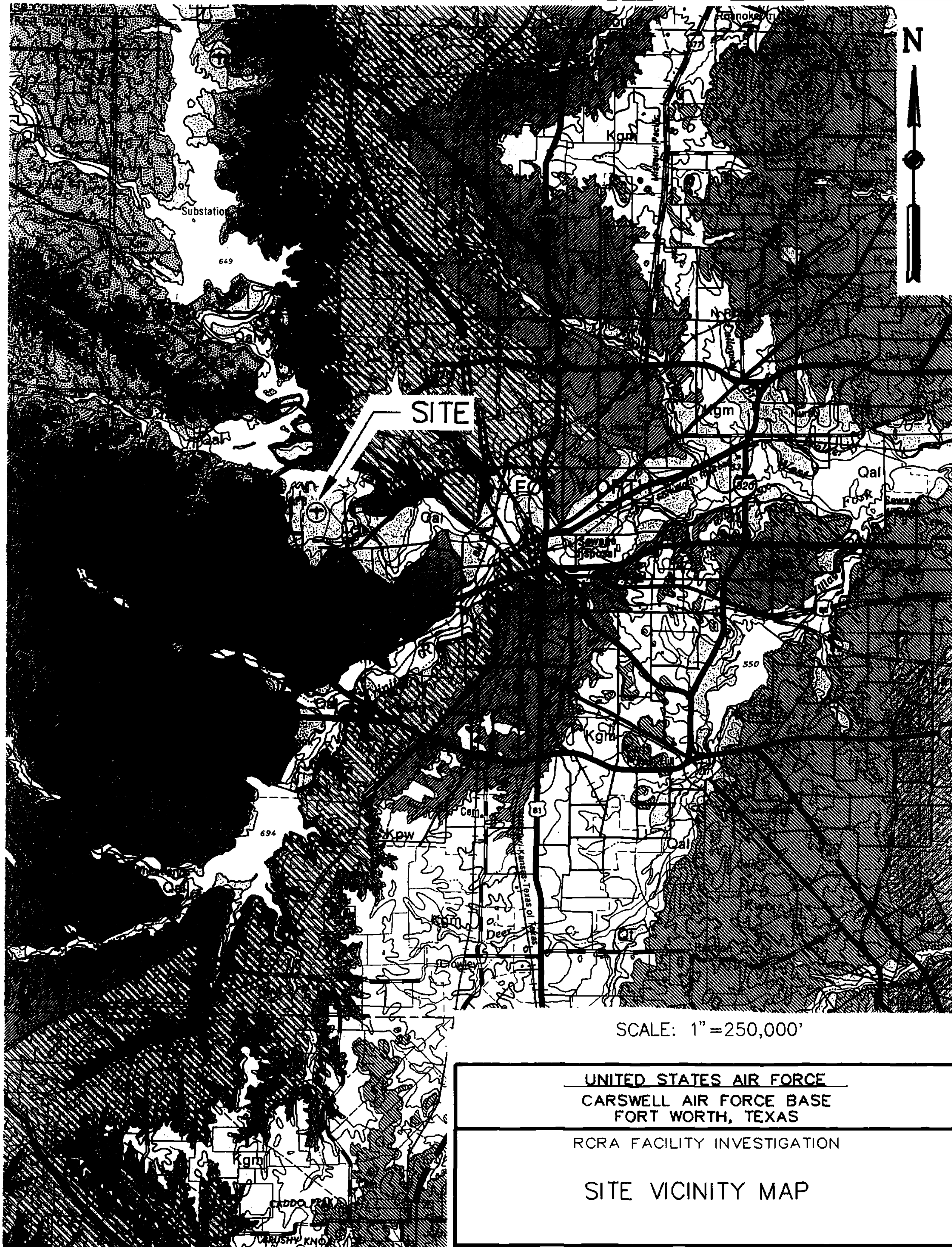
1.0 INTRODUCTION

Law Environmental, Inc., (LAW) was contracted by the U.S. Air Force Center for Environmental Excellence (AFCEE) to perform an environmental assessment at Carswell Air Force Base (Carswell AFB), Terrance County, Texas (Figure 1-1). The environmental assessment was conducted in response to the Statement of Work (SOW) dated September 13, 1993, under Delivery Order No. 0015, Contract No. F33615-90-D-4008.

1.1 PROJECT OBJECTIVES

The environmental assessment was developed to investigate, sample, and dispose of storage drums containing investigative derived waste (IDW) located at the Building 1337 Storage Yard, the Building 1190 Storage Yard, and within Building 1347 (Figure 1-2). The primary objectives of the environmental assessment are listed below:

- Sample and characterize the contents of storage drums located at Building 1337 Storage Yard for disposal. The Building 1337 storage drums contained investigative derived waste (IDW) resulting from past Installation Restoration Program (IRP) investigations conducted at the Carswell AFB facility.
- Based on the results of the waste characterization, arrange for the proper transportation and disposal of the Building 1337 drummed material.
- Arrange for proper transportation and disposal of drummed material from previous oil/water separator sludge disposal operations. The drummed material was stored at Buildings 1190 and 1347.
- Drill three soil borings in the Building 1337 Storage Yard to collect soil samples for chemical analysis. Based on the results of the soil analysis, assess whether the storage drums located at Building 1337 released contaminants to site soils.



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UNITED STATES AIR FORCE

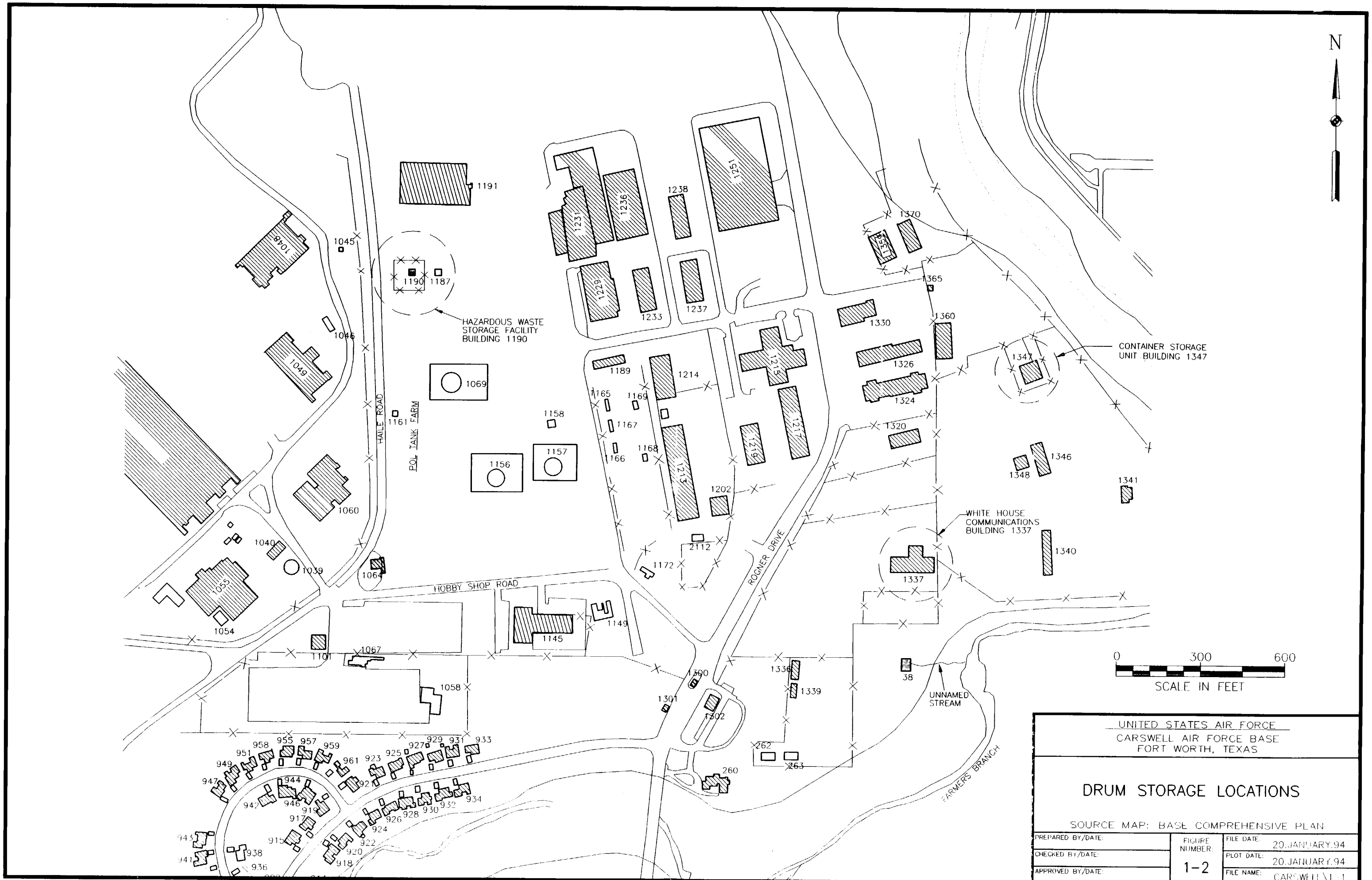
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

RCRA FACILITY INVESTIGATION

SITE VICINITY MAP

PREPARED BY/DATE: TDM 30 AUG 94	FIGURE NUMBER: 1-1	FILE DATE: 30 AUGUST 94
CHECKED BY/DATE: TDM 30 AUG 94		PLOT DATE: 30 AUGUST 94
APPROVED BY/DATE: EFS 9 SEP 94		FILE NAME: CARSWELL\SITVIC

SOURCE: GEOLOGIC ATLAS OF TEXAS, DALLAS SHEET, 1987, BUREAU OF ECONOMIC GEOLOGY, THE UNIVERSITY OF AUSTIN, TEXAS



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UNITED STATES AIR FORCE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

DRUM STORAGE LOCATIONS

SOURCE MAP: BASE COMPREHENSIVE PLAN

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CHECKED BY/DATE:		PLOT DATE: 20 JANUARY 94
APPROVED BY/DATE:		FILE NAME: CARSWELL\1_1

1.2 PROJECT APPROACH

The project was performed in general accordance with project specific health and safety plan (LAW, 1993), work plan addendum (LAW, 1994a), and sampling and analysis plan addendum (LAW, 1994b). The approaches and activities conducted during the course of this assessment were implemented in five stages, as follows:

1. Site visit to review available IRP records and interview Carswell AFB personnel regarding age, origin, and contents of drummed material.

2. Site visit to collect samples of IDW for identification via analytical testing.

3. Compilation of available information, including analytical data, to identify and select appropriate disposal options and disposal facilities based on waste type and disposal costs.

4. Site visit to install three soil borings and collect six soil samples to assess whether constituents of concern originating from the IDW storage drums have been released into Building 1337 Storage Yard soil.

5. Complete arrangements for IDW drum transportation and acceptance for disposal. Package, pickup, and transport IDW to disposal facility.

1.3 ORGANIZATION OF REPORT

The Assessment Report has been generated to assemble and integrate data obtained during this soil investigation and disposal of the drummed materials stored at Buildings 1137, 1190, and 1347. The report is arranged according to the following sections:

EXECUTIVE SUMMARY - Summarizes the purpose, approach, and results of the assessment.

1.0 INTRODUCTION - Discusses the project objective, approach and report organization.

2.0 SITE SETTING - Discusses the physical characteristics of the areas under study.

3.0 PROJECT ACTIVITIES AND METHODOLOGIES - Describes the tasks performed during this environmental assessment.

4.0 INVESTIGATIVE RESULTS - Discusses the analytical results and conclusions obtained from the investigation

5.0 COMPARISON OF ANALYTICAL DATA WITH REGULATORY STANDARDS - Discusses the comparison between chemical constituents detected on site and the Texas Risk Reduction Standards.

6.0 CONCLUSIONS and RECOMMENDATIONS - Provides conclusions with respect to the environmental condition of the site based on information obtained during the investigation. Also, provides recommendations for further actions.

2.0 SITE SETTING

This section summarizes the site setting of Carswell Air Force Base (Carswell AFB) and specifically the Building 1337 Storage Yard area.

2.1 GEOLOGY

The majority of Carswell AFB is covered by Quaternary terrace deposits of the Trinity River (Barnes, 1988). The terrace deposits are composed of sand, silt, clay, and gravel of variable thickness and lateral extent. The terrace deposits are underlain Cretaceous limestones. The uppermost limestone in the southeastern portion of the base is the Goodland Formation. The Goodland Formation is a chalky white fossiliferous limestone and marl. Below the Goodland Limestone is the Walnut Formation, a coquinoidal limestone with variable quantities of clay and shale. Below the Walnut Formation is the Paluxy Formation, a fine to coarse grain sand with minor quantities of clay, sandy clay, pyrite, lignite, and shale. The regional dip of the rocks in the vicinity of Carswell AFB ranges from 35 to 40 feet per mile to the east to southeast.

2.2 HYDROGEOLOGY

The three uppermost hydrogeological units identified at Carswell AFB are as follows:

- A perched water zone occupying the Quaternary terrace deposits of the Trinity River
- An aquitard consisting of predominantly unsaturated limestone of the Goodland and Walnut Creek Formations
- The Paluxy Sands

The Quaternary terrace deposits which form the perched-water zone are composed of sand, silt, clay, and gravel. Ground water is first encountered within the perched-water zone at depths ranging from approximately 5 to 15 feet below the ground surface. Annual ground-water fluctuations are typically on the order of 5 feet. Recharge to the perched-water zone is from rainfall and infiltration from stream channels and drainage ditches.

The perched-water zone in the Quaternary terrace deposits is separated from the underlying aquifers by the low permeability limestone and shale of the Goodland and Walnut Formations. Although primarily dry, drillers in the area have reported small quantities of water in the Walnut Formation, indicating that ground water may move through the Goodland and Walnut Formations along fractures and bedding planes. The thickness of the Goodland/Walnut Formations is approximately 25 feet or greater beneath most of the base. However, the top of the formations is an erosional surface and weathering may locally reduce the thickness of the formations. In areas of greater erosion, the Quaternary terrace deposits may be in contact with the Paluxy Formation.

The Paluxy Formation forms the shallowest bedrock aquifer beneath Carswell AFB. Ground water within the Paluxy Formation normally occurs under confined conditions beneath the aquitard of the Goodland/Walnut Formations at depths of approximately 100 feet below ground surface (450 feet above mean sea level) along the eastern portion of the base. Extensive pumping of ground water in the Fort Worth area has lowered the potentiometric surface within the Paluxy Aquifer beneath the top of the formation, resulting in unconfined conditions of the aquifer in the area of Carswell AFB.

The Paluxy Formation is divided into upper and lower sand members and the aquifer is likewise divided into upper and lower aquifers. The upper sand is fine grained and shaley, while the lower sand is coarser; therefore, most water-production wells are screened in the

lower section of the aquifer (USACE, 1991). In the Vicinity of Carswell AFB, the Paluxy Aquifer is recharged from surface outcrops of the formation west of Carswell AFB and from outcrops north of the base located under Lake Worth.

2.3 BUILDING 1337 STORAGE YARD

Building 1337 is located in the southeastern portion of Carswell AFB. Drums of investigative derived waste (IDW) generated during past installation Restoration Program (IRP) investigations were stored at the Building 1337 Storage Yard (Figure 2-1). The site is bordered to the west by the Abandoned Gasoline Station and to the south by the Unnamed Stream, both of which are included in the SD13 IRP Site. The Building 1337 Storage Yard is a fenced area approximately 270 feet long by 110 feet wide.

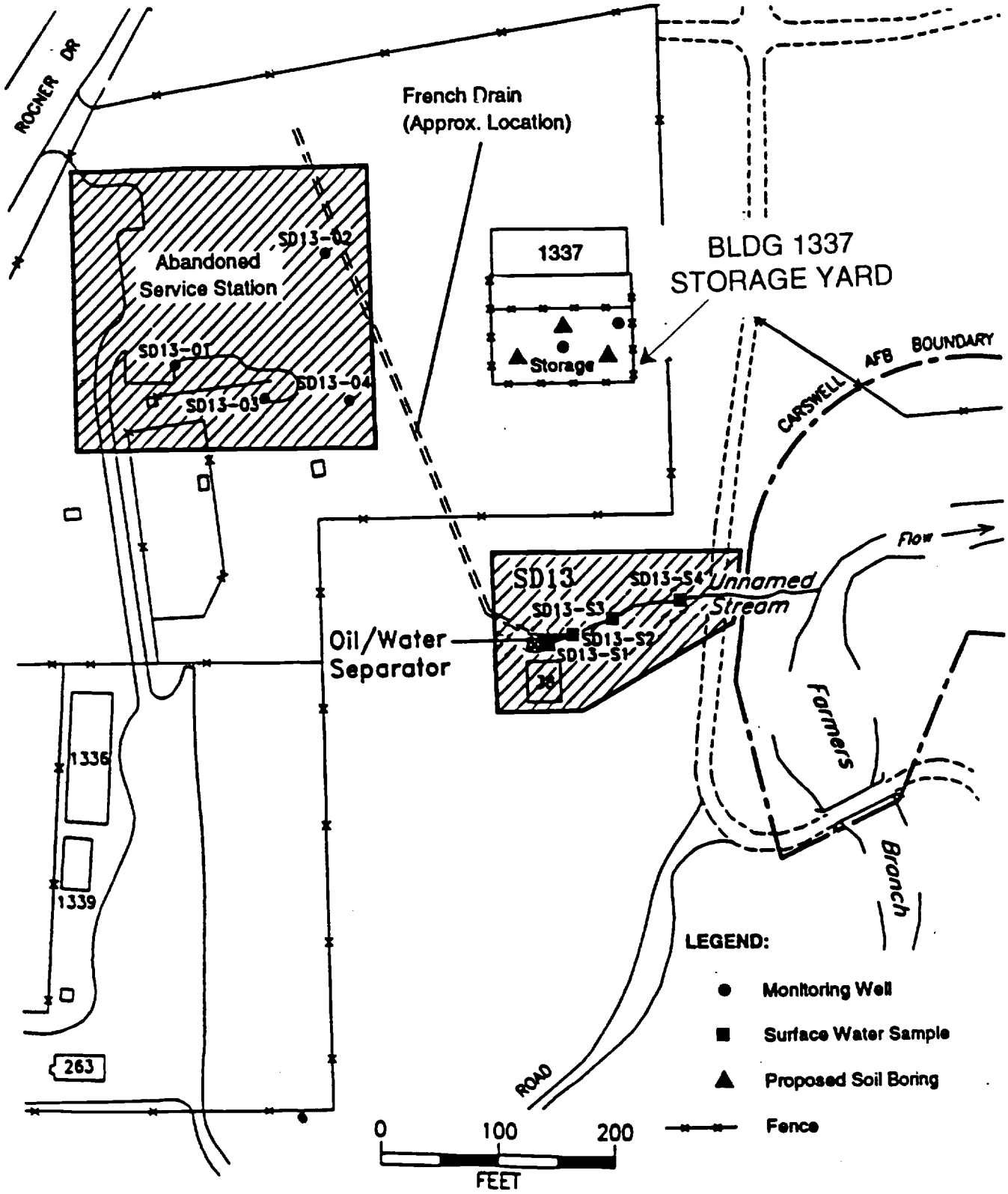
The Building 1337 Storage Yard is approximately 564 feet above mean sea level and slopes to the south and southeast toward Farmers Branch. The Goodland Limestone outcrops approximately 200 feet east of the 1337 Storage Yard in the Farmers Branch Creek. Groundwater flow in the vicinity of the 1337 Storage area appears to be to the southeast towards Farmers Branch.

FIGURE 2-1

BUILDING 1337 STORAGE YARD
LOCATION OF SOIL BORINGS

(AFTER RADIAN, 1991a)

CARSWELL AIR FORCE BASE, TEXAS



Source Geraghty & Miller, Inc.

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3.0 PROJECT ACTIVITIES AND METHODOLOGIES

3.1 PURPOSE OF FIELD ACTIVITIES

Field activities associated with the sampling and characterization of drummed IDW stored at Buildings 1337, 1190, and 1347 were conducted to identify the IDW for disposal of the material in accordance with federal and state of Texas regulations. Soil borings were advanced within the Building 1337 Storage Yard to collect subsurface soil samples for chemical analysis to determine whether drummed IDW material had been released into site soil.

3.2 FIELD ACTIVITIES AND METHODOLOGIES

This section of the report discusses the field activities and methods used during this project to characterize the drummed IDW material and collect soil samples for chemical analysis.

3.2.1 Drum Disposal Program

The following sections discuss the activities that led to the disposal of stored IDW drums and drum contents located at Carswell AFB Buildings 1337, 1190, and 1347.

3.2.1.1 Data Collection - LAW interviewed Carswell AFB personnel, reviewed available Installation Restoration Program (IRP) documents provided by Carswell AFB, and compiled information from the interviews and documents to identify and generally characterize the drummed material for idenfification of applicable disposal options.

Prospective disposal facilities and the Texas Natural Resources Conservation Commission (TNRCC) were contacted to clarify the type of information and data required to transport and dispose of the

IDW in accordance with state and federal regulations. The project sampling and analysis plan (SAP) Addendum (LAW, 1994a) describes the methodology and protocols to provide chemical analytical data for disposal.

3.2.1.2 Sampling and Analysis - In May 1994 LAW personnel collected samples of IDW stored in drums at Building 1337 and shipped the samples to APPL, Inc., of Fresno, California for a full scan Toxicity Characteristics Leaching Procedure (TCLP) analysis of water and soil. The results of the TCLP analyses are attached in Appendix A. A sample of the sludge collected from Building 1347 was also collected and analyzed by Top Tech International for benzene. The results of the benzene analysis are also attached in Appendix A.

3.2.1.3 Disposal - IDW disposal activities consisted of the following :

- Waste characterization documentation was submitted to disposal facilities and TNRCC for authorization to dispose.
- The sludge drums stored at Building 1190 were opened and the contents were vacuumed into a tank truck for transportation to the disposal facility. Empty sludge drums from Building 1190 were triple rinsed. The rinse water was collected, vacuumed into the tank truck and transported by Effluent Treatment Services, Inc., for disposal at their facility at 1401 Bradley, Halton City, Texas. After the sludge drums were rinsed, the lids were secured and the empty drums were stored at Building 1190.
- At Building 1347, 6 drums (250 gallons) of sludge exhibiting levels of benzene above 5 mg/L were picked up and transported by J.B. Hunt, Inc., for disposal at Marine Shale Processors, Inc., at 9282 Highway 90 East in Morgan City, Louisiana. See Appendix B for copies of the hazardous waste manifest for these drums.

- The 1,997 gallons of water stored in the IRP drums in Building 1337 Storage Yard was vacuumed into a tanker truck and disposed of at Effluent Treatment Services, Inc., located at 1401 Bradley, Halton City, Texas. 27.03 tons of soil was removed from the IRP drums and collected in a dump truck, along with 4.55 tons of crushed drums, for disposal at the Laidlaw landfill at 2100 A Minnis Drive, Fort Worth, Texas. See Appendix B for copies of the non-hazardous waste manifests documenting the disposal of the IRP IDW and crushed drums.

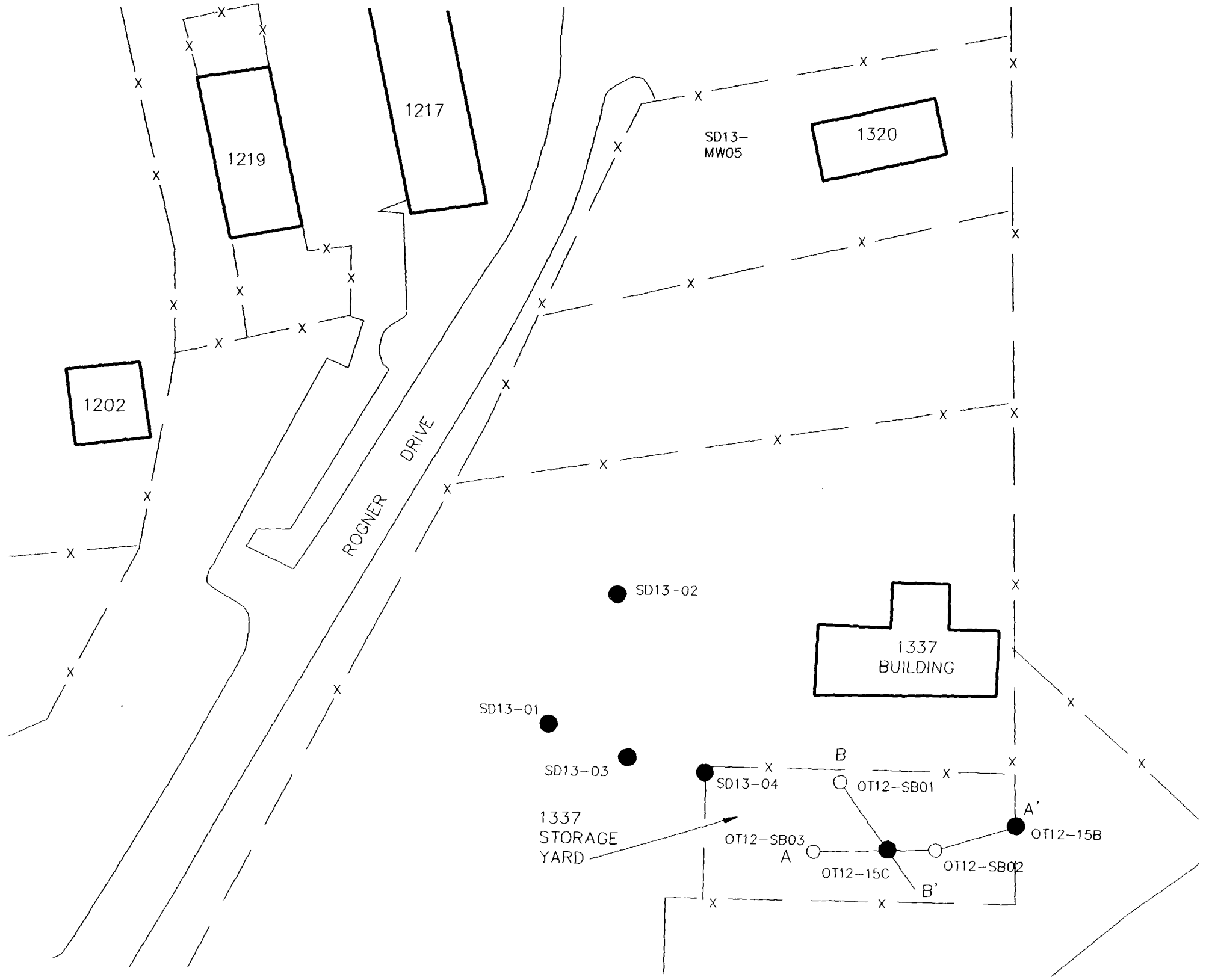
3.2.2 Soil Boring Program

This section describes the procedures used to advance soil borings and to sample soil from the soil borings installed at the Building 1337 Storage Yard.

3.2.2.1 Soil Boring Installation - Soil borings at the Building 1337 Storage Yard were advanced following procedures outlined in the project Work Plans (LAW, 1994a, 1994b) and approved by AFCEE. Soil boring procedures included advancing soil borings with 6.25-inch inner diameter (ID) augers and continuous sample collection with 3.0-inch ID split spoon samplers with California brass rings. To reduce the volume of IDW (soil cuttings), LAW and AFCEE agreed to modify the soil boring techniques by eliminating the use of the hollow stem augers and pushing the split spoon sampler directly into the soil. Because the split spoon sampler was pushed into the soil, standard penetration tests (SPT) were not conducted.

On March 26, 1994, three soil borings (OT12-SB01 through OT12-SB03) were advanced in the Building 1337 Storage Yard (Figure 3-1). Each boring was advanced to the saturated zone or to refusal. The depths of the borings ranged from 6 feet below the ground surface (OT12-SB02 and OT12-SB03) to 7 feet below the ground surface (OT12-SB01). The soil boring operations were observed by an on-site

238 26



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LEGEND

● SD13-02	LOCATION OF PRE-EXISTING GROUND WATER MONITORING WELL
SD13-MW05	LOCATION OF GROUND WATER MONITORING WELL INSTALLED BY LAW
OT12-SB01○	LOCATION OF SOIL BORING

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SCALE IN FEET

UNITED STATES AIR FORCE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

CROSS-SECTION LOCATION MAP

BUILDING 1337

DATE: 18. JUNE. 94
PROJECT No. 11-3517-0121
FIGURE NUMBER: FIGURE 3-1

geologist. The geologist logged the subsurface conditions encountered in the borings and recorded the information on soil boring logs (Appendix C). The soils were classified using the Unified Soil Classification System (ASTM D 2488-69).

3.2.2.2 Soil Sampling and Analysis - The soil borings were advanced using a 24-inch long, carbon steel split barrel sampler which encased four 6-inch long California brass rings. In each soil boring, a decontaminated split spoon sampler was advanced 2 feet, the split spoon sampler was then removed from the boring, placed on aluminum foil, and opened. The brass rings were spaced approximately 2-inches apart and initial photoionization detector (PID) readings were obtained from between each brass ring. The soils encountered were logged by the on-site geologist, the upper most brass ring was removed, and the remaining brass rings were wrapped in aluminum foil and allowed to equilibrate to atmospheric conditions for approximately 15 minutes. After allowing the soil samples to equilibrate, a second set of PID readings were obtained. After field screening, the brass rings were sealed with a Teflon liner and a plastic cap encasing the soil in the brass rings. The sampling activities were repeated at each boring location until saturated soil or refusal was encountered.

Two sets of soil samples were retained from each soil boring for chemical analysis. In soil boring OT12-SB01, the soil sample with the highest PID reading (3- to 5-foot interval) and the sample from the boring termination (5- to 7-foot interval) were retained. In soil boring OT12-SB02, three soil samples were collected. However, the recovery of the uppermost sample was only 25 percent due to the presence of a thin concrete layer from 2.0 to 2.4 feet below the ground surface. Therefore, the soil samples from the 3- to 5-foot interval and from the boring termination (5- to 6-foot interval) were retained. In the third boring, OT12-SB03, the uppermost soil sample (0- to 2-foot interval) was retained because of the

observation of black tar-like bands in the soil. Additionally, the soil sample from the boring termination (4- to 6-foot interval) was retained. Because of wet weather conditions during the boring operations for OT12-SB02 and OT12-SB03, the PIDs failed and the soil samples from these borings were not field screened. Refer to soil boring logs, Appendix C, for PID readings.

For each of the six soil samples retained for laboratory analysis, the middle 6-inch brass ring was sent to the laboratory for volatile organic analysis. Soil from the remaining two brass rings was removed from the brass rings and placed into a stainless steel mixing bowl, thoroughly mixed with a stainless steel spoon, and placed into the appropriate laboratory sample containers.

The soil samples were transported under chain-of-custody protocol via overnight courier to Law Environmental National Laboratories in Pensacola, Florida. The soil samples were analyzed for metals by EPA Method SW3050/SW6010 and for volatile organic compounds by EPA Method SW8240. Additional information on the laboratory methodology is presented in Section 3.3. The results of the laboratory analyses are presented in Section 4.0. The sampling equipment was decontaminated prior to each use in accordance with the SAP Addendum (LAW, 1994a).

3.2.3 Management of Investigation Derived Waste

Soil investigation activities conducted for this project generated soil cuttings from soil boring activities and wash water from personnel and equipment decontamination.

IDW material generated during the field investigation was placed in 55-gallon storage drums and labelled with the following information:

- Date accumulation began
- Site identification
- Drum contents

3.3 LABORATORY AND DATA ACQUISITION ACTIVITIES

A total of six field samples and associated Quality Assurance/Quality Control (QA/QC) samples were collected and analyzed. Descriptions of the data quality objectives (DQOs), analytical methodologies, the analytical quality control requirements, and an evaluation of the quality of the data with respect to presence or absence of contamination are presented in the following sections.

3.3.1 Data Quality Objectives

The DQOs for the soil investigation at Building 1337 were determined based on the intended use of the data as explained in Section 1.1. Precision, accuracy, representativeness, completeness, and comparability (PARCC) parameters were evaluated as described in Section 1.4 of the Carswell AFB Sampling and Analysis Plan (SAP) Addendum (LAW, 1994a). Carswell AFB, AFCEE, and LAW use the data generated to determine if soil contamination occurred due to drum storage at Building 1337 Storage Yard. Based on the results of this investigation and the recommendations specified by LAW, Carswell AFB and the AFCEE representatives will decide on further action for this site.

3.3.2 Analytical Methodologies

The analytical methods used for the soils program are listed below.

· Volatile Organic Compounds	SW8240
· ICP Screen for Metals	SW3050/SW6010

The methods were selected to assess whether constituents of concern had been released from the drums stored at the Building 1337 Storage Yard. Analytical procedures are described in section 1.8 of the SAP Addendum (LAW, 1994a).

3.3.3 Analytical Quality Control

The quality control requirements and the reporting limits applicable to volatile organic and metal analysis are listed in Appendix A of the SAP Addendum (LAW, 1994a).

3.3.4 Data Quality Evaluation

Data quality was evaluated through the collection and analysis of field QC samples including trip blanks, equipment rinsates, duplicate samples, and ambient condition blanks. In addition, method-specific laboratory QC criteria, including method blanks, matrix spike (MS) and matrix spike duplicate (MSD) samples, surrogate recoveries (for volatile organic), internal standard recoveries (for volatile organic), laboratory control samples (LCS), extraction and analytical hold times and calibration data for each sample were evaluated. The results of these data quality procedures were then reviewed with respect to the DQOs established in the SAP Addendum and the usability of the data was determined. The analytical data summary is presented in Appendix D.

3.3.4.1 Data Quality Evaluation of Volatile Organic Compounds - Volatile organic compounds were analyzed by EPA Method SW 8240. All method-specific quality control for laboratory data evaluation were met including MS/MSD recoveries, surrogate recoveries, internal standards, LCS recoveries, and sample preparation and analysis. Hold times for the initial analysis were met for samples analyzed except for sample OT12-SB03C. OT12-SB03C was analyzed

initially at a five time dilution due to odor and color; however, all target compounds were below the raised detection limits. The laboratory reanalyzed the sample 3 days out of analytical hold time criteria. All results for reanalysis of OT12-SB03C were flagged "J" (estimated based on QC data).

The positive analytical results are below the method detection limits for all compounds except Toluene and Acetone. The possible impact is described below.

Compound	Concentration		PQL	MDL
1,1,1 Trichloroethane	0.0044	J	0.005	0.005
Acetone	0.037	J	0.01	0.01
Xylene	0.0044	J	0.005	0.005
Toluene	0.014	J	0.005	0.005
Ethylbenzene	0.041	J	0.005	0.005

The positive analytical results are estimated due to the exceedance of hold time criteria. In addition, all compounds, except toluene and acetone are below the method detection limit (MDL). These values may have been positive above the MDL had they been analyzed within hold time criteria. However, these speculated positive values would not be expected to be more than an order of magnitude above the MDL. These reported values are below the MDL, which leads me to question whether or not these values should be reported by the laboratory. In this case, however, the estimated values are acceptable, given that they are considerably below risk values listed on Tables 5-1 and 5-2.

Initial calibration and tuning criteria for volatile organics were acceptable for all six samples. The continuing calibration percent difference for 2-chloroethyl-vinyl-ether was outside of acceptance criteria range. All 2-chloroethyl-vinyl-ether results were flagged "J" (estimated based on QC data).

To evaluate the field sampling accuracy and precision, an equipment blank (EB1-260394), a trip blank (TB1-260394), an ambient condition blank (AB1-260394), and field duplicate sample (OT12-SBDP1) were examined. Equipment blanks and ambient condition blanks were free of target volatile compounds. Field sample OT12-SB02B and its field duplicate sample OT12-SBDP1 were in good agreement for all target volatile compounds. Methylene chloride was detected in TB1-260394 at 13 micrograms per liter (μg/L). Associated positive results for methylene chloride which were less than five times the value detected in the trip blank were flagged "JH" (estimated quantitation - possibly biased high based on QC data).

3.3.4.2 Data Quality Evaluation of Metals - Metals were analyzed by EPA Method SW 6010. Extraction and analytical hold times were met for each sample analyzed. Initial calibration and continuing calibration checks were acceptable. Method blanks were free of metal contamination. MS/MSD samples were assigned to field sample OT12-SB01B. Except for antimony, lead, manganese, and zinc, MS/MSD recoveries for all metals analyzed were within acceptable limits. Antimony recoveries for both MS (20 percent) and MSD (22 percent) samples were below laboratory established advisory limits (78 percent to 117 percent). Based on associated LCS and post digestion spikes for antimony, the data supports matrix interference. Furthermore, the laboratory suggested that the high iron concentration in the samples may act as a catalyst to produce antimony pentachloride ($SbCl_5$), which has a boiling point of 79 degrees Celsius. The digestion temperature for EPA Method 3050 is approximately 98 degrees Celsius, resulting in a considerable loss of all antimony which was converted to antimony pentachloride ($SbCl_5$). All samples associated with the batch will be flagged "JL" (estimated quantitation - possibly biased low based on QC data). Lead and zinc MS/MSD recoveries were above advisory limits for MSD recovery and relative percent difference (RPD). The associated LCS was within limits, indicating the problem may be due

to a matrix interference. Lead and zinc results from sample OT12-SB01B were qualified "JH" (estimated quantitation - possibly biased high due to QC data). Manganese MS/MSD recoveries were below laboratory established advisory limits for MS recovery and outside the range for RPD advisory limits. The associated LCS was within limits, indicating the problem may be due to matrix interference. Manganese results from sample OT12-SB01B were qualified "JL" (estimated quantitation - possibly biased low due to QC data).

To evaluate the field sampling accuracy and precision, equipment blank (EB1-260394) and field duplicate samples (OT12-SBDP1) were examined. Field sample OT12-SB02B and its associated field duplicate sample OT12-SBDP1 were in good agreement for all metal compounds. Aluminum, calcium, copper, iron, manganese, and zinc were detected in equipment blank EB1260394 at three times the detection limit. Decontamination procedures were followed as listed in Section 2.1.8 of the Field Sampling Plan (FSP) Addendum (LAW, 1994a). Although the above metals were detected in equipment blank (EB1260394), it had little or no impact on the sample results due the high concentrations (in most cases 1,000 times the detection limit) detected in the associated field samples. For example, the detection limit for iron was 4.2 mg/kg and it was detected at 5,500 mg/kg in field sample OT12-SB02B. Associated samples were qualified "JH" (estimated quantitation - possibly biased high based on QC data).

4.0 RESULTS

4.1 DRUM PROGRAM

The results of the IDW disposal program consist of the following work completed:

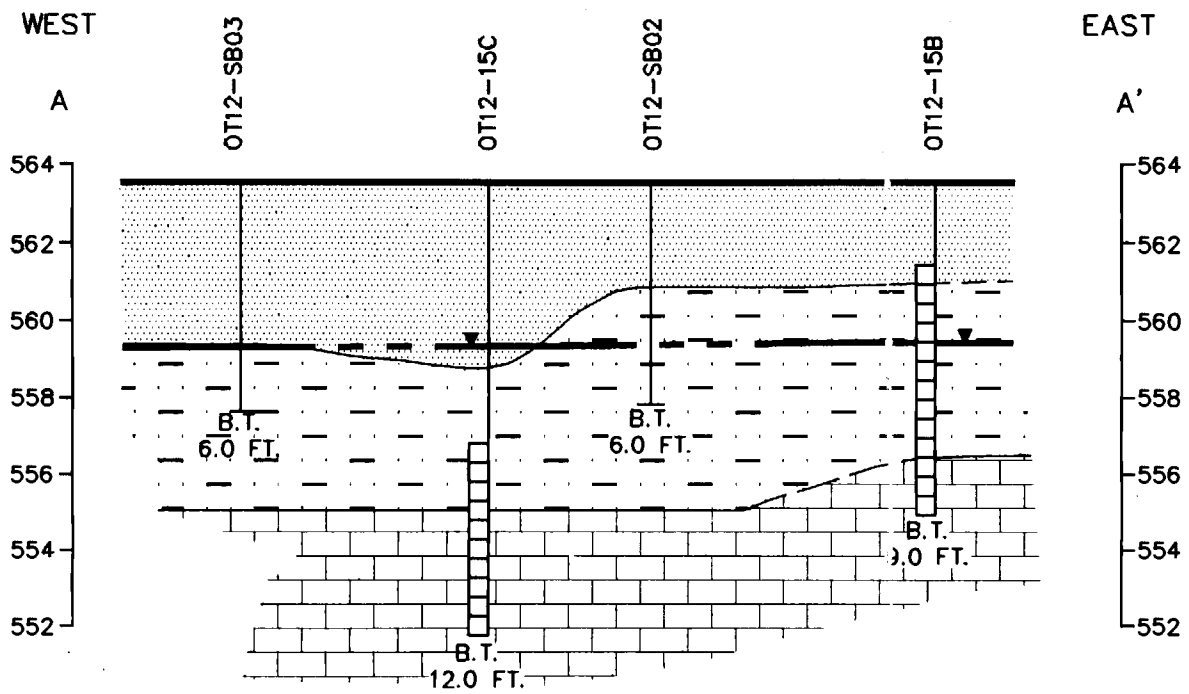
- Five drums of hazardous waste containing elevated levels of benzene were removed from Building 1347 and properly disposed. See Appendix A for benzene results.
- Oil/water separator drums were removed from Building 1190 and properly disposed. Also, the drums were salvaged for reuse by Carswell AFB.
- IRP IDW drums were removed from the Building 1337 Storage Yard and properly disposed.

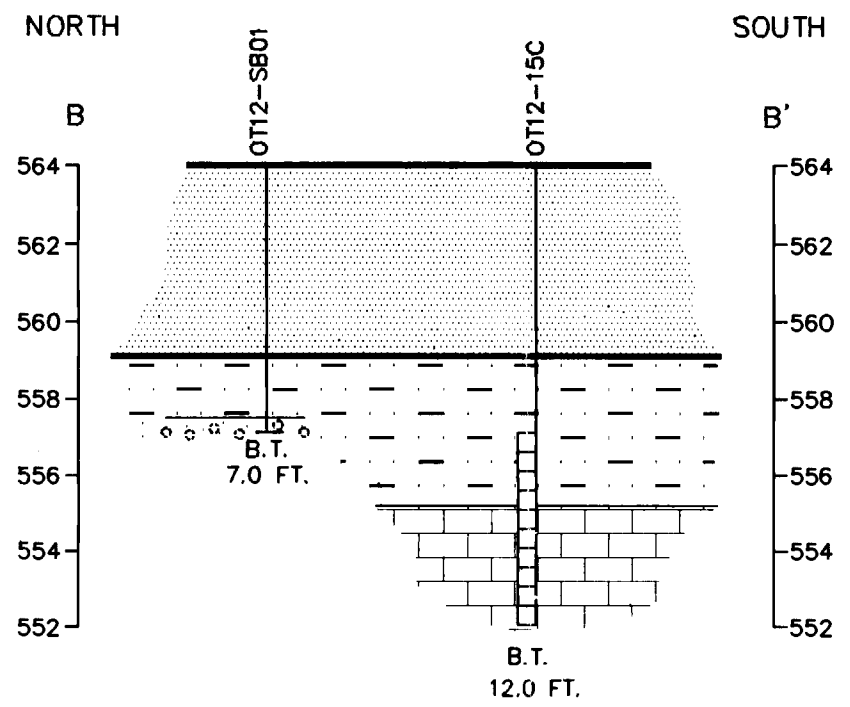
4.2 SOILS PROGRAM

Three soil borings (OT12-SB01 through OT12-SB03) were installed within the Building 1337 Storage Yard on March 26, 1994 (Figure 3-1). The borings were advanced to refusal; the depths of the borings ranged from 6 feet below the ground surface (OT12-SB02 and OT12-SB03) to 7 feet below the ground surface (OT12-SB01). Ground water was detected within boring OT12-SB01 at an approximate depth of 6.8 feet. The soil borings encountered three to 5 feet of fill material. The fill material consisted of silty to clayey sand and angular gravel. Petroleum odors and thin tar-like bands were encountered within OT12-SB02. A silty to clayey fine to medium sand (alluvium) was encountered beneath the fill material.

As shown on Cross Sections A-A' and B-B' on Figure 4-1, a 3- to 5-foot layer of fill material is prevalent across the Building 1337 Storage Yard. A layer of alluvium composed of silty to clayey sand

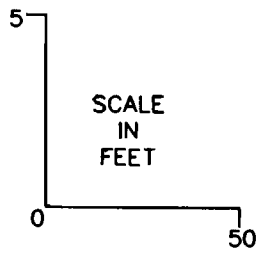
238 35





LEGEND

- CONTACT
- ESTIMATED CONTACT
- WATER LEVEL MARCH 1994
- SCREENED INTERVAL OF MONITORING WELL
- B.T. BORING TERMINATED
- FILL
- LIMESTONE AND SHALE
- SILTY TO CLAYEY SAND
- SANDY FINE GRAVEL



NOTES:
1. MONITORING WELLS OT12-15B AND OT12-15C INSTALLED BY RADIAN, JANUARY 1985.
2. ELEVATION OF GROUND-SURFACE ESTIMATED FOR OT12-SB01, OT12-SB2, AND OT12-SB03.
3. DEPTH OF GROUND-WATER MEASURED IN MONITORING WELLS OT12-15B AND OT12-15C ON MARCH 28, 1994
4. GEOLOGIC DESCRIPTIONS FOR MONITORING WELLS OT12-15B AND OT12-15C FROM RADIAN, 1986.

UNITED STATES AIR FORCE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

CROSS SECTION A-A' AND B-B'

BUILDING 1337

DATE:	19. JUNE. 94	FIGURE NUMBER:
PROJECT No.	11-3517-0121	FIGURE 4-1

is located beneath the filled material. Monitoring wells OT12-15B and OT12-15C encountered limestone and shale at depths ranging from approximately 7 to 10 feet below the ground surface.

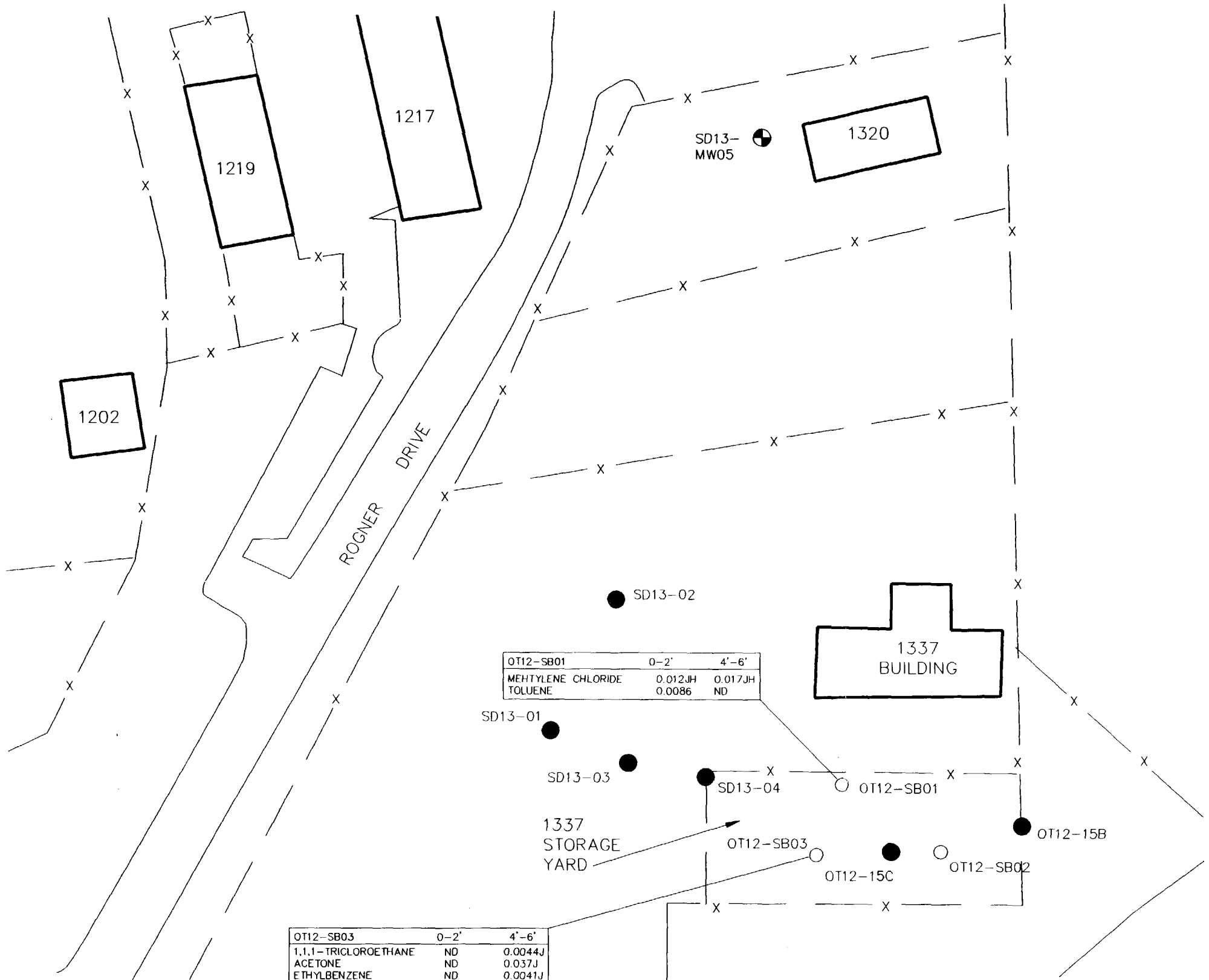
The depth of ground water was measured in monitoring wells OT12-15B and OT12-15C on March 28, 1994. Ground water was measured at an elevation of 559.63 feet above mean sea level (msl) in monitoring well OT12-15B and at 559.55 feet msl in monitoring well OT12-15C, both at a depth of approximately 5.5 feet below the ground surface.

Two soil samples were collected from each of the three soil borings and submitted for off-site chemical analysis. A total of six soil samples were collected and analyzed for volatile organic compounds and metals. Sample locations are presented on Figure 4-2. Table 4-1 presents positive results detected for the soil samples collected at the Building 1337 Storage Yard. (Duplicate results and a discussion of data evaluation and field precision are presented in Section 3.3).

Methylene chloride was detected in a majority of the soil samples collected at estimated concentrations (due to blank contamination) ranging from 0.012 to 0.018 milligrams per kilogram (mg/kg). Soil sample OT12-SB03C was analyzed out of analytical hold time; however, a few contaminants of concern including 1,1,1-trichloroethane, acetone, ethylbenzene, total xylene, and toluene were detected at estimated concentrations (refer to Section 3.3.4.1 for details). Toluene was detected in soil sample OT12-SB01B at 0.0086 mg/kg and in soil sample OT12-SBDP1 at 0.0096 mg/kg. In addition to toluene, acetone was detected in sample OT12-SBDP1 at 0.18 mg/kg and in sample OT12-SB02C at 0.085 mg/kg.

FILE: X/CARSWELL/XSLOCMAP 8/16/94

238 37



OT12-SB01	0-2'	4'-6'
MEHTYLENE CHLORIDE	0.012JH	0.017JH
TOLUENE	0.0086	ND

OT12-SB03	0-2'	4'-6'
1,1,1-TRICLOROETHANE	ND	0.0044J
ACETONE	ND	0.037J
ETHYLBENZENE	ND	0.0041J
TOTAL-XYLENE	ND	0.0044J
MEHTYLENE CHLORIDE	0.016JH	ND
TOLUENE	ND	0.014J

OT12-SB02	0-2'	DUPLICATE	4'-6'
ACETONE	ND	0.18	0.085
MEHTYLENE CHLORIDE	0.013JH	0.018JH	0.013JH
TOLUENE	ND	0.0096	ND

N

LAYER/LEVEL

LEGEND

- SD13-02 — LOCATION OF PRE-EXISTING GROUND WATER MONITORING WELL
- SD13-MW05 — LOCATION OF GROUND WATER MONITORING WELL INSTALLED BY LAW
- OT12-SB01 — LOCATION OF SOIL BORING

0 100 200

SCALE IN FEET

UNITED STATES AIR FORCE
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

POSITIVE ANALYTICAL RESULTS VOLATILE ORGANICS (mg/kg)

BUILDING 1337

DATE: 18. JUNE. 94

PROJECT No. 11-3517-0121

FIGURE NUMBER: FIGURE 4-2

TABLE 4-1

POSITIVE RESULTS TABLE
SOIL BORING SAMPLES DO NO. 15
Carswell Air Force Base
Fort Worth, Texas

PARAMETER	Sample No.:	OT12SB01B	OT12SB01C	Sample OT12SB02B	Duplicate OT12SBDP1	OT12SB02C	OT12SB03A	OT12SB03C
	Sample Date:	03/26/94	03/26/94	03/26/94	03/26/94	03/26/94	03/26/94	03/26/94
	Sample Depth:	2-4'	4-6'	2-4'	2-4'	4-6'	0-2'	4-6'
Metals (SW6010/SW3050),(MG/KG)								
ALUMINUM		2800 JH	3900 JH	4000 JH	4100 JH	2800 JH	3900 JH	1600 JH
ARSENIC		6.1	7.5	13	13	4.0	10	<3.4
BARIUM		67	200	53	59	69	66	45
BERYLLIUM		0.23	<1.6	<1.7	<1.6	<0.16	<1.5	<0.16
CADMIUM		0.86	2.4	0.92	0.71	0.98	0.88	0.32
CALCIUM		9600 JH	110000 JH	200000 JH	210000 JH	38000 JH	160000 JH	56000 JH
CHROMIUM, TOTAL		5.6	9.5	7.2	8.0	5.6	6.2	4.1
COBALT		3.0	3.5	4.1	3.4	2.7	3.8	1.1
COPPER		9.4 JH	54 JH	31 JH	22 JH	11 JH	26 JH	9.1 JH
IRON		7600 JH	14000 JH	5500 JH	5200 JH	5.3 JH	4700 JH	1800 JH
LEAD		30 J	32	17	25	79	11	5.7
MAGNESIUM		390	1400	1900	2100	690	1800	450
MANGANESE		76 JH	220	290	320 JH	120	280 JH	49
NICKEL		5.3	11	6.1	5.1	4.8	6.6	3.5
POTASSIUM		420	660	550	580	730	820	210
SODIUM		39	84	180	160	45	110	50
VANADIUM		10	15	16	14	10	14	5.8
ZINC		57 JH	280 JH	21 JH	22 JH	89 JH	20 JH	7.1 JH
Volatile Organics (SW8240/SW5030),(MG/KG)								
1,1,1-TRICHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054	<0.0061	0.0044 J
ACETONE		<0.011	<0.012	<0.011	0.18	0.085	<0.012	0.037 J
ETHYLBENZENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054	<0.0061	0.0041 J
total-XYLENE (SUM OF ISOMERS)		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054	<0.0061	0.0044 J
METHYL ETHYL KETONE		<0.011	<0.012	<0.011	0.044	<0.011	<0.012	<0.011 J
METHYLENE CHLORIDE		0.012 JH	0.017 JH	0.013 JH	0.018 JH	0.013 JH	0.016 JH	<0.0056 J
TOLUENE		0.0086	<0.0058	<0.0054	0.0096	<0.0016	<0.0012	0.014 J

J - Estimated quantitation based upon QC data.
JH - Estimated quantitation - possibly biased high based upon QC data.
JL - Estimated quantitation - possibly biased low based upon QC data.

PREPARED BY/DATE: DBJ 8/16/94
CHECKED BY/DATE: SRS 8/16/94
APPROVED BY/DATE: JSP 8/16/94

5.0 COMPARISON OF ANALYTICAL DATA WITH REGULATORY STANDARDS

5.1 INTRODUCTION

This section compares the positive analytical results discussed in Section 4.0 to the regulatory standard appropriate for this investigation. The regulatory standard to apply for this investigation was selected based on available analytical data and our understanding of current land use and probable future land use at the facility.

5.1.1 Regulatory Standards

The Texas Natural Resource Conservation Commission (TNRCC) published its final Risk Reduction Standards in the Texas Register which were made effective on June 29, 1993 (TNRCC, 1993) (see Appendix E). The requirements of these standards were written to ensure the protection of human health and the environment from exposure to contaminants released from solid waste management facilities or other areas. Furthermore, the standards apply to closure of facilities used for the storage, processing, or disposal of industrial solid waste or municipal hazardous waste, and to remediation of contaminated media resulting from unauthorized releases from such facilities.

Under this regulation, a regulated party may initiate site remediation or closure of a facility where contaminated media may exist by applying Risk Reduction Standard Numbers 1, 2, or 3. Attainment of Risk Reduction Standard Number 1 involves closure or remediation to background, or the practical quantitation limit (PQL), if the PQL is greater than background. If Standard Number 1 is attained, the responsible party is not required to provide deed certifications as may be required under Risk Reduction Standards 2 and 3.

Attainment of Risk Reduction Standard Number 2 involves closure or remediation to health risk-based cleanup levels, namely, the Medium-Specific Concentrations (MSCs). The TNRCC has published MSCs for soil and ground water, for both industrial and residential land use. Using Standard Number 2, the responsible party must register-specific information in the registry of county deeds. This information includes a certification that closure or remediation of the area was carried out in accordance with this standard. If the facility meets the residential soil requirements, no post-closure care, engineering or institutional control measures are required. However, if the industrial soil MSCs are used, the deed certification must contain a statement that current or future owners of the facility must undertake actions as necessary to protect human health and the environment in accordance with TNRCC regulations. The responsible party is released from responsibility for post-closure care once the deed certification is accepted by the executive director of the TNRCC.

If Risk Reduction Standard Number 3 is applied to a site, media cleanup levels are proposed based on an assessment of the potential risk to human health and the environment using site-specific conditions. Standard Number 3 provides flexibility for situations where closure or remediation by removal or decontamination would not be practical. This standard also requires deed certification. For this standard, the county deed records must state that remediation was carried out in accordance with this standard, and whether continued post-closure care, control or engineering measures are required.

5.1.2 Environmental Setting

The scope of this site investigation was developed to determine the potential for impact to soil and ground water at the facility and to establish an environmental baseline. Although background

analytical data has been obtained for Carswell Air Force Base (Carswell AFB) under Delivery Orders 0011 and 0021, none has been established for Building 1337. Therefore, the sole use of Risk Reduction Standard Number 1 was deemed inappropriate. When Standard Number 1 is not deemed appropriate, the next standard in the hierarchy of the regulation is Risk Reduction Standard Number 2. Therefore, the positive analytical results are compared to Risk Reduction Standard Number 2.

5.2 COMPARISON OF DATA TO RISK REDUCTION STANDARD NUMBER 2

Results of the data evaluation effort are compared to MSCs for soil. The land use at Building 1337 Storage Yard is industrial under current conditions and is expected to continue to be industrial in the future. Therefore, the MSCs for soil that are utilized for this site are the Soil/Air and Ingestion Standard for industrial land use (SAI-Ind), and the Industrial Soil-to-Ground Water Cross-media Protection Concentration (GWP-Ind). The purpose of the GWP-Ind is to establish concentrations of chemicals in soils that, if leached downward into ground water, would not result in ground-water concentrations above health-based levels.

5.2.1 Soil Results

According to the requirements of the Risk Reduction Standard for industrial soil, the concentration of a contaminant within 2 feet of the surface shall not exceed the SAI-Ind nor the GWP-Ind, whichever is lower. At depths below 2 feet, concentrations shall not exceed the GWP-Ind (TNRCC, 1993).

5.2.1.1 Surface soil - The analytical results for the surface soil sample are compared to the GWP-Ind and SAI-Ind MSCs in Table 5-1. Chemical analyses for metals shows that the GWP-Ind MSCs for

arsenic, cadmium and lead, and the SAI-Ind MSC for arsenic, are exceeded in the surface soil sample, OT12-SB03A.

The metal concentrations in surface soil sample OT12-SB03A, that exceed MSCs, are compared to U.S. Geological Service (USGS) data for metals detected in surface soils under ambient conditions in the western states (USGS, 1984). Arsenic, cadmium and lead concentrations detected in this soil sample fall within the expected range for ambient conditions. Cadmium was not included in the 1984 USGS study. However, USGS data from 1975 show the cadmium level at the site to be within the expected ambient range (USGS, 1975).

In addition, although there is no background data available for the Building 1337 Storage Yard site, the OT12-SB03A surface soil concentrations are compared to the background analytical data obtained for Delivery orders 0011 and 0021 for the base. It can be seen that cadmium and lead surface soil concentrations fall within their background concentration ranges. The arsenic concentration detected in the surface soil sample OT12-SB03A (10 mg/kg) exceeds the maximum detected background arsenic concentration of 5.3 mg/kg.

Methylene chloride was the sole volatile organic compound detected above its PQL in the surface boring OT12-SB03A. The concentration of methylene chloride detected is below both of the MSCs. Therefore, soils are in compliance with Risk Reduction Standard 2 for volatile organic compounds (VOCs).

5.2.1.2 Subsurface - Analytical results for subsurface samples are compared to the GWP-Ind MSC in Table 5-2. The analytical results for arsenic exceeded their MSC in three of five samples. Boring sample OT12-SB03C is the only subsurface sample in which arsenic was not detected. The GWP-Ind MSC is exceeded for cadmium in samples from all subsurface locations except OT12-SB03C (four of

TABLE 5-1

SURFACE SOIL CONCENTRATIONS COMPARED TO INDUSTRIAL MSCs AND AMBIENT CONCENTRATIONS
Building 1337 Storage Yard
Carswell Air Force Base
Fort Worth, Texas

	OT12SB03A 03/26/94 0-2'	MSCs GWP-Ind (mg/kg)	MSCs SAI-Ind (mg/kg)	Surface Soil Background Range (a) (mg/kg)	Ambient Concentrations for the Western U.S. (b) (mg/kg)
Metals :					
Aluminum	3,900 JH	--	--	7,300 - 16,000	5,000 - 100,000
Arsenic	***10***	5	3.27	4.9 - 5.3	<0.10 - 97
Barium	66	200	137,000	62 - 130	70 - 5,000
Beryllium	ND	0.4	1.33	0.87	<1 - 15
Cadmium	**0.68**	0.5	1,020	1.8 - 4.4	1 - 10 (c)
Calcium	160,000 JH	--	--	6,200 - 190,000	600 - 320,000
Chromium (total)	6.2	10	5,110	9.6 - 18	3 - 2,000
Cobalt	3.8	--	--	2.2 - 6.3	<3 - 50
Copper	26 JH	--	--	6.6 - 8	2 - 300
Iron	4,700 JH	--	--	6,000 - 17,000	1,000 - >100,000
Lead	**11**	1.5	1,000	6.1 - 16	<10 - 700
Magnesium	1,800	--	--	1,600 - 1,900	300 - >100,000
Manganese	280 JH	--	--	200 - 250	30 - 5,000
Nickel	6.6	10	20,400	4.7 - 12	30 - 5,000
Potassium	820	--	--	750 - 1,400	1,900 - 63,000
Sodium	110	--	--	36 - 120	500 - 100,000
Vanadium	14	--	--	16 - 37	7 - 500
Zinc	20 JH	--	--	10 - 26	10 - 2,100
Volatile Organics :					
1,1,1-Trichlorethane	ND	20	14,000		
Acetone	ND	1,020	4,160		
Ethylbenzene	ND	70	17,000		
Methylene Chloride	0.016 JH	0.5	13.8		
Methyl Ethyl Ketone	ND	511	14,000		
Toluene	ND	100	3,630		
Xylenes	ND	1,000	5,800		

(a) Background data collected for Delivery Orders 0011 and 0021
(b) USGS, 1984.
(c) USGS, 1975.
GWP-Ind - Industrial Soil-to-Groundwater Cross-media Protection Concentration
JH - Estimated quantitation - possibly biased high based upon QC data
MSCs - Medium Specific Concentrations
ND - Not Detected
SAI-Ind - Industrial Soil/Air and Ingestion Standard
Boxed Bold - Value exceeds GWP-Ind MSC
Boxed Italics - Value exceeds SAI-Ind MSC

PREPARED BY/DATE: FMA for CDH 8-15-94
CHECKED BY/DATE: [illegible] 16 Aug 94
APPROVED BY/DATE: LWC 8/16/94

TABLE 5–2

SUBSURFACE SOIL CONCENTRATIONS COMPARED TO AN INDUSTRIAL MSC AND BACKGROUND CONCENTRATIONS
Building 1337 Storage Yard
Carswell Air Force Base
Fort Worth, Texas

	OT12SB01B 03/26/94 2–4'	OT12SB01C 03/26/94 4–6'	OT12SB02B 03/26/94 2–4'	OT12SB02C 03/26/94 4–6'	OT12SB03C 03/26/94 4–6'	MSC GWP–Ind (mg/kg)	Subsurface Soil Background Range (a) (mg/kg)
Metals :							
Aluminum	2,800 JH	3,900 JH	4,100 JH	2,800 JH	1.600 JH	--	5,200 – 13,000
Arsenic	**6.1**	**7.5**	**13**	4.0	ND	5	6.4 – 12
Barium	67	200	59	69	45	200	40 – 130
Beryllium	0.23	ND	ND	ND	ND	0.4	0.42
Cadmium	**0.86**	**2.4**	**0.92**	**0.98**	0.32	0.5	1.3 – 6.8
Calcium	9,600 JH	110.000 JH	210,000 JH	38,000 JH	56,000 JH	--	3,500 – 200,000
Chromium (total)	5.6	9.5	8.0	5.6	4.1	10	9.2 – 13
Cobalt	3.0	3.5	4.1	2.7	1.1	--	2.9 – 7.6
Copper	9.4 JH	54 JH	31 JH	11 JH	9.1 JH	--	5 – 28
Iron	7,600 JH	14.000 JH	5,500 JH	5.3 JH	1,800 JH	--	5,600 – 24,000
Lead	**30 J**	**32**	**25**	**79**	**5.7**	1.5	10 – 88
Magnesium	390	1,400	2,100	690	450	--	650 – 3,100
Manganese	76 JH	220	320 JH	120	49	--	140 – 920
Nickel	5.3	**11**	6.1	4.8	3.5	10	4.3 – 15
Potassium	420	660	580	730	210	--	840 – 1,400
Sodium	39	84	180	45	50	--	36 – 170
Vanadium	10	15	16	10	5.8	--	12 – 29
Zinc	57 JH	280 JH	22 JH	89 JH	7.1 JH	--	8.3 – 54
Volatile Organics :							
1,1,1–Trichlorethane	ND	ND	ND	ND	0.0044 J	20	
Acetone	ND	ND	0.18	0.085	0.037 J	1,020	
Ethylbenzene	ND	ND	ND	ND	0.0041 J	70	
Methylene Chloride	0.012 JH	0.017 JH	0.018 JH	0.013 JH	ND	0.5	
Methyl Ethyl Ketone	ND	ND	0.044	ND	ND	511	
Toluene	0.0086	ND	0.0096	ND	0.014 J	100	
Xylenes	ND	ND	ND	ND	0.0044 J	1,000	

(a) Background data collected for Delivery Orders 0011 and 0021
GWP–Ind – Industrial Soil–to–Groundwater Cross–media Protection Concentration
J – Estimated quantitation based upon QC data
JH – Estimated quantitation – possibly biased high based upon QC data
MSCs – Medium Specific Concentrations
ND – Not Detected
Boxed Bold – Value exceeds GWP–Ind MSC
-- No data available.

PREPARED BY/DATE: KMA for CDH 8-15-94
CHECKED BY/DATE: [illegible] 16 AUG 94
APPROVED BY/DATE: LWC 8/16/94

five samples). The GWP-Ind MSC for lead is exceeded in all five samples. Nickel was detected at a concentration which exceeds its MSC in only one subsurface soil sample (OT12-SB01C). All other metals were detected at concentrations below their MSCs. It appears that metal concentrations are greater at depth in soil boring OT12-SB01 and are generally greater at the surface in soil boring OT12-SB02.

Data on site-specific ambient concentrations of metals in the subsurface were not available. However, if the concentrations of metals that exceed MSCs were to be compared to the range reported by the USGS for ambient levels in western surficial soils (USGS, 1984), as given in Table 5-1,it can be seen that all are within or below these reported ranges.

The subsurface soil data were compared to the background data gathered under Delivery Orders 0011 and 0021. Nickel, lead, and cadmium concentrations detected on the site fall within their background ranges. All but one of the arsenic concentrations at the site fall within the background arsenic range. Sample OT12-SB02B has an arsenic concentration of 13 mg/kg which only slightly exceeds the maximum background concentration for the base of 12 mg/kg.

All of the VOCs detected were at concentrations below their MSCs. Therefore, soils are in compliance with Risk Reduction Standard 2 for VOCs.

5.3 SUMMARY

The analytical results for surface and subsurface soil were compared with Risk Reduction Standard Number 2 of the Texas Natural Resources Conservation Commission (TNRCC) Risk Reduction Standards (TNRCC, 1993) and to ambient and background concentrations. The

regulatory standard applicable for this investigation was selected based upon available analytical data and LAW's understanding that the land use at the Building 1337 Storage Yard is entirely industrial under current land use, and is expected to continue to be entirely industrial in the future. Based upon the results of this comparison, the following conclusions may be made:

- VOCs were detected in soil samples from all three locations. However, the detected concentrations did not exceed the Medium-Specific Concentrations (MSCs) for Risk Reduction Standard Number 2. Therefore, soils are in compliance with the standard for these analytes.

- The concentrations of several metals in soil samples exceeded their MSCs. These exceedances were observed in samples collected at all locations, and at various depths. Review of the data for metals does not indicate any obvious or apparent difference between concentrations of metals in samples collected from different locations. Also, there is no consistent trend in metals concentrations in soils with depth. The concentrations of all four of the metals for which exceedances were observed are within the expected range for ambient conditions, based on a comparison with USGS data for metals detected in surface soils under ambient conditions in the western states (USGS, 1975; USGS, 1984). However, on comparison of detected concentrations for these four metals to Carswell AFB background data obtained under Delivery Orders 0011 and 0021 it can be seen that arsenic exceeds the maximum detected background concentrations in two of the three boring locations.

- No other constituents detected in soil samples exceeded the standard.

An analysis of the findings from this study indicates that there are exceedances of MSCs by arsenic, cadmium, lead, and nickel. Arsenic was detected in OT12-SB02B above its site background concentration range.

6.0 CONCLUSIONS AND RECOMMENDATIONS

The drummed material stored at Buildings 1337, 1190, and 1346 were identified as non-hazardous material, except for the five drums of "benzene" contaminated drums stored at Building 1346 which were determined to be hazardous due to the presence of elevated levels of benzene. The storage drums were characterized, transported and disposed in accordance with federal and state regulations.

The results of the soil sampling conducted at the Building 1337 Storage Yard indicate volatile organic compounds and metals are present in site soil. Based on comparison of soil constituent concentrations to the Texas Risk Reduction Standards, volatile organic compounds do not present a risk. However, metal concentrations detected within site soils were found to exceed Medium-Specific Concentrations (MSCs) for industrial land use. The Industrial Soil-to-Ground Water Cross-media Protection Concentration (GWP-Ind) for arsenic, cadmium, and lead were exceeded; therefore, presenting a potential health-based risk associated with metals in soil. Arsenic was also detected in site soils above its Soil/Air Ingestion Standard for industrial land use (SAI-Ind), indicating a potential risk associated with inhalation of fugitive dust contaminated with arsenic.

Further soil sample collection and analysis is recommended to more clearly define the horizontal and vertical extent of metal contamination at the Building 1337 Storage Yard.

REFERENCES

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TAB

APPENDIX A

APPENDIX A

IDW ANALYTICAL DATA

4203 West Swift ▼ Fresno California 93722 ▼ Phone 209.275-2175 ▼ Fax 209.275-4222

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94
Page 1 of 8

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Acid Cmpds	Concentration µg/L	Quantitation Limit µg/L
2,4,6-Trichlorophenol	ND*	5.0
4-Chloro-3-methylphenol	ND	10.0
2-Chlorophenol	ND	5.0
2,4-Dichlorophenol	ND	5.0
2,4-Dimethylphenol	ND	5.0
2-Nitrophenol	ND	5.0
4-Nitrophenol	ND	10.0
2,4-Dinitrophenol	ND	10.0
2-Methyl-4,6-dinitrophenol	ND	10.0
2-Methylphenol	ND	5.0
4-Methylphenol	ND	5.0
Pentachlorophenol	ND	10.0
Phenol	ND	5.0
Benzoic acid	ND	5.0

Base/Neutral Cmpds	Concentration µg/L	Quantitation Limit µg/L
Acenaphthene	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobenzene	ND	5.0
Hexachloroethane	ND	5.0
Bis-(2-chloroethyl)ether	ND	5.0
2-Chloronaphthalene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
3,3'-Dichlorobenzidine	ND	10.0
2,4-Dinitrotoluene	ND	5.0
2,6-Dinitrotoluene	ND	5.0
Fluoranthene	ND	5.0
4-Chlorophenylphenylether	ND	5.0
4-Bromophenylphenylether	ND	5.0
Bis-(2-chloroisopropyl)ether	ND	5.0
Bis-(2-chloroethoxy)methane	ND	5.0
Hexachlorobutadiene	ND	5.0

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Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94
Page 2 of 8

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Base/Neutral Cmpds	Concentration µg/L	Quantitation Limit µg/L
Hexachlorocyclopentadiene	ND	5.0
Isophorone	ND	5.0
Naphthalene	ND	5.0
2-Methylnaphthalene	ND	5.0
Nitrobenzene	ND	5.0
N-nitrosodiphenylamine	ND	5.0
N-nitrosodi-n-propylamine	ND	5.0
N-nitrosodimethylamine	ND	5.0
Bis-(2-ethylhexyl)phthalate	ND	5.0
Butylbenzylphthalate	ND	5.0
Di-n-butylphthalate	ND	5.0
Di-n-octylphthalate	ND	5.0
Diethylphthalate	ND	5.0
Dimethylphthalate	ND	5.0
Benzo(a)anthracene	ND	5.0
Benzo(a)pyrene	ND	5.0
Benzo(k)fluoranthene	ND	5.0
Benzo(b)fluoranthene	ND	5.0
Benzyl alcohol	ND	5.0
Chrysene	ND	5.0
Acenaphthylene	ND	5.0
Anthracene	ND	5.0
Benzo(ghi)perylene	ND	5.0
Fluorene	ND	5.0
Phenanthrene	ND	5.0
Dibenzo(a,h)anthracene	ND	5.0
Dibenzofuran	ND	5.0
Indeno(1,2,3-cd)pyrene	ND	5.0
Pyrene	ND	5.0

* ND = None Detected

Tested By Kathryn M. Graham

Checked By Mike Ray

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94
Page 3 of 8

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Tentatively Identified and Quantified Compounds:

4-Hydroxy-4-methyl-2-pentanone B	67.5 µg/L
2,3-Dihydro-1H-inden-1-one	6.1 µg/L
Hexadecanoic acid	6.1 µg/L
Scan # 1581	7.4 µg/L

B = Compound found in the associated blank.

TIC's are calculated on a 1:1 response factor to the nearest internal standard.

Tested by Kathryn M. Graham

Checked by Mike Ray

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94
Date Extracted: 03/24/94

Method 8260 Results (Purgeables):

Compound	Concentration µg/L	Detection limit µg/L
Acetone	110	100
Benzene	ND*	5.0
Bromodichloromethane	ND	5.0
Bromoform	ND	5.0
Bromomethane	ND	10.0
Carbon tetrachloride	ND	5.0
Chlorobenzene	ND	5.0
Chloroethane	ND	10.0
2-Chloroethylvinyl ether	ND	10.0
Chloroform	ND	5.0
Chloromethane	ND	10.0
Dibromochloromethane	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,1-Dichloroethane	ND	5.0
1,2-Dichloroethane	ND	5.0
1,1-Dichloroethene	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Ethyl benzene	ND	5.0
Methylene chloride	ND	20
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Trichloroethene	ND	5.0
Trichlorofluoromethane	ND	10.0
Vinyl chloride	ND	10.0
Xylenes	ND	5.0

* ND = None Detected

Tested By Kathryn M. Graham

Checked By

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94
Page 5 of 8

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94
Date Extracted: 03/24/94

Method 8080 Results (OCl Pesticides):

Compound	Concentration µg/L	Quantitation limit µg/L
Alachlor	ND*	0.05
Aldrin	ND	0.05
Benefin	ND	0.05
α-BHC	ND	0.05
ß-BHC	ND	0.05
δ-BHC	ND	0.05
Captan	ND	0.05
Carbophenothion	ND	0.05
Chlordane	ND	0.05
Dicofol	ND	0.05
Dieldrin	ND	0.05
DMPA	ND	0.05
Endosulfan I	ND	0.05
Endosulfan II	ND	0.05
Endosulfan sulfate	ND	0.05
Endrin	ND	0.05
Endrin aldehyde	ND	0.05
Endrin ketone	ND	0.05
Heptachlor	ND	0.05
Heptachlor epoxide	ND	0.05
Lindane	ND	0.05
2,4'-DDT	ND	0.05
2,4'-TDE/DDD	ND	0.05
4,4'-DDE	ND	0.05
4,4'-DDT	ND	0.05
4,4'-TDE/DDD	ND	0.05
Methoxychlor	ND	0.05
Nitrofen	ND	0.05
PCNB	ND	0.05
Toxaphene	ND	1.0

* ND = None Detected

Tested By Steven Tallmon

Checked By Mike Ray

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94
Page 6 of 8

Sample I.D. No: Carswell AFB
DR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94

Test Results: .

	Results	Quantitation Limit	Method Number
Total Recoverable Petroleum Hydrocarbons (TRPH), mg/L	10.4	0.5	EPA 418.1

Tested By Debra Christy

Checked By

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/17/94
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
IDR1 CAFB-Wat
APPL Sample No: R16730-04012W A-H

Date Received: 03/22/94

Test Results

	Results µg/L	Quantitation Limit µg/L	Method Number
Silver (Ag)	<10	10	EPA 6010
Barium (Ba)	38.8	5	EPA 6010
Cadmium (Cd)	<5	5	EPA 6010
Chromium (Cr)	5.6	5	EPA 6010
Lead (Pb)	<20	20	EPA 6010
Arsenic (As)	<5	5	EPA 7062
Mercury (Hg)	<0.2	0.2	EPA 7470
Selenium (Se)	<2	2	EPA 7742

Tested by Debra Christy

Checked by

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Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94

Page 1 of 7

Sample I. D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/28/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Semi-Volatiles

Compounds	Concentration µg/L	Detection Limit µg/L
m-Cresol (3-Methylphenol)	ND*	10.0
p-Cresol (4-Methylphenol)	ND	10.0
1,4-Dichlorobenzene	ND	5.0
Hexachlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Hexachloroethane	ND	5.0
Nitrobenzene	ND	5.0
o-Cresol (2-Methylphenol)	ND	10.0
2,4-Dinitrotoluene	ND	5.0
Pentachlorophenol	ND	10.0
Pyridine	ND	5.0
2,4,5-Trichlorophenol	ND	10.0
2,4,6-Trichlorophenol	ND	10.0
Total Cresol	ND	10.0

*ND = None Detected

Tested By Kathryn M. Graham

Checked By Mike Ray

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94
Page 2 of 7

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/28/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Semi-Volatiles

Tentatively Identified and Quantified Compounds:

Propanoic acid, 1-methylethylester B	29.3 µg/L
3-Methyl-2-pentanone	7.2 µg/L
Acetamide	4.5 µg/L J
1,3,5-Cycloheptatriene B	4.4 µg/L J
Butanoic acid,. 1-methylethylester	68.2 µg/L
Scan # 196 B	65.1 µg/L
Scan # 309	6.7 µg/L
Scan # 316	12.1 µg/L
Scan # 710	6.9 µg/L
2-Fluoro-4-nitrophenol	9.0 µg/L
Scan # 898	6.6 µg/L
Scan # 1941 B	8.1 µg/L

B = Conpound found in the associated blank.

J = Estimated value, below detection limit.

TIC's are calculated on a 1:1 response factor to the nearest internal standard.

Tested by Kathryn M. Graham

Checked by

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94
Page 3 of 7

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/22/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Volatiles

Compounds	Concentration µg/L	Detection Limit µg/L
Benzene	ND*	5.0
Carbon tetrachloride	ND	5.0
Chlorobenzene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
1,1-Dichloroethene	ND	5.0
Tetrachloroethene	ND	5.0
Trichloroethene	ND	5.0
MEK (2-Butanone)	ND	100
Vinyl chloride	ND	10.0
1,4-Dichlorobenzene	ND	5.0

*ND = None Detected

Tested By Kathryn M. Graham

Checked By

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Pesticides

Compounds	Concentration µg/L	Detection Limit µg/L
Endrin	ND*	0.05
Heptachlor	ND	0.05
Heptachlor Epoxide	ND	0.05
Lindane	ND	0.05
Methoxychlor	ND	0.05
Technical Chlordane	ND	0.05
Toxaphene	ND	0.05

*ND = None Detected

Tested By Steven Tallmon

Checked By Mark Ray

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) PCB

Compounds	Concentration µg/L	Detection Limit µg/L
PCB #1016	ND*	0.5
PCB #1221	ND	0.5
PCB #1232	ND	0.5
PCB #1242	ND	0.5
PCB #1248	ND	0.5
PCB #1254	ND	0.5
PCB #1260	ND	0.5

*ND = None Detected

Tested By Steve Tallman

Checked By

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114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94
Page 6 of 7

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94

Toxicity Characteristic Leaching Procedure (TCLP) 40 CFR

Part 261, Appendix II, Chapter 1, (7-1-90 EDITION)

	Result mg/L	Quantitation Limit mg/L	Method Number
Arsenic (As)	<0.5	0.5	EPA 6010
Barium (Ba)	<2	2	EPA 6010
Cadmium (Cd)	<0.05	0.05	EPA 6010
Chromium (Cr)	<0.05	0.05	EPA 6010
Lead (Pb)	<0.5	0.5	EPA 6010
Mercury (Hg)	<0.002	0.002	EPA 7470
Selenium (Se)	<0.5	0.5	EPA 6010
Silver (Ag)	<0.2	0.2	EPA 6010
Total Recoverable Petroleum Hydrocarbons (TRPH)	<0.5	0.5	EPA 418.1

Tested By Debra Christy

Checked By

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: 03/20/94
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
DR 1 CAFB-SOL
APPL Sample No: R16730-04013S A-B

Date Received: 03/22/94
Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Herbicides

Compounds	Concentration µg/L	Detection Limit µg/L
2,4-D	ND*	0.5
2,4,5-TP	ND	0.5

*ND = None Detected

Tested By Steven Tollman

Checked By

4203 West Swift ▼ Fresno, California 93722 ▼ Phone 209.275-2175 ▼ Fax 209.275-4222

238 65

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jim Overholtzer

Sample Date: 03/15/94
Report Date: 04/04/94
Page 1 of 1

Sample I.D. No: Carswell AFB TB
APPL Sample No: R16730-04014W

Date Received: 03/22/94
Date Extracted: 03/24/94

Method 8260 Results (Purgeables):

Compound	Concentration µg/L	Detection limit µg/L
Acetone	90 J	100
Benzene	ND	5.0
Bromodichloromethane	ND	5.0
Bromoform	ND	5.0
Bromomethane	ND	10.0
Carbon tetrachloride	ND	5.0
Chlorobenzene	ND	5.0
Chloroethane	ND	10.0
2-Chloroethylvinyl ether	ND	10.0
Chloroform	ND	5.0
Chloromethane	ND	10.0
Dibromochloromethane	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,1-Dichloroethane	ND	5.0
1,2-Dichloroethane	ND	5.0
1,1-Dichloroethene	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Ethyl benzene	ND	5.0
Methylene chloride	ND	20
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Trichloroethene	ND	5.0
Trichlorofluoromethane	ND	10.0
Vinyl chloride	ND	10.0
Xylenes	ND	5.0

J = Estimated value below detection limit.
* ND = None Detected

Tested By Kathryn M. Graham

Checked By Nick Bz

4203 West Swift ▼ Fresno, California 93722 ▼ Phone 209.275-2175 ▼ Fax 209.275-4222

238 66

Ensite, Inc
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Page 1 of 20

Sample I.D. No: Carswell AFB
Blank for samples
taken 03/20/94

Date Received: NA

APPL Sample No: R16730-940328S

Date Extracted: 03/28/94

Toxicity Characteristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Semi-Volatiles

Compounds	Concentration µg/L	Detection Limit µg/L
m-Cresol (3-Methylphenol)	ND*	10.0
p-Cresol (4-Methylphenol)	ND	10.0
1,4-Dichlorobenzene	ND	5.0
Hexachlorobenzene	ND	5.0
Hexachlorobutadiene	ND	5.0
Hexachloroethane	ND	5.0
Nitrobenzene	ND	5.0
o-Cresol (2-Methylphenol)	ND	10.0
2,4-Dinitrotoluene	ND	5.0
Pentachlorophenol	ND	10.0
Pyridine	ND	5.0
2,4,5-Trichlorophenol	ND	10.0
2,4,6-Trichlorophenol	ND	10.0
Total Cresol	ND	10.0

*ND = None Detected

Checked By Pamela Cooke

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB
Blank for samples
taken 03/20/94
APPL Sample No: R16730-940328S

Date Received: NA

Date Extracted: 03/28/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Semi-Volatiles

Tentatively Identified and Quantified Compounds:

Propanoic acid, 1-methylethylester	18.0 µg/L
Butanoic acid,- 1-methylethylester	47.0 µg/L
mono-(2-Ethylhexyl)-hexanedioic acid	44.0 µg/L
1,3,5-Cycloheptatriene	8.4 µg/L
Scan # 194	41 µg/L

TIC's are calculated on a 1:1 response factor to the nearest internal standard.

Checked by Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/04/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04013S 04013SA

EPA Method TCLP (Semi-Volatiles) Concentration Units: µg/L

SPIKES

Analysis	Date	Amt in Sample	Amt Spiked	Results	Recovery Percent	RPD
o-Cresol	03/28/94	0.00	100	19.1	19.1	24
m-Cresol/p-Cresol*	03/28/94	0.00	200	33.1	16.5	17
Total Cresol**	03/28/94	0.00	300	52.2	17.4	20
2,4,5-Trichlorophenol	03/28/94	0.00	100	45.7	45.7	2.0
2,4,6-Trichlorophenol	03/28/94	0.00	100	49.3	49.3	1.8
Pentachlorophenol	03/28/94	0.00	100	82.4	82.4	9.3
Pyridine	03/28/94	0.00	100	45.4	45.4	0.7
Hexachloroethane	03/28/94	0.00	100	75.0	75.0	3.4
Nitrobenzene	03/28/94	0.00	100	74.3	47.3	5.0
Hexachlorobutadiene	03/28/94	0.00	100	70.2	70.2	0.1
2,4-Dinitrotoluene	03/28/94	0.00	100	90.3	90.3	0.0
Hexachlorobenzene	03/28/94	0.00	100	87.0	87.0	7.6

APPL Spike ID: R16730 03566S 04013SB

Analysis	Date	Amt in Sample	Amt Spiked	Results	Recovery Percent	RPD
o-Cresol	03/28/94	0.00	100	24.2	24.2	24
m-Cresol/p-Cresol*	03/28/94	0.00	200	39.4	19.7	17
Total Cresol**	03/28/94	0.00	300	63.6	21.2	20
2,4,5-Trichlorophenol	03/28/94	0.00	100	46.6	46.6	2.0
2,4,6-Trichlorophenol	03/28/94	0.00	100	48.4	48.4	1.8
Pentachlorophenol	03/28/94	0.00	100	90.4	90.4	9.3
Pyridine	03/28/94	0.00	100	45.1	45.1	0.7
Hexachloroethane	03/28/94	0.00	100	77.6	77.6	3.4
Nitrobenzene	03/28/94	0.00	100	78.1	78.1	5.0
Hexachlorobutadiene	03/28/94	0.00	100	70.3	70.3	0.1
2,4-Dinitrotoluene	03/28/94	0.00	100	90.3	90.3	0.0
Hexachlorobenzene	03/28/94	0.00	100	93.9	93.9	7.6

* m- and p-Cresol co-elute
** Sum of o-,m-,p-Cresol

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Page 4 of 20

Sample I.D. No: Carswell AFB Blank for samples taken 03/20/94
APPL Sample No: R16730-940322S

Date Received: NA
Date Extracted: 03/22/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Volatiles

Compounds	Concentration µg/L	Detection Limit µg/L
Benzene	ND*	5.0
Carbon tetrachloride	ND	5.0
Chlorobenzene	ND	5.0
Chloroform	ND	5.0
1,2-Dichloroethane	ND	5.0
1,1-Dichloroethene	ND	5.0
Tetrachloroethene	ND	5.0
Trichloroethene	ND	5.0
MEK (2-Butanone)	ND	100
Vinyl chloride	ND	10.0
1,4-Dichlorobenzene	ND	5.0

*ND = None Detected

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia . 30144
Attn: Jon Overholtzer

Report Date: 04/10/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04013S 03566SA

EPA Method TCLP (Volatiles) Concentration Units: µg/L

SPIKES

Analysis	Date	Amt in Sample	Amt Spiked	Results	Recovery Percent	RPD
1,1-Dichloroethene	03/22/94	0.00	50	53.2	106	0.0
MEK (2-Butanone)	03/22/94	0.00	250	292	117	4.8
Chloroform	03/22/94	0.00	50	47.5	95.0	2.5
Carbon tetrachloride	03/22/94	0.00	50	45.7	91.4	2.4
Benzene	03/22/94	0.00	50	49.0	98.0	0.0
1,2-Dichloroethane	03/22/94	0.00	50	47.0	94.0	2.3
Trichloroethene	03/22/94	0.00	50	46.7	93.4	0.6
Tetrachloroethene	03/22/94	0.00	50	45.3	90.6	2.2
Chlorobenzene	03/22/94	0.00	50	46.6	93.2	5.2
1,4-Dichlorobenzene	03/22/94	0.00	50	41.5	83.0	6.8
Vinyl Chloride	03/22/94	0.00	50	75.9	152	2.7

APPL Sample No: R16730 03566S 03566SA

Analysis	Date	Amt in Sample	Amt Spiked	Results	Recovery Percent	RPD
1,1-Dichloroethene	03/22/94	0.00	50	53.2	106	0.0
MEK (2-Butanone)	03/22/94	0.00	250	307	123	4.8
Chloroform	03/22/94	0.00	50	48.7	97.4	2.5
Carbon tetrachloride	03/22/94	0.00	50	44.6	89.2	2.4
Benzene	03/22/94	0.00	50	49.0	98.0	0.0
1,2-Dichloroethane	03/22/94	0.00	50	48.1	96.2	2.3
Trichloroethene	03/22/94	0.00	50	47.0	94.0	0.6
Tetrachloroethene	03/22/94	0.00	50	46.3	92.6	2.2
Chlorobenzene	03/22/94	0.00	50	49.1	98.2	5.2
1,4-Dichlorobenzene	03/22/94	0.00	50	44.4	88.8	6.8
Vinyl Chloride	03/22/94	0.00	50	78.0	156	2.7

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/20/94
Date Received: NA

APPL Sample No: R16730-940325S
Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Pesticides

Compounds	Concentration µg/L	Detection Limit µg/L
Endrin	ND*	0.05
Heptachlor	ND	0.05
Heptachlor Epoxide	ND	0.05
Lindane	ND	0.05
Methoxychlor	ND	0.05
Technical Chlordane	ND	0.05
Toxaphene	ND	1.0

*ND = None Detected

Checked By James Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/20/94
Date Received: NA

APPL Sample No: R16730-940325S
Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) PCB

Compounds	Concentration µg/L	Detection Limit µg/L
PCB #1016	ND*	1.0
PCB #1221	ND	10
PCB #1232	ND	1.0
PCB #1242	ND	1.0
PCB #1248	ND	1.0
PCB #1254	ND	1.0
PCB #1260	ND	1.0

*ND = None Detected

Checked By Samuel Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/10/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04013S 940325SA

Concentration Units: µg/L

SPIKE

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery
8080	Lindane	03/25/94	0.00	0.40	0.342	85.5
8080	Heptachlor	03/25/94	0.00	0.40	0.324	81.0
8080	Endrin	03/25/94	0.00	1.00	1.30	130
8080	Methoxychlor	03/25/94	0.00	4.00	3.09	77.2
8080	Technical Chlordane	03/25/94	0.00	10.0	7.50	75.0
8080	Toxaphene	03/25/94	0.00	10.0	8.56	85.6

Comments:

Checked By James Coster

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/04/94

Sample I.D. No: Carswell AFB
Blank for samples
taken 03/20/94
APPL Sample No: R16730-940325S

Date Received: NA

Date Extracted: 03/25/94

Toxicity Charateristic Leaching Procedure (TCLP) 40 CFR Ch.1 (7-1-88 Edition) Herbicides

Compounds	Concentration µg/L	Detection Limit µg/L
2,4-D	ND*	2.0
2,4,5-TP	ND	1.0

*ND = None Detected

Checked By James Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/04/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04013S 04013SA

Concentration Units: µg/L

SPIKES

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8150	Dicamba	03/25/94	0.0	1.00	0.752	75.2	0.9
8150	2,4-DP	03/25/94	0.0	1.00	0.648	64.8	1.9
8150	2,4-D	03/25/94	0.0	1.00	0.772	77.2	2.4
8150	Silvex	03/25/94	0.0	1.00	0.766	76.6	0.5
8150	2,4,5-T	03/25/94	0.0	1.00	0.578	57.8	2.3

APPL Spike ID: R16730 04013S 04013SB

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8150	Dicamba	03/25/94	0.0	1.00	0.759	75.9	0.9
8150	2,4-DP	03/25/94	0.0	1.00	0.636	63.6	1.9
8150	2,4-D	03/25/94	0.0	1.00	0.754	75.4	2.4
8150	Silvex	03/25/94	0.0	1.00	0.762	76.2	0.5
8150	2,4,5-T	03/25/94	0.0	1.00	0.565	56.5	2.3

Comments:

Checked By Pamela Cook

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/04/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
Date Received: NA

APPL Sample No: R16730-940323W
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Acid Cmpds	Concentration µg/L	Quantitation Limit µg/L
2,4,6-Trichlorophenol	ND*	5.0
4-Chloro-3-methylphenol	ND	10.0
2-Chlorophenol	ND	5.0
2,4-Dichlorophenol	ND	5.0
2,4-Dimethylphenol	ND	5.0
2-Nitrophenol	ND	5.0
4-Nitrophenol	ND	10.0
2,4-Dinitrophenol	ND	10.0
2-Methyl-4,6-dinitrophenol	ND	10.0
2-Methylphenol	ND	5.0
4-Methylphenol	ND	5.0
Pentachlorophenol	ND	10.0
Phenol	ND	5.0
Benzoic acid	ND	5.0

Base/Neutral Cmpds	Concentration µg/L	Quantitation Limit µg/L
Acenaphthene	ND	5.0
1,2,4-Trichlorobenzene	ND	5.0
Hexachlorobenzene	ND	5.0
Hexachloroethane	ND	5.0
Bis-(2-chloroethyl)ether	ND	5.0
2-Chloronaphthalene	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
3,3'-Dichlorobenzidine	ND	10.0
2,4-Dinitrotoluene	ND	5.0
2,6-Dinitrotoluene	ND	5.0
Fluoranthene	ND	5.0
4-Chlorophenylphenylether	ND	5.0
4-Bromophenylphenylether	ND	5.0
Bis-(2-chloroisopropyl)ether	ND	5.0
Bis-(2-chloroethoxy)methane	ND	5.0
Hexachlorobutadiene	ND	5.0

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
Date Received: NA

APPL Sample No: R16730-940323W
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Base/Neutral Cmpds	Concentration µg/L	Quantitation Limit µg/L
Hexachlorocyclopentadiene	ND	5.0
Isophorone	ND	5.0
Naphthalene	ND	5.0
2-Methylnaphthalene	ND	5.0
Nitrobenzene	ND	5.0
N-nitrosodiphenylamine	ND	5.0
N-nitrosodi-n-propylamine	ND	5.0
N-nitrosodimethylamine	ND	5.0
Bis-(2-ethylhexyl)phthalate	ND	5.0
Butylbenzylphthalate	ND	5.0
Di-n-butylphthalate	ND	5.0
Di-n-octylphthalate	ND	5.0
Diethylphthalate	ND	5.0
Dimethylphthalate	ND	5.0
Benzo(a)anthracene	ND	5.0
Benzo(a)pyrene	ND	5.0
Benzo(k)fluoranthene	ND	5.0
Benzo(b)fluoranthene	ND	5.0
Benzyl alcohol	ND	5.0
Chrysene	ND	5.0
Acenaphthylene	ND	5.0
Anthracene	ND	5.0
Benzo(ghi)perylene	ND	5.0
Fluorene	ND	5.0
Phenanthrene	ND	5.0
Dibenzo(a,h)anthracene	ND	5.0
Dibenzofuran	ND	5.0
Indeno(1,2,3-cd)pyrene	ND	5.0
Pyrene	ND	5.0

* ND = None Detected

Checked By James Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
Date Received: NA

APPL Sample No: R16730-940323W
Date Extracted: 03/23/94

Method 8270 Results (Base Neutral and Acids):

Tentatively Identified and Quantified Compounds:

1,1-Diethoxyethane	6.9 µg/L
4-Hydroxy-4-methyl-2-pentanone	64.1 µg/L

TIC's are calculated on a 1:1 response factor to the nearest internal standard.

Checked by Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/10/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04012W 940322WA

Concentration Units: µg/L SPIKES Extraction Date: 03/22/94

Method	Analysis	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8270	Phenol	00.0	200	89.4	44.7	2.8
8270	2-Chlorophenol	00.0	200	190	95.0	1.0
8270	4-Chloro-3-methylphenol	00.0	200	197	98.5	1.0
8270	4-Nitrophenol	00.0	200	99.4	49.7	0.6
8270	Pentachlorophenol	00.0	200	227	114	8.8
8270	1,4-Dichlorobenzene	00.0	100	74.9	74.9	2.2
8270	N-Nitroso-di-n-propylamine	00.0	100	77.8	77.8	1.9
8270	1,2,4-Trichlorobenzene	00.0	100	78.3	78.3	0.3
8270	Acenaphthene	00.0	100	85.2	85.2	1.3
8270	2,4-Dinitrotoluene	00.0	100	91.5	91.5	0.4
8270	Pyrene	00.0	100	96.9	96.9	1.5

APPL Spike ID: R16730 03565W 940317WB

Method	Analysis	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8270	Phenol	00.0	200	91.9	46.0	2.8
8270	2-Chlorophenol	00.0	200	192	96.0	1.0
8270	4-Chloro-3-methylphenol	00.0	200	199	99.5	1.0
8270	4-Nitrophenol	00.0	200	100	50.0	0.6
8270	Pentachlorophenol	00.0	200	248	124	8.8
8270	1,4-Dichlorobenzene	00.0	100	76.6	76.6	2.2
8270	N-Nitroso-di-n-propylamine	00.0	100	79.3	79.3	1.9
8270	1,2,4-Trichlorobenzene	00.0	100	78.1	78.1	0.3
8270	Acenaphthene	00.0	100	86.3	86.3	1.3
8270	2,4-Dinitrotoluene	00.0	100	91.9	91.9	0.4
8270	Pyrene	00.0	100	98.4	98.4	1.5

Comments:

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
APPL Sample No: R16730-940324W

Date Received: NA
Date Extracted: 03/24/94

Method 8260 Results (Purgeables):

Compound	Concentration µg/L	Detection limit µg/L
Acetone	ND*	100
Benzene	ND	5.0
Bromodichloromethane	ND	5.0
Bromoform	ND	5.0
Bromomethane	ND	10.0
Carbon tetrachloride	ND	5.0
Chlorobenzene	ND	5.0
Chloroethane	ND	10.0
2-Chloroethylvinyl ether	ND	10.0
Chloroform	ND	5.0
Chloromethane	ND	10.0
Dibromochloromethane	ND	5.0
1,2-Dichlorobenzene	ND	5.0
1,4-Dichlorobenzene	ND	5.0
1,3-Dichlorobenzene	ND	5.0
1,1-Dichloroethane	ND	5.0
1,2-Dichloroethane	ND	5.0
1,1-Dichloroethene	ND	5.0
trans-1,2-Dichloroethene	ND	5.0
1,2-Dichloropropane	ND	5.0
cis-1,3-Dichloropropene	ND	5.0
trans-1,3-Dichloropropene	ND	5.0
Ethyl benzene	ND	5.0
Methylene chloride	ND	20
1,1,2,2-Tetrachloroethane	ND	5.0
Tetrachloroethene	ND	5.0
Toluene	ND	5.0
1,1,1-Trichloroethane	ND	5.0
1,1,2-Trichloroethane	ND	5.0
Trichloroethene	ND	5.0
Trichlorofluoromethane	ND	10.0
Vinyl chloride	ND	10.0
Xylenes	ND	5.0

* ND = None Detected

Checked By Tamara Cook

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/10/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04012W,04014W >PH324

Concentration Units: µg/L

SPIKES

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8260	1,1-DCE	03/24/94	0.00	50.0	56.3	113	0.9
8260	Benzene	03/24/94	0.00	50.0	49.9	99.8	1.6
8260	Trichloroethene	03/24/94	0.00	50.0	48.5	97.0	1.9
8260	Toluene	03/24/94	0.00	50.0	47.2	94.4	2.6
8260	Chlorobenzene	03/24/94	0.00	50.0	48.6	97.2	0.6

APPL Spike ID: R16730 04012W,04014W >PI324

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8260	1,1-DCE	03/24/94	0.00	50.0	56.8	114	0.9
8260	Benzene	03/24/94	0.00	50.0	49.1	98.2	1.6
8260	Trichloroethene	03/24/94	0.00	50.0	47.6	95.2	1.9
8260	Toluene	03/24/94	0.00	50.0	46.0	92.0	2.6
8260	Chlorobenzene	03/24/94	0.00	50.0	48.9	97.8	0.6

Comments:

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/10/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
APPL Sample No: R16730-940324W

Date Received: NA
Date Extracted: 03/24/94

Method 8080 Results (OCl Pesticides):

Compound	Concentration µg/L	Detection limit µg/L
Alachlor	ND*	0.05
Aldrin	ND	0.05
Benefin	ND	0.05
α-BHC	ND	0.05
ß-BHC	ND	0.05
δ-BHC	ND	0.05
Captan	ND	0.05
Carbophenothion	ND	0.05
Chlordane	ND	0.05
Chlorthal	ND	0.05
Dicofol	ND	0.05
Dieldrin	ND	0.05
DMPA	ND	0.05
Endosulfan I	ND	0.05
Endosulfan II	ND	0.05
Endosulfan sulfate	ND	0.05
Endrin	ND	0.05
Endrin aldehyde	ND	0.05
Endrin ketone	ND	0.05
Heptachlor	ND	0.05
Heptachlor epoxide	ND	0.05
Lindane	ND	0.05
2,4'-DDT	ND	0.05
2,4'-TDE	ND	0.05
4,4'-DDE	ND	0.05
4,4'-DDT	ND	0.05
4,4'-TDE	ND	0.05
Methoxychlor	ND	0.05
Nitrofen	ND	0.05
PCNB	ND	0.05
Toxaphene	ND	1.0

* ND = None Detected

Checked By Samuel Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Report Date: 04/10/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04012W 940324WA

Concentration Units: µg/L

SPIKES

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8080	Lindane	03/17/94	0.00	0.200	0.184	92.0	4.8
8080	Heptachlor	03/17/94	0.00	0.200	0.159	79.5	14
8080	Aldrin	03/17/94	0.00	0.200	0.142	71.0	21
8080	Dieldrin	03/17/94	0.00	0.500	0.458	91.6	36
8080	Endrin	03/17/94	0.00	0.500	0.491	98.2	3.0
8080	4,4'-DDT	03/17/94	0.00	0.500	0.335	67.0	1.8

APPL Spike ID: R16730 04012W 940324WB

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8080	Lindane	03/17/94	0.00	0.200	0.193	96.5	4.8
8080	Heptachlor	03/17/94	0.00	0.200	0.183	91.5	14
8080	Aldrin	03/17/94	0.00	0.200	0.176	88.0	21
8080	Dieldrin	03/17/94	0.00	0.500	0.475	95.0	36
8080	Endrin	03/17/94	0.00	0.500	0.506	101	3.0
8080	4,4'-DDT	03/17/94	0.00	0.500	0.329	65.8	1.8

Comments:

Checked By Pamela Cooper

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia 30144
Attn: Jon Overholtzer

Sample Date: NA
Report Date: 04/04/94

Sample I.D. No: Carswell AFB Blank for samples taken 03/17/94
APPL Sample No: R16730-940325W

Date Received: NA
Date Extracted: 03/25/94

Method 8150 Results (Herbicides):

Compound	Concentration mg/kg	Quantitation Limit mg/kg
Dicamba	ND*	0.1
2,4-D	ND	0.2
2,4-DB	ND	0.2
2,4-DP (Dichlorprop)	ND	0.2
2,4,5-T	ND	0.1
2,4,5-TP (Silvex)	ND	0.1
Dinoseb (DNBP)	ND	0.1
Dalapon	ND	2.0
MCPA	ND	50
MCPP	ND	50

* ND = None Detected

Checked By Lonnie Cook

Ensite, Inc.
114 Town Park Drive, Suite 400
Kennesaw, Georgia · 30144
Attn: Jon Overholtzer

Report Date: 04/04/94

Project ID No: Carswell AFB

APPL Spike ID: R16730 04012W 940324WA

Concentration Units: µg/L

SPIKES

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8150	Dicamba	03/25/94	0.0	1.00	0.816	81.6	11
8150	2,4-DP	03/25/94	0.0	1.00	1.08	108	10
8150	2,4-D	03/25/94	0.0	1.00	1.18	118	9.7
8150	Silvex	03/25/94	0.0	1.00	0.984	98.4	10
8150	2,4,5-T	03/25/94	0.0	1.00	1.22	122	10

APPL Spike ID: R16730 04012W 940324WB

Method	Analysis	Date	Amt in Sample	Amt Spiked	Results	Percent Recovery	RPD
8150	Dicamba	03/25/94	0.0	1.00	0.908	90.8	11
8150	2,4-DP	03/25/94	0.0	1.00	1.20	120	10
8150	2,4-D	03/25/94	0.0	1.00	1.30	130	9.7
8150	Silvex	03/25/94	0.0	1.00	1.09	109	10
8150	2,4,5-T	03/25/94	0.0	1.00	1.35	135	10

Comments:

Checked By Pamela Cooper

238 86

65 drum pit

Building 113

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services
2575 LONE STAR DRIVE * P.O. BOX 224227, DALLAS, TEXAS 75222 * 214/631-2700

Client CARSWELL AIR FORCE BASE
HOSP/SGPB
BIOENVIRONMENTAL ENGINEERING,
CARSWELL AFB, TX. 76127-5300
Attn: CAPTAIN BOUMA

Client No. 21514690
Report No. D3-04-284
Report Date 05/12/93 09:02

Project HAZWASTE ACC PT

Date Sampled 04/26/93

Sampled By MARIA R. PAZ

Sample Type SLUDGE/LIQUID

Transported by BOB GARRETT

P.O. # BPA#F41613-A0044 CALL#138-141

Date Received 04/27/93

PROJECT#7SG/CEV-HAZWASTE ACC PT/BLDG 1190
CALL#138-141

Lab No.	Sample Identification
D3-04-284-01	GL930138
D3-04-284-02	GL930139
D3-04-284-03	GL930140
D3-04-284-04	GT930141

SOUTHWESTERN LABORATORIES

Reviewed By

William J. Gase, Supervisor, EAS

Order # 03-04-284
05/12/93 09:02
Client: CARSWELL AIR FORCE BASE

TEST RESULTS BY SAMPLE

Sample: 01A GL930138 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	17.7	MG/KG	2.00	04/28/93	MD
Toluene	SW-846 8020	384	MG/KG	2.00	04/28/93	MD
Ethylbenzene	SW-846 8020	281	MG/KG	2.00	04/28/93	MD
Total Xylenes	SW-846 8020	1651	MG/KG	2.00	04/28/93	MD
Total BTEX	SW-846 8020	2334	MG/KG	2.00	04/28/93	MD

Sample: 01B GL930138 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organic Compounds	8010 & 8020	Enclosure	Date Com		05/04/93	LG

Sample: 01C GL930138 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>150	DEG. F		05/06/93	JG
TCLP Metals	SW846-7000			Regulatory Limit		
Arsenic	SW846-7000	<0.01	MG/L	5.0	05/07/93	CL
Barium	SW846-7000	1.13	MG/L	100	05/10/93	CG
Cadmium	SW846-7000	0.65	MG/L	1.0	05/07/93	CL
Chromium	SW846-7000	<0.05	MG/L	5.0	05/07/93	CL
Lead	SW846-7000	3.27	MG/L	5.0	05/07/93	CL
Mercury	SW846-7000	<0.002	MG/L	0.20	05/05/93	KC
Selenium	SW846-7000	<0.005	MG/L	1.0	05/10/93	CL
Silver	SW846-7000	0.06	MG/L	5.0	05/07/93	CL
TCLP Preparation		04/28/93	Date Com			MW
pH	EPA 9045	6.1	pH Units		04/28/93	MW

Sample: 01D GL930138 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
TCLP Volatile Organics	EPA_624	Enclosure	Date Com		05/03/93	LG
Zero Headspace Extraction	TCLP	04/29/93	Date Com		04/29/93	LG

Sample: 02A GL930139 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	8.45	MG/KG	2.00	04/28/93	MD
Toluene	SW-846 8020	82.7	MG/KG	2.00	04/28/93	MD
Ethylbenzene	SW-846 8020	38.2	MG/KG	2.00	04/28/93	MD
Total Xylenes	SW-846 8020	146	MG/KG	2.00	04/28/93	MD
Total BTEX	SW-846 8020	275	MG/KG	2.00	04/28/93	MD

Sample: 02B GL930139 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organic Compounds	8010 & 8020	Enclosure	Date Com		05/04/93	LG

Sample: 02C GL930139 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>150	DEG. F		05/06/93	JG
TCLP Metals	SW846-7000			Regulatory Limit		
Arsenic	SW846-7000	<0.01	MG/L	5.0	05/07/93	CL
Barium	SW846-7000	0.69	MG/L	100	05/10/93	CG
Cadmium	SW846-7000	<0.03	MG/L	1.0	05/07/93	CL
Chromium	SW846-7000	<0.05	MG/L	5.0	05/07/93	CL
Lead	SW846-7000	<0.10	MG/L	5.0	05/07/93	CL
Mercury	SW846-7000	<0.002	MG/L	0.20	05/05/93	BC
Selenium	SW846-7000	<0.005	MG/L	1.0	05/10/93	CL
Silver	SW846-7000	<0.03	MG/L	5.0	05/07/93	CL
TCLP Preparation		04/28/93	Date Com			MW
pH	EPA 9045	6.5	pH Units		04/28/93	MW

Sample: 02D GL930139 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
TCLP Volatile Organics	EPA_624	Enclosure	Date Com		05/03/93	LG
Zero Headspace Extraction	TCLP	04/29/93	Date Com		04/29/93	LG

Sample: 03A GL930140 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	13.4	MG/KG	2.00	04/28/93	MD
Toluene	SW-846 8020	128	MG/KG	2.00	04/28/93	MD
Ethylbenzene	SW-846 8020	102	MG/KG	2.00	04/28/93	MD
Total Xylenes	SW-846 8020	321	MG/KG	2.00	04/28/93	MD
Total BTEX	SW-846 8020	564	MG/KG	2.00	04/28/93	MD

Sample: 03B GL930140 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organic Compounds	8010 & 8020	Enclosure	Date Com		05/04/93	LG

Sample: 03C GL930140 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	143	DEG. F		05/06/93	MB
TCLP Metals	SW846-7000			Regulatory Limit		
Arsenic	SW846-7000	0.02	MG/L	5.0	05/07/93	CL
Barium	SW846-7000	0.92	MG/L	100	05/10/93	CG
Cadmium	SW846-7000	<0.03	MG/L	1.0	05/07/93	CL
Chromium	SW846-7000	<0.05	MG/L	5.0	05/07/93	CL
Lead	SW846-7000	0.17	MG/L	5.0	05/07/93	CL
Mercury	SW846-7000	<0.002	MG/L	0.20	05/05/93	KC
Selenium	SW846-7000	<0.005	MG/L	1.0	05/10/93	CL
Silver	SW846-7000	<0.03	MG/L	5.0	05/07/93	CL
TCLP Preparation		04/28/93	Date Com			MW
pH	EPA 9045	5.8	pH Units		04/28/93	MW

Sample: 03D GL930140 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
TCLP Volatile Organics	EPA_624	Enclosure	Date Com		05/03/93	LG
Zero Headspace Extraction	TCLP	04/30/93	Date Com		04/30/93	LG

TEST RESULTS BY SAMPLE

Sample: 04A GT930141 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	4.72	MG/L	2.00	04/28/93	MD
Toluene	SW-846 8020	30.9	MG/L	2.00	04/28/93	MD
Ethylbenzene	SW-846 8020	11.3	MG/L	2.00	04/28/93	MD
Total Xylenes	SW-846 8020	49.5	MG/L	2.00	04/28/93	MD
Total BTEX	SW-846 8020	96.4	MG/L	2.00	04/28/93	MD

Sample: 04B GT930141 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Volatile Organic Compounds	EPA 8240	Enclosure	Date Com		05/04/93	LG

Sample: 04C GT930141 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>150	DEG. F		05/06/93	JG
TCLP Metals	SW846-7000			Regulatory Limit		
Arsenic	SW846-7000	<0.01	MG/L	5.0	05/07/93	CL
Barium	SW846-7000	0.40	MG/L	100	05/10/93	CG
Cadmium	SW846-7000	<0.03	MG/L	1.0	05/07/93	CL
Chromium	SW846-7000	<0.05	MG/L	5.0	05/07/93	CL
Lead	SW846-7000	<0.10	MG/L	5.0	05/07/93	CL
Mercury	SW846-7000	<0.002	MG/L	0.20	05/05/93	KC
Selenium	SW846-7000	<0.005	MG/L	1.0	05/10/93	CL
Silver	SW846-7000	0.151	MG/L	5.0	05/07/93	CL
TCLP Preparation		04/28/93	Date Com			MW
pH	EPA 150.1	6.3	pH units		04/28/93	MW

Sample: 04D GT930141 Collected: 04/26/93

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
TCLP Volatile Organics	EPA_624	Enclosure	Date Com		05/04/93	LG
Zero Headspace Extraction	TCLP	05/04/93	Date Com		05/04/93	LG

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55
Client: Carswell AFB
Date Analyzed: 05/03/93 Thru 05/04/93
Instrument ID: 70 1

THE FOLLOWING SAMPLES WERE ANALYZED:

LAB NUMBER	SAMPLE ID	LAB FILE ID
9304284-1	GS 930138	>AJ371
9304284-2	GS 930139	>AJ373
9304284-3	GS 930140	>AJ374
9304284-4	GS 930141	>AJ379

Loretta Gase, GC/MS Chemist

William J. Gase, Supervisor, EAS

VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

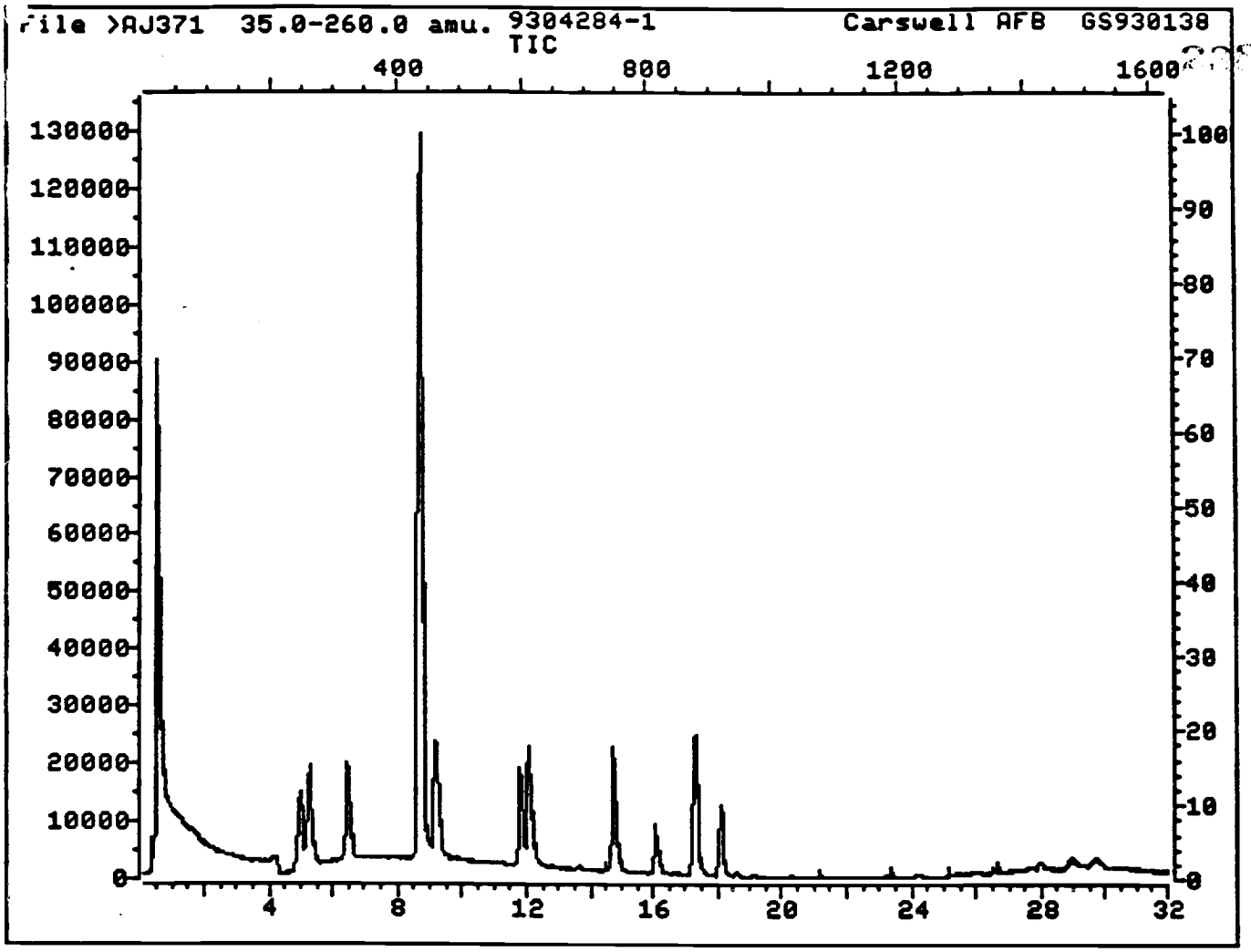
238 93

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55 Dallas
Matrix: TCLP Extract
Sample vol: 0.250 ml
Level: (low/med) LOW
Dilution Factor: 1

Lab Number: 9304284-1
Client: Carswell AFB
Sample ID: GS 930138
Lab File ID: >AJ371
Date Received: 04/27/93
Date Analyzed: 05/03/93

CAS NO.	COMPOUND	CONCENTRATION ug/L
71-43-2	Benzene	<100.
56-23-5	Carbon Tetrachloride	<100.
108-90-7	Chlorobenzene	<100.
67-66-3	Chloroform	<100
107-02-2	1,2-Dichloroethane	<100.
75-35-4	1,1-Dichloroethene	<100.
78-93-3	2-Butanone (MEK)	<2000.
127-18-4	Tetrachloroethene	<100.
79-01-6	Trichloroethene	<100.
75-01-4	Vinyl Chloride	<200.

D - The result is from a diluted sample.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32

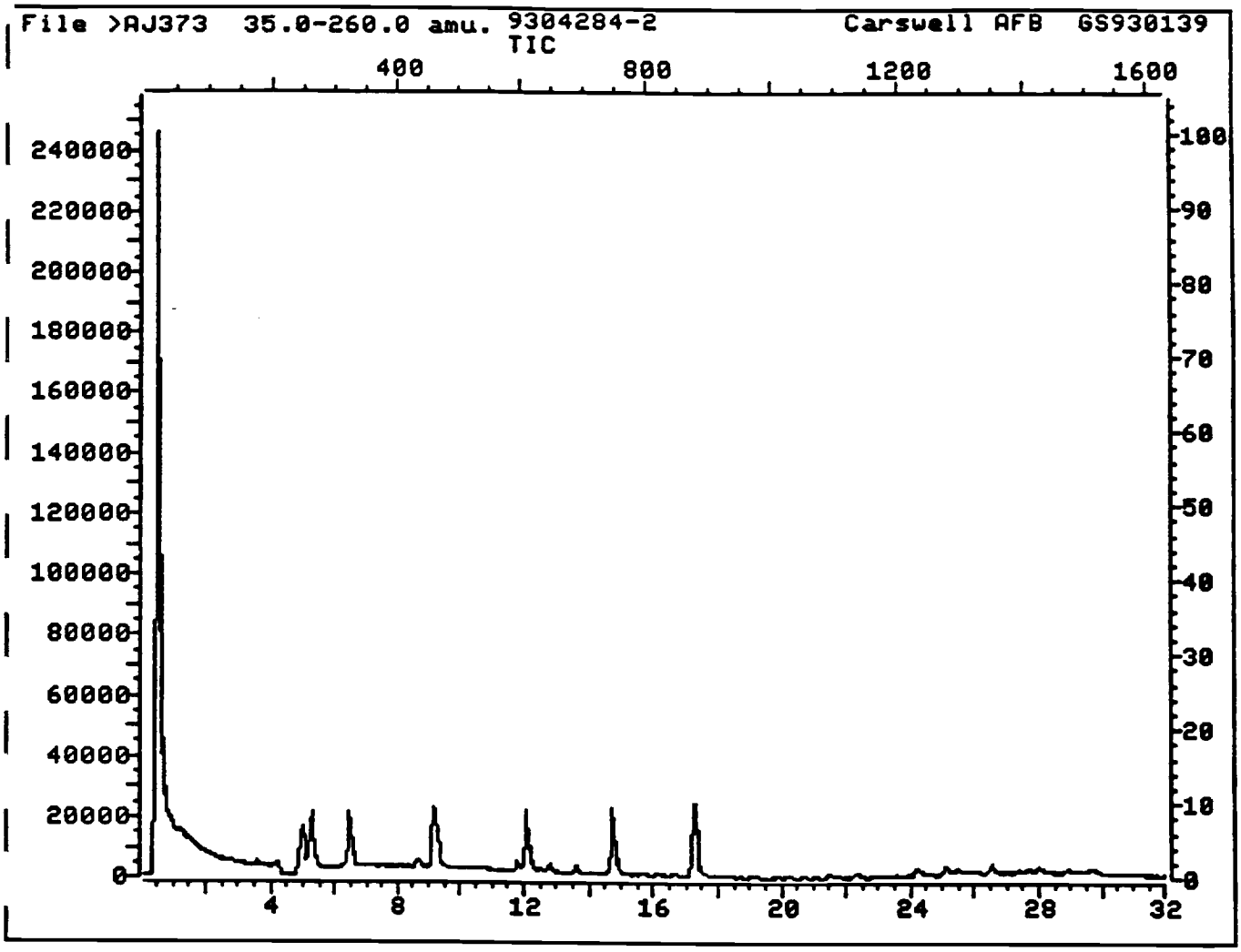
VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55 Dallas
Matrix: TCLP Extract
Sample vol: 0.250 ml
Level: (low/med) LOW
Dilution Factor: 1

Lab Number: 9304284-2
Client: Carswell AFB
Sample ID: GS 930139
Lab File ID: >AJ373
Date Received: 04/27/93
Date Analyzed: 05/03/93

CAS NO.	COMPOUND	CONCENTRATION ug/L
71-43-2	Benzene	<100.
56-23-5	Carbon Tetrachloride	<100.
108-90-7	Chlorobenzene	<100.
67-66-3	Chloroform	<100
107-02-2	1,2-Dichloroethane	<100.
75-35-4	1,1-Dichloroethene	<100.
78-93-3	2-Butanone (MEK)	<2000.
127-18-4	Tetrachloroethene	<100.
79-01-6	Trichloroethene	<100.
75-01-4	Vinyl Chloride	<200.

D - The result is from a diluted sample.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Carswell AFB GS930139
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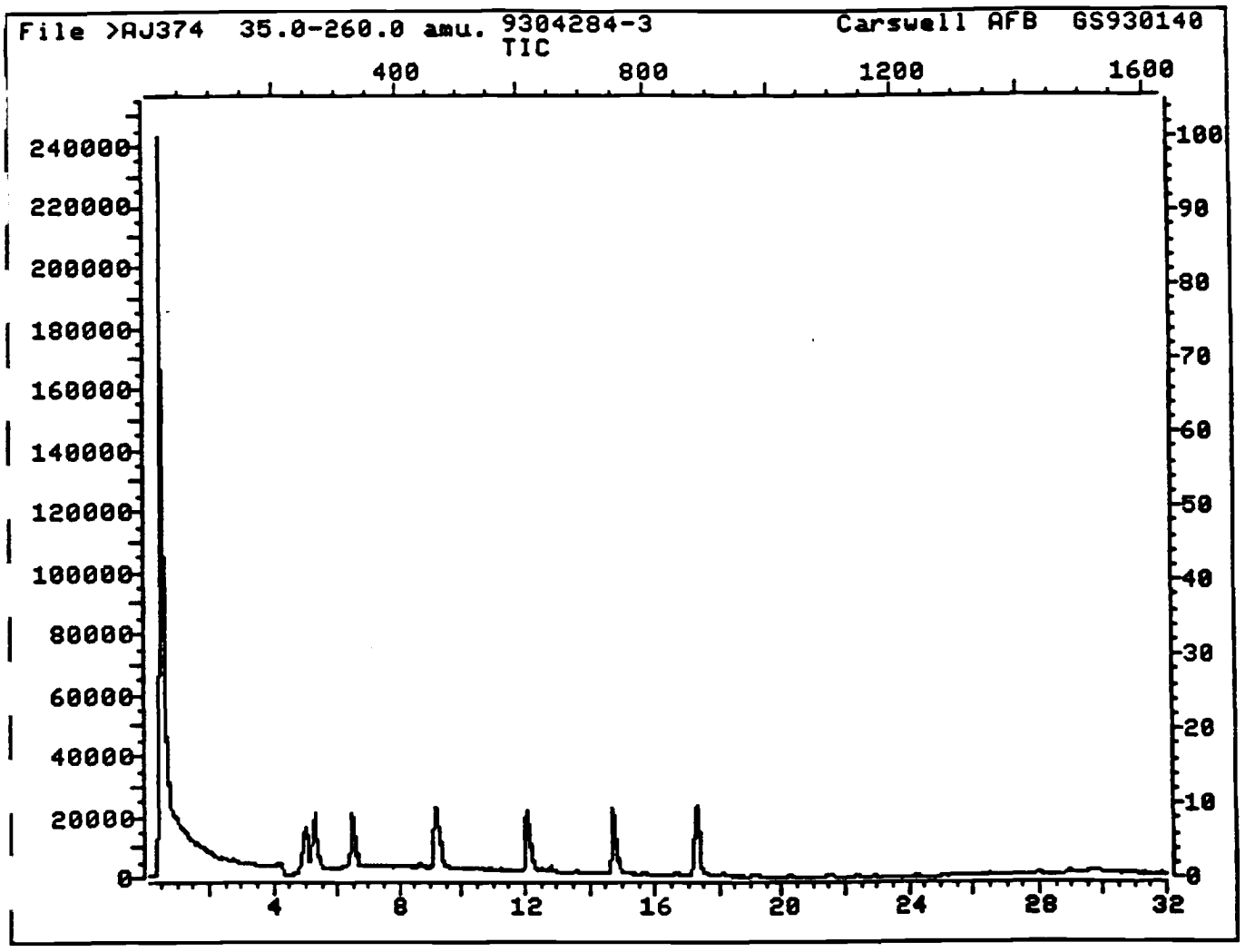
VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55 Dallas
Matrix: TCLP Extract
Sample vol: 0.250 ml
Level: (low/med) LOW
Dilution Factor: 1

Lab Number: 9304284-3
Client: Carswell AFB
Sample ID: GS 930140
Lab File ID: >AJ374
Date Received: 04/27/93
Date Analyzed: 05/03/93

CAS NO.	COMPOUND	CONCENTRATION ug/L
71-43-2	Benzene	109.
56-23-5	Carbon Tetrachloride	<100.
108-90-7	Chlorobenzene	<100.
67-66-3	Chloroform	<100
107-02-2	1,2-Dichloroethane	<100.
75-35-4	1,1-Dichloroethene	<100.
78-93-3	2-Butanone (MEK)	<2000.
127-18-4	Tetrachloroethene	<100.
79-01-6	Trichloroethene	<100.
75-01-4	Vinyl Chloride	<200.

D - The result is from a diluted sample.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VOLATILE ORGANICS ANALYSIS DATA SHEET
TCLP

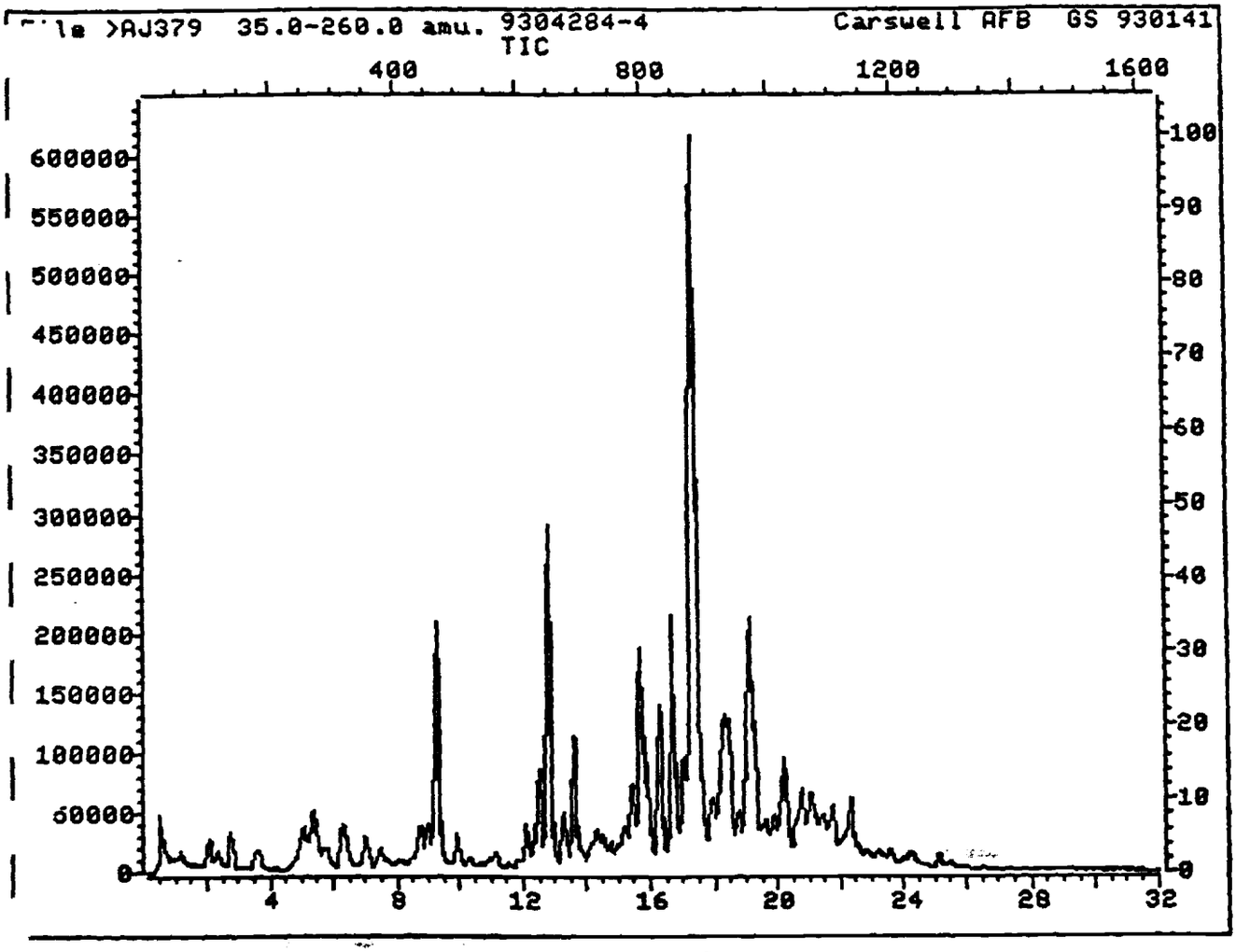
Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55 Dallas
Matrix: TCLP Extract
Sample vol: 0.250 ml
Level: (low/med) LOW
Dilution Factor: 1

Lab Number: 9304284-4
Client: Carswell AFB
Sample ID: GS 930141
Lab File ID: >AJ379
Date Received: 04/27/93
Date Analyzed: 05/04/93

CAS NO.	COMPOUND	CONCENTRATION ug/L
71-43-2	Benzene	2109.
56-23-5	Carbon Tetrachloride	<100.
108-90-7	Chlorobenzene	<100.
67-66-3	Chloroform	<100
107-02-2	1,2-Dichloroethane	<100.
75-35-4	1,1-Dichloroethene	<100.
78-93-3	2-Butanone (MEK)	<2000.
127-18-4	Tetrachloroethene	380.
79-01-6	Trichloroethene	<100.
75-01-4	Vinyl Chloride	<200.

D - The result is from a diluted sample.

238100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300000
250000
200000
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100000
50000
0
100
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12
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20
24
28
32

Lab Name: SOUTHWESTERN LABORATORIES
Lab Code: 54-55
Client: Carswell AFB
Date Analyzed: 05/04/93
Instrument ID: 70 1

THE FOLLOWING SAMPLES WERE ANALYZED:

LAB NUMBER	SAMPLE ID	LAB FILE ID
9304284-1	GS 930138	>AJ390
9304284-2	GS 930139	>AJ391
9304284-3	GS 930140	>AJ392
9304284-4	GS 930141	>AJ393

Loretta Gase, GC/MS Chemist

William J. Gase, Supervisor, EAS

238102

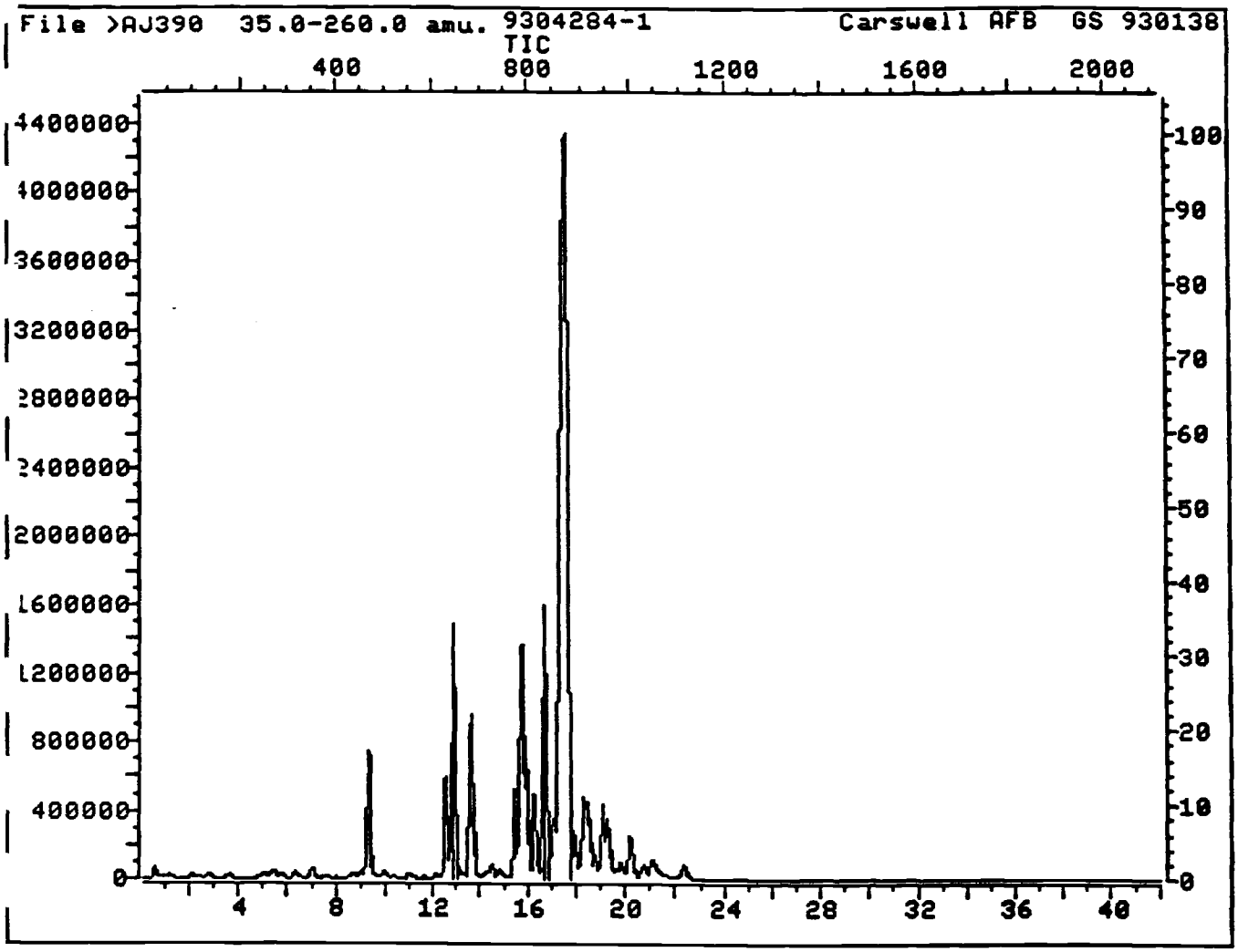
VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA METHOD 8010

Name: Southwestern Laboratories
Code: 54-55 Dallas
Matrix: (soil/water) Soil
Sample wt/vol: 0.0340 (g/mL) G
Level: (low/med) Low
Dilution Factor: 1.0

Lab Number: 9304284-1
Client: Carswell AFB
Sample ID: GS 930138
Lab File ID: >AJ390
Date Received: 04/27/93
Date Analyzed: 5/04/93

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	1500.	U
74-83-9	Bromomethane	1500.	U
75-01-4	Vinyl Chloride	1500.	U
75-69-4	Trichlorofluoromethane	1500.	U
75-00-3	Chloroethane	1500.	U
75-09-2	Methylene Chloride	740.	U
75-35-4	1,1-Dichloroethene	740.	U
75-34-3	1,1-Dichloroethane	740.	U
156-60-5	trans-1,2-Dichloroethene	740.	U
67-66-3	Chloroform	740.	U
107-02-2	1,2-Dichloroethane	740.	U
71-55-6	1,1,1-Trichloroethane	740.	U
56-23-5	Carbon Tetrachloride	740.	U
75-27-4	Bromodichloromethane	740.	U
78-87-5	1,2-Dichloropropane	740.	U
110-75-8	2-Chloroethylvinyl Ether	1500.	U
10061-01-5	cis-1,3-Dichloropropene	740.	U
79-01-6	Trichloroethene	740.	U
124-48-1	Dibromochloromethane	740.	U
79-00-5	1,1,2-Trichloroethane	740.	U
10061-02-6	trans-1,3-Dichloropropene	740.	U
75-25-2	Bromoform	740.	U
127-18-4	Tetrachloroethene	4000.	
79-34-5	1,1,2,2-Tetrachloroethane	740.	U
108-90-7	Chlorobenzene	740.	U
541-73-1	1,3-Dichlorobenzene	740.	U
106-46-7	1,4-Dichlorobenzene	740.	U
95-50-1	1,2-Dichlorobenzene	740.	U

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
B - The compound was found in the method blank.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Carswell AFB GS 930138
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238104

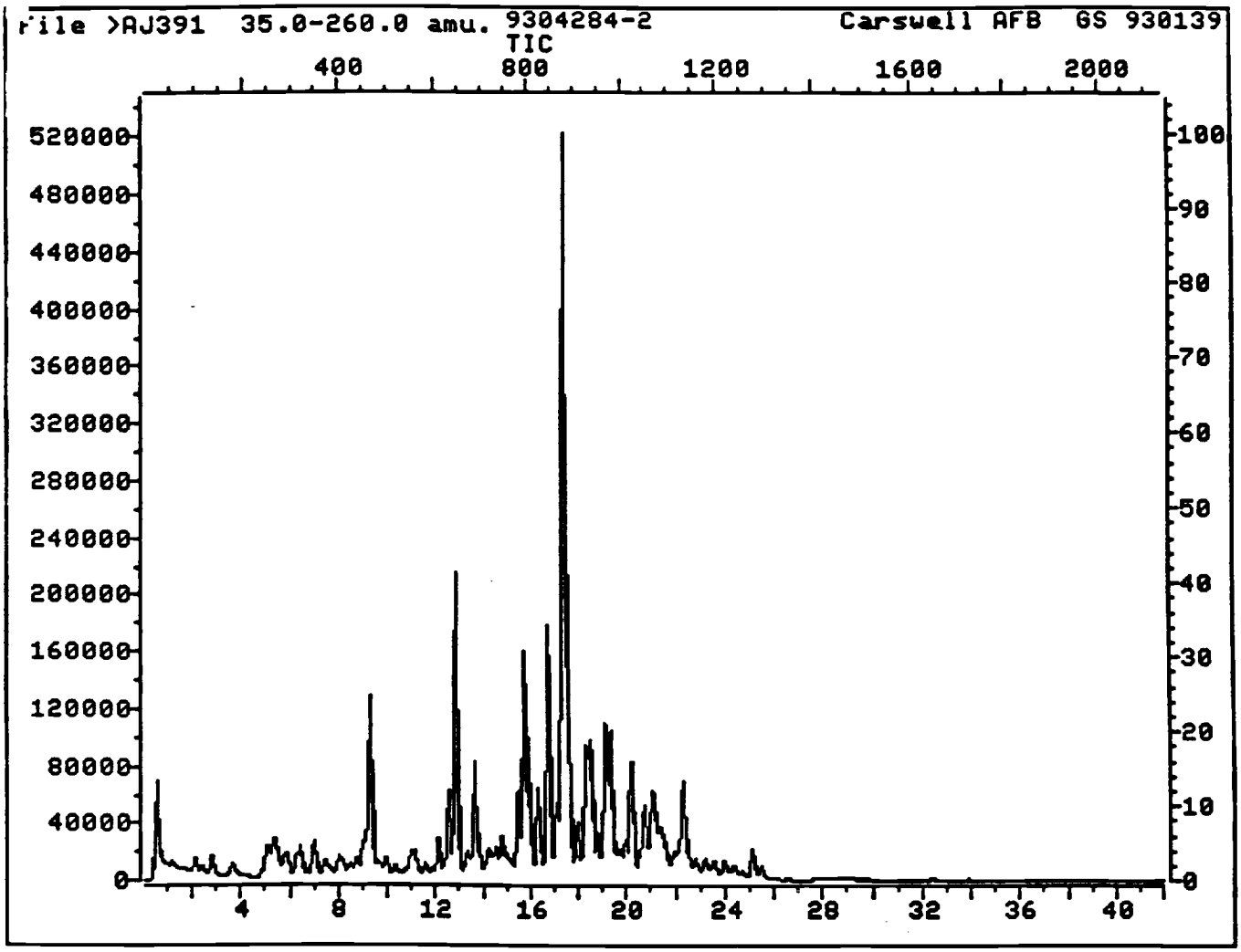
VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA METHOD 8010

Name: Southwestern Laboratories
Code: 54-55 Dallas
Matrix: (soil/water) Soil
Sample wt/vol: 0.0354 (g/mL) G
Level: (low/med) Low
Dilution Factor: 1.0

Lab Number: 9304284-2
Client: Carswell AFB
Sample ID: GS 930139
Lab File ID: >AJ391
Date Received: 04/27/93
Date Analyzed: 5/04/93

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	1400.	U
74-83-9	Bromomethane	1400.	U
75-01-4	Vinyl Chloride	1400.	U
75-69-4	Trichlorofluoromethane	1400.	U
75-00-3	Chloroethane	1400.	U
75-09-2	Methylene Chloride	710.	U
75-35-4	1,1-Dichloroethene	710.	U
75-34-3	1,1-Dichloroethane	710.	U
156-60-5	trans-1,2-Dichloroethene	710.	U
67-66-3	Chloroform	710.	U
107-02-2	1,2-Dichloroethane	710.	U
71-55-6	1,1,1-Trichloroethane	710.	U
56-23-5	Carbon Tetrachloride	710.	U
75-27-4	Bromodichloromethane	710.	U
78-87-5	1,2-Dichloropropane	710.	U
110-75-8	2-Chloroethylvinyl Ether	1400.	U
10061-01-5	cis-1,3-Dichloropropene	710.	U
79-01-6	Trichloroethene	710.	U
124-48-1	Dibromochloromethane	710.	U
79-00-5	1,1,2-Trichloroethane	710.	U
10061-02-6	trans-1,3-Dichloropropene	710.	U
75-25-2	Bromoform	710.	U
127-18-4	Tetrachloroethene	1400.	
79-34-5	1,1,2,2-Tetrachloroethane	710.	U
108-90-7	Chlorobenzene	710.	U
541-73-1	1,3-Dichlorobenzene	710.	U
106-46-7	1,4-Dichlorobenzene	1100.	
95-50-1	1,2-Dichlorobenzene	710.	U

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
B - The compound was found in the method blank.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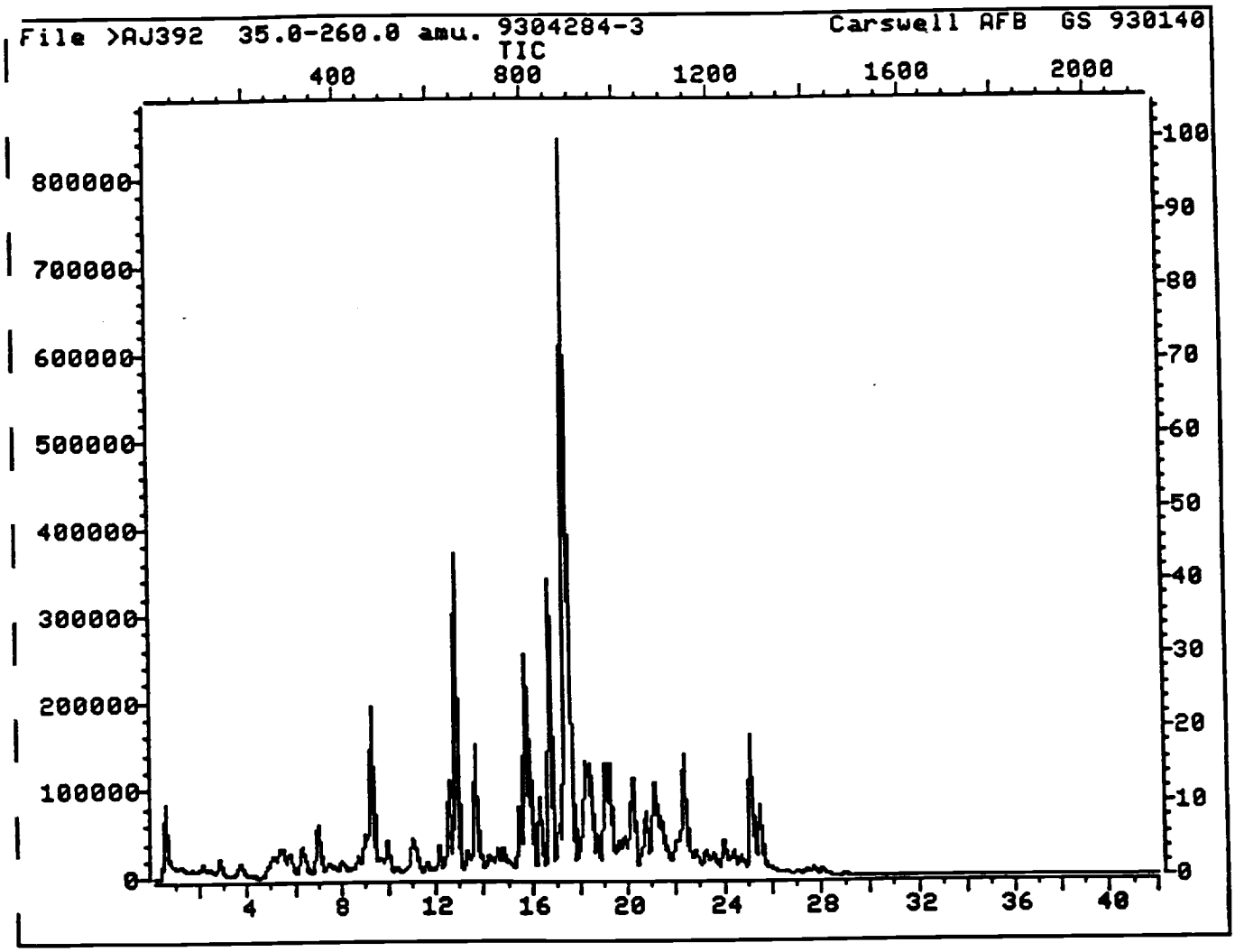
VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA METHOD 8010

Name: Southwestern Laboratories
Lab Code: 54-55 Dallas
Matrix: (soil/water) Soil
Sample wt/vol: 0.0298 (g/mL) G
Level: (low/med) Low
Dilution Factor: 1.0

Lab Number: 9304284-3
Client: Carswell AFB
Sample ID: GS 930140
Lab File ID: >AJ392
Date Received: 04/27/93
Date Analyzed: 5/04/93

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/Kg	Q
74-87-3	Chloromethane	1700.	U
74-83-9	Bromomethane	1700.	U
75-01-4	Vinyl Chloride	1700.	U
75-69-4	Trichlorofluoromethane	1700.	U
75-00-3	Chloroethane	1700.	U
75-09-2	Methylene Chloride	840.	U
75-35-4	1,1-Dichloroethene	840.	U
75-34-3	1,1-Dichloroethane	840.	U
156-60-5	trans-1,2-Dichloroethene	840.	U
67-66-3	Chloroform	840.	U
107-02-2	1,2-Dichloroethane	840.	U
71-55-6	1,1,1-Trichloroethane	840.	U
56-23-5	Carbon Tetrachloride	840.	U
75-27-4	Bromodichloromethane	840.	U
78-87-5	1,2-Dichloropropane	840.	U
110-75-8	2-Chloroethylvinyl Ether	1700.	U
10061-01-5	cis-1,3-Dichloropropene	840.	U
79-01-6	Trichloroethene	840.	U
124-48-1	Dibromochloromethane	840.	U
79-00-5	1,1,2-Trichloroethane	840.	U
10061-02-6	trans-1,3-Dichloropropene	840.	U
75-25-2	Bromoform	840.	U
127-18-4	Tetrachloroethene	1400.	
79-34-5	1,1,2,2-Tetrachloroethane	840.	U
108-90-7	Chlorobenzene	840.	U
541-73-1	1,3-Dichlorobenzene	840.	U
106-46-7	1,4-Dichlorobenzene	840.	U
95-50-1	1,2-Dichlorobenzene	840.	U

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
B - The compound was found in the method blank.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Carswell AFB GS 930140
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VOLATILE ORGANICS ANALYSIS DATA SHEET
EPA METHOD 8010

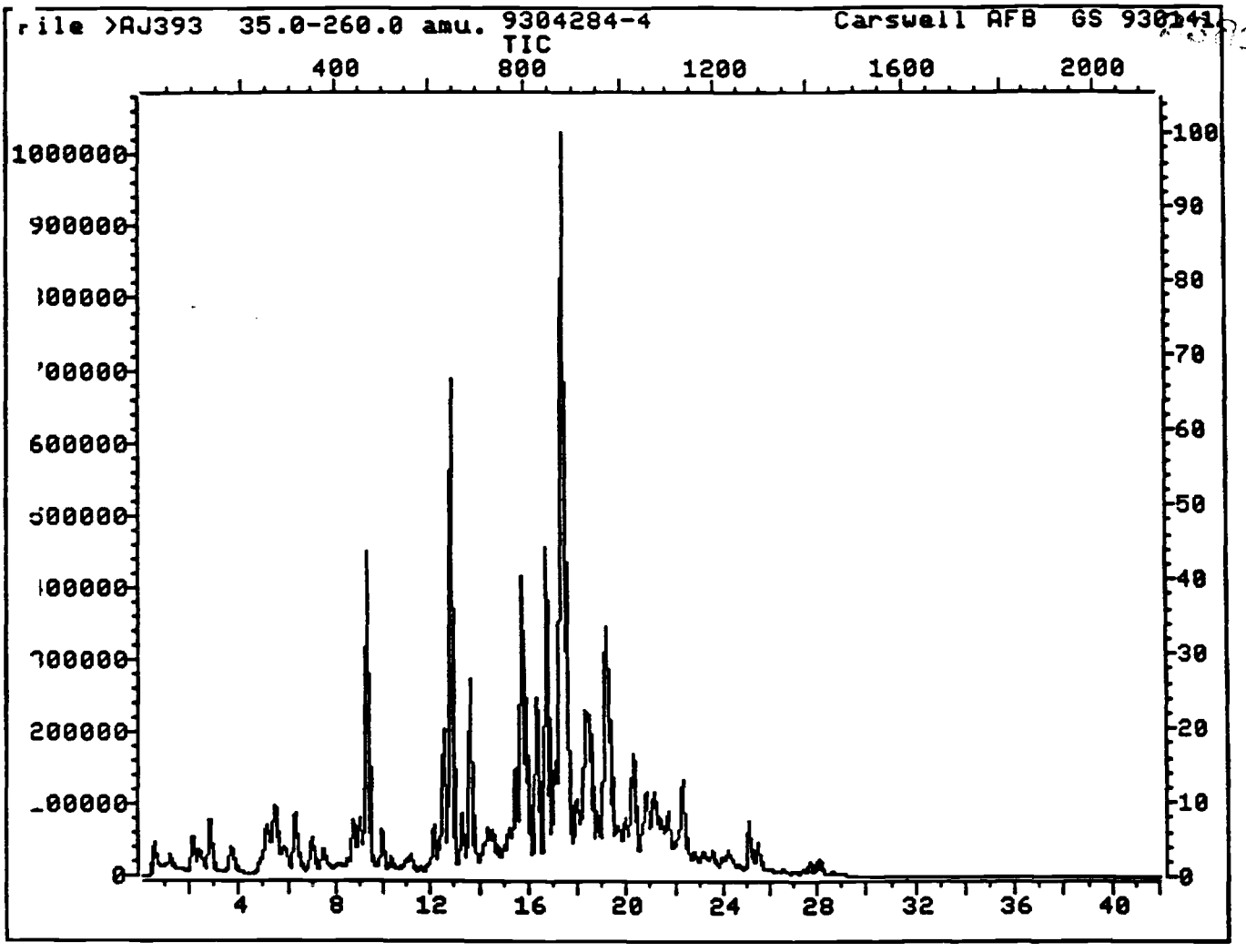
238108

Name: Southwestern Laboratories
Code: 54-55 Dallas
Matrix: (soil/water) Liquid
Sample wt/vol: 0.003 (g/mL) ml
Level: (low/med) Low
Dilution Factor: 1.0

Lab Number: 9304284-4
Client: Carswell AFB
Sample ID: GS 930141
Lab File ID: >AJ393
Date Received: 04/27/93
Date Analyzed: 5/04/93

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/Kg) ug/L	Q
74-87-3	Chloromethane	17000.	U
74-83-9	Bromomethane	17000.	U
75-01-4	Vinyl Chloride	17000.	U
75-69-4	Trichlorofluoromethane	17000.	U
75-00-3	Chloroethane	17000.	U
75-09-2	Methylene Chloride	8300.	U
75-35-4	1,1-Dichloroethene	8300.	U
75-34-3	1,1-Dichloroethane	8300.	U
156-60-5	trans-1,2-Dichloroethene	8300.	U
67-66-3	Chloroform	8300.	U
107-02-2	1,2-Dichloroethane	8300.	U
71-55-6	1,1,1-Trichloroethane	8300.	U
56-23-5	Carbon Tetrachloride	8300.	U
75-27-4	Bromodichloromethane	8300.	U
78-87-5	1,2-Dichloropropane	8300.	U
110-75-8	2-Chloroethylvinyl Ether	17000.	U
10061-01-5	cis-1,3-Dichloropropene	8300.	U
79-01-6	Trichloroethene	8300.	U
124-48-1	Dibromochloromethane	8300.	U
79-00-5	1,1,2-Trichloroethane	8300.	U
10061-02-6	trans-1,3-Dichloropropene	8300.	U
75-25-2	Bromoform	8300.	U
127-18-4	Tetrachloroethene	60000.	
79-34-5	1,1,2,2-Tetrachloroethane	8300.	U
108-90-7	Chlorobenzene	8300.	U
541-73-1	1,3-Dichlorobenzene	8300.	U
106-46-7	1,4-Dichlorobenzene	8300.	U
95-50-1	1,2-Dichlorobenzene	9900.	

NOTE: U - Compound analyzed for but not detected. The reported value is the minimum attainable detection limit for the sample.
D - The result is from a diluted sample.
B - The compound was found in the method blank.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Carswell AFB GS 930141
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SwL

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

2575 Lone Star Drive, P. O. Box 224227, Dallas, Texas 75222

ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Project No.

Client / Project: Carswell AFB

Field Sample No. / Identification	Date and Time	Grab	Comp	No. of Sample Containers	Sample Type (Liquid, Sludge, etc.)	Preservative	Analysis Requested (Method 8010)	Laboratory Remarks
SL930138	4/26/93 1330	X		4	Sludge	NA	~~BTEX and Total chlorinated volatiles~~ Ignitability, pH, TCLP metals & volatiles,	
GL930139	4/26/93 1350	X		4	Sludge	NA	Ignitability, pH, TCLP metals & volatiles, BTEX, Total chlorinated volatiles (Method 8010)	
GL930140	4/26/93 1330	X		4	Sludge	NA	Ignitability, pH, TCLP metals & volatiles, BTEX, total chlorinated Volatiles (Method 8010)	
GT930141	4/26/93 1330	X		4	Liquid	NA	Ignitability, pH, TCLP metals & volatiles, BTEX, Total chlorinated volatiles (Method 8010)	

Samplers : (Signature)		Relinquished by: (Signature)	Date : Time :	Received by : (Signature)	Date : Time :	COC Seal No.
Maria R. Paz		Bob Kennett	27Apr93 0735	Bob Kennett	4/27/93 7:35	Rcvd in good condition
Affiliation		Relinquished by (Signature) Bob Kennett	Date : 4/27/93 Time : 9:47 AM	Received by : (Signature)	Date : Time :	
		Relinquished by: (Signature)	Date : Time :	Received by Laboratory: (Signature) M Koch	Date : 4.27.93 Time : 9:47 AM	Intact:

Remarks :

Data Results To:

1. Robert L. Thompson Strategic Hosp/SGPB
   Carswell AFB, Texas 76127-5300

2. 7 SG / CEV
   Carswell AFB, TX 76127-5300
   Attn: Capt Perma

Laboratory No. 9304.21

238111

6 Drums of

Building

SWL SOUTHWESTERN LABORATORIES 338112

2575 LONE STAR DRIVE * P.O. BOX 224227, DALLAS,TEXAS 75222 * 214/631-2700

Client CARSWELL AIR FORCE BASE
7SPTG/DEV
CARSWELL AFB, TX. 76127-5300

Attn: MSGT PAUL BAILEY

Client No. 21514690
Report No. D3-09-046
Report Date 09/22/93 09:26

Project DRUM SAMPLING

Date Sampled 09/07/93

Sampled By R ZINT

Sample Type SLUDGE

Transported by R ZINT

P.O. # BPA#91-A0154 CALL# 93-140

Date Received 09/07/93

Call # 93-140

Lab No.	Sample Identification
D3-09-046-01	DRUM-1
D3-09-046-02	DRUM 2
D3-09-046-03	DRUM 3
D3-09-046-04	DRUM 4
D3-09-046-05	DRUM 5

SOUTHWESTERN LABORATORIES

Reviewed By

William J Gase, Supervisor, EAS

AFBDA Drums located at DRMO Haz/Was storage building. The drums EMTEC were called to respond to. These samples were taken after the incident.

Sample: 01A DRUM-1 Collected: 09/07/93 12:00

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	19.4	MG/L	10.0	09/08/93	MD
Toluene	SW-846 8020	245	MG/L	10.0	09/08/93	MD
Ethylbenzene	SW-846 8020	344	MG/L	10.0	09/08/93	MD
Total Xylenes	SW-846 8020	1906	MG/L	10.0	09/08/93	MD
Total BTEX	SW-846 8020	2514	MG/L	10.0	09/08/93	MD

Sample: 01C DRUM-1 Collected: 09/07/93 12:00

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	117	DEG. F		09/17/93	LG

Sample: 02A DRUM 2 Collected: 09/07/93 12:30

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	2.67	MG/L	0.30	09/08/93	MD
Toluene	SW-846 8020	18.9	MG/L	0.30	09/08/93	MD
Ethylbenzene	SW-846 8020	9.34	MG/L	0.30	09/08/93	MD
Total Xylenes	SW-846 8020	44.3	MG/L	0.30	09/08/93	MD
Total BTEX	SW-846 8020	75.2	MG/L	0.30	09/08/93	MD

Sample: 02C DRUM 2 Collected: 09/07/93 12:30

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>160	DEG. F		09/17/93	LG

TEST RESULTS BY SAMPLE

Sample: 03A DRUM 3 **Collected: 09/07/93 12:45**

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	0.62	MG/L	0.10	09/08/93	MD
Toluene	SW-846 8020	2.24	MG/L	0.10	09/08/93	MD
Ethylbenzene	SW-846 8020	0.34	MG/L	0.10	09/08/93	MD
Total Xylenes	SW-846 8020	1.89	MG/L	0.10	09/08/93	MD
Total BTEX	SW-846 8020	5.09	MG/L	0.10	09/08/93	MD

Sample: 03C DRUM 3 **Collected: 09/07/93 12:45**

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>160	DEG. F		09/17/93	LG

Sample: 04A DRUM 4 **Collected: 09/07/93 01:10**

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	1.42	MG/L	0.10	09/08/93	MD
Toluene	SW-846 8020	4.54	MG/L	0.10	09/08/93	MD
Ethylbenzene	SW-846 8020	0.90	MG/L	0.10	09/08/93	MD
Total Xylenes	SW-846 8020	4.52	MG/L	0.10	09/08/93	MD
Total BTEX	SW-846 8020	11.4	MG/L	0.10	09/08/93	MD

Sample: 04C DRUM 4 **Collected: 09/07/93 01:10**

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>160	DEG. F		09/17/93	LG

Order # D3-09-046

09/22/93 09:26

TEST RESULTS BY SAMPLE

Client: CARSWELL AIR FORCE BASE

Sample: 05A DRUM 5 Collected: 09/07/93 01:30

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
BTEX	SW-846 8020					
Benzene	SW-846 8020	0.04	MG/L	0.01	09/08/93	MD
Toluene	SW-846 8020	0.26	MG/L	0.01	09/08/93	MD
Ethylbenzene	SW-846 8020	0.05	MG/L	0.01	09/08/93	MD
Total Xylenes	SW-846 8020	0.29	MG/L	0.01	09/08/93	MD
Total BTEX	SW-846 8020	0.64	MG/L	0.01	09/08/93	MD

Sample: 05C DRUM 5 Collected: 09/07/93 01:30

Test Name	Method	Result	Units	Detection Limit	Date Started	Analyst
Ignitability	SW-846 1010	>160	DEG. F		09/17/93	LG

238116

FACSIMILE TRANSMITTAL

Chemaway Transport, Inc.

P.O.Box 877

Kaufman, Texas 75142

TELEPHONE: (214) 932-7482
FACSIMILE: (214) 932-7782

FROM: Rick LaRuey NAME DATE: 8-2-94

TITLE

TO: John O'Brien NAME FAX: (404) 421-3593

Law Environmental COMPANY NAME

ADDRESS

CITY, STATE, ZIP CODE

RE: Here is the total Benzene, copies of the Manifest to Follow

NUMBER OF PAGES BEING SENT INCLUDING LEAD SHEET 2

IF MESSAGE IS NOT CORRECTLY RECEIVED, CALL (214) 932-7482.

SAMPLE ID: CARSWELL AIRFORCE BASE

TOTAL BENZENE

COMPOUND	EPA METHOD NUMBER	DETECTION LIMIT (mg/L)	SAMPLE RESULTS (mg/L)
Benzene	624	0.01	0.30

TAB

APPENDIX B

APPENDIX B

DRUM DISPOSAL DOCUMENTATION

238120

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES

June 20, 1994

Mr. Mike Botwin
Air Force Base Conversion Agency
AFBCA/OL-H
1 Warehouse Road
Carswell AFB, TX 76127

Subject: IRP Drum Disposal Manifests
Carswell Air Force Base
Contract No. F33615-90-D-4008, Delivery Order No. 0015
Law Project No. 11-3517-0115

Dear Mr. Botwin:

Enclosed for your files are the original manifests for the drummed material shipped and disposed of from Carswell Air Force Base during the Law Environmental, Inc. field trip May 19-20, 1994.

If you have any questions or require additional information, please feel free to contact us at 404/499-6800.

Sincerely,

LAW ENVIRONMENTAL, INC.

John O'Brien
Project Manager

Enclosure

cc: Chris Hobbins - AFCEE
Jon Overholtzer - LAW

LAW ENVIRONMENTAL, INC.
GOVERNMENT SERVICES DIVISION
114 TOWNPARK DRIVE, SUITE 400 • KENNESAW, GA 30144-5569
(404) 499-6800 • FAX (404) 421-3593
ONE OF THE LAW COMPANIES

238121

LAIDLAW WASTE SYSTEMS

THIS IS YOUR **INVOICE**

DATE 05/31/94
INVOICE 40531-020

ACCOUNT NO. 50004

BALANCE DUE 760.00

AMOUNT PAID

ENSITE INC
114 TOWNPARK DRIVE STE.400
KENNESAW, TX
30144

FORT WORTH REGIONAL LANDFILL
FORT WORTH TX.

REMIT TO FORT WORTH REGIONAL LANDFILL
2100 A MINNIS DRIVE
FORT WORTH TX.
76117

77750004200076000000000

PLEASE DO NOT STAPLE

DETACH AND RETURN THIS PORTION WITH YOUR PAYMENT - TERMS NET 10 DAYS

REFER ALL INQUIRIES TO: (817) 838-2338
FORT WORTH REGIONAL LANDFILL
INVOICE: 40531-020

ACCOUNT NO. 50004
2100 A MINNIS DRIVE
FORT WORTH TX.

DATE	DESCRIPTION	YDS. WGT.	AMOUNT
	BALANCE FORWARD		0.00
05/20/94	8743 ENSITE CLEAN SOI	16.28 YD	210.00
05/21/94	8926 CHARGE CUSTOMER	10.75 YD	130.00
05/21/94	8927 ENSITE CLEAN SOI	1.73 YD	210.00
05/23/94	9031 ENSITE CLEAN SOI	2.82 YD	210.00

LAIDLAW WASTE SYSTEMS 05/31/94

TERMS: NET 10 DAYS
INTEREST ON OVERDUE PAYMENTS
OF 1 1/2% PER MONTH

760.00

TOTAL CURRENT	TOTAL 30 DAYS	TOTAL 60 DAYS	TOTAL 90 DAYS & OVER
760.00	0.00	0.00	0.00

760.00
BALANCE DUE

EIGHT = 0.00 YARDS = 31.58 ITEMS = 0 LOADS = 0

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 09-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. / Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
	TXD571924042 22007		

GENERATOR

3. Generator's Name and Mailing Address
CARSWELL AFB
AFBCA 10C-H BLDG 1215
CARSWELL AFB, TX
4. Generator's Phone (817) 731-8973

A. State Manifest Document Number: 00748694
B. State Generator's ID: 65004

5. Transporter 1 Company Name: Knowles Contracting
6. US EPA ID Number: TXD988056560
C. State Transporter's ID: 41870
D. Transporter's Phone: 817 625 7777

7. Transporter 2 Company Name:
8. US EPA ID Number:
E. State Transporter's ID:
F. Transporter's Phone:

9. Designated Facility Name and Site Address
LAIDLAW 2100A MINNIS
Ft Worth Landfill 537
Ft Worth TX
10. US EPA ID Number: NONE TXD071142442
G. State Facility's ID: TDH-04611
H. Facility's Phone: 817 838 [illegible]

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	
	a. CRUSHED EMPTY DRUMS LAST CONTAINING NON-CONTAMINATED SOIL	01	DT	20	Y	030 193
	b.					
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above
K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
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Printed/Typed Name	Signature	Month Day Year
MICHAEL J. BOTWIN	Michael J. Botwin	05 20 94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month Day Year
BRAD ROE	Brad Roe	05 20 94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date: Month Day Year
Ft. Worth LF	Margery Arnold	5/21/94

TWC 0311 (Rev. 01-21-93) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

238126

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 9-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. TXD571924042	Manifest Document No. 94.083	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
CARSWELL AFB
AFBCA/OC-H BLDG 1215
CARSWELL AFB TX 76127
4. Generator's Phone (817) 731 8973

A. State Manifest Document Number 00718697
B. State Generator's ID 65004

5. Transporter 1 Company Name: KNOWLES Contracting Inc. 6. US EPA ID Number: TXD71[illegible]
C. State Transporter's ID: 11870
D. Transporter's Phone: 817 625 7787

7. Transporter 2 Company Name 8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
LAIDLAW 2100A MINNIS
FT WORTH LANDFILL 537
FT WORTH TX
10. US EPA ID Number: NONE TX0571924842
G. State Facility's ID: TXD[illegible]
H. Facility's Phone: 817-838-[illegible]

11A HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.
	a. NON-CONTAMINATED CLEAN SOIL Non EPA Regulated Material	01	DT	20	Y
	b.				
	c.				
	d.				

J. Additional Descriptions for Materials Listed Above
K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
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Printed/Typed Name	Signature	Month	Day	Year
MICHAEL J. BOTWIN	Michael J. Botwin	05	20	94

GENERATOR

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
John Herndon KCT #33	John Herndon	05	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
FT WORTH L/F	Margaret Arnold	05	21	94

TRANSPORTER

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Date: Month	Day	Year

FACILITY

White - original Pink - SD Facility Yellow - Transporter Green - Generator's first copy

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

238124

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

Form approved. OMB No. 2050-0039, expires 9-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. / Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
	TXD571924042 4008		

3. Generator's Name and Mailing Address
CARSWELL AFB
AFBCA/OC-M BLDG 1215
CARSWELL AFB, TX
4. Generator's Phone (817) 731-8973

A. State Manifest Document Number: 00 18696
B. State Generator's ID: 65004

5. Transporter 1 Company Name: KNOWLES CONTRACTING INC
6. US EPA ID Number: TXD988056560
C. State Transporter's ID: 41870
D. Transporter's Phone: 817 625 7131

7. Transporter 2 Company Name: NONE
8. US EPA ID Number:
E. State Transporter's ID:

9. Designated Facility Name and Site Address
LAIDLAW 2100 A MINNIS
FT WORTH LANDFILL 637
FT WORTH, TX
10. US E
TXD571924042
F. [illegible] Phone: 817-838-2551

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. NON-CONTAMINATED CLEAN SOIL NON-EPA REGULATED MATERIAL	01 20	DT	20	Y
	b.				
	c.				
	d.				

J. Additional Descriptions for Materials Listed Above
K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

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GENERATOR

Printed/Typed Name	Signature	Month	Day	Year
MICHAEL J. BOTWIN	Michael J. Botwin	05	20	94

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
BRADLEY REG.		05	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space: CONTAINED DRUMS OF ASPHALT ASD.

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
FT WORTH LANDFILL - LAIDLAW 0464

Printed/Typed Name	Signature	Month	Day	Year
CINDY LANHAM	Cindy Lanham	5	20	94

TWC 0311 (Rev. 01-21-93) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

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Form approved. OMB No. 2050-0039, expires 9-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. / Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
	TXD571924042 / 99804		

3. Generator's Name and Mailing Address	A. State Manifest Document Number
Carswell AFB AFRCA 10C-H BLDG. 1215 CARSWELL AFB TX 4. Generator's Phone (817) 731-8973	00748693 B. State Generator's ID 65004

5. Transporter 1 Company Name / 6. US EPA ID Number	C. State Transporter's ID / D. Transporter's Phone
KNOWLES CONTRACTING INC / TXD 988056560	817 624 7781

7. Transporter 2 Company Name / 8. US EPA ID Number	E. State Transporter's ID / Transporter's Phone

9. Designated Facility Name and Site Address / 10. US EPA ID Number	F. State Facility's ID / Facility's Phone
LAIDLAW 2100 A MINNIS Ft. WORTH LANDFILL 537 Ft. WORTH TX / NONE	TDH 70464 817 838 2388

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	
	a. CRUSHED EMPTY DRUMS SOIL LAST CONTAINED NON-CONTAMINATED	01	DT	20	Y	0301
	b.					
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above

15. Special Handling Instructions and Additional Information

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations, including applicable state regulations.
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GENERATOR	Printed/Typed Name	Signature	Month Day Year
	MICHAEL J. BOTWIN	Michael J. Botwin	05 23 94

TRANSPORTER	17. Transporter 1 Acknowledgement of Receipt of Materials		Date
	Printed/Typed Name	Signature	Month Day Year
	STANLEY ROE	Stanley Roe	05 23 94
	18. Transporter 2 Acknowledgement of Receipt of Materials		Date
	Printed/Typed Name	Signature	Month Day Year

FACILITY	19. Discrepancy Indication Space		
	20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.		Date
	Printed/Typed Name	Signature	Month Day Year
	Fort Worth 4F	Margery Arnold	5 24 94

TNRCC-0311 (Rev. 01-23-93) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

WASTE DELIVERED FOR DISPOSAL IS
NON-HAZARDOUS SOLID WASTE MATERIALS

238126

ENSITE ENVIRONMENTAL

CREDIT TICKET

DATE: 05/20/94
TICKET NO: 8743

TIME In: 15:19
TIME Out: 00:00

VEHICLE NO: ENSITE
ACCOUNT NO: 50004

NAME: ENSITE ENVIRONMENTAL
NAME: ENSITE ENVIRONMENTAL SITE RESTOR.

..st Type	Description
200	ENSITE CLEAN SOIL/DRUMS

Origin County: 1 TARRANT COUNTY 100.00%

Gross: 0
Tare: 0 ** MANUAL ENTRY **
Net: 32560
Tons: 16.28 Veh. Cap: 20

WEIGHMASTER: MP

Signature:

238127

[illegible]

CREDIT TICKET

Page: 1

DATE: 05/21/94
TICKET NO: 8926

TIME In: 13:52
TIME Out: 00:00

VEHICLE NO: ENSITE
ACCOUNT NO: 50004

NAME: ENSITE ENVIRONMENTAL
NAME: ENSITE ENVIRONMENTAL SITE RESTOR.

Wst Type	Description	
703	CHARGE CUSTOMER PACKED	
Origin County: 1	TARRANT COUNTY	100.00%

Gross: 0
Tare: 0 ** MANUAL ENTRY **
Net: 21500
Tons: 10.75 Veh Cap: 20
** Note: REPLACES 8856 - WRONG PAY TYPE MA

WEIGHMASTER: MP Signature:

LAIDLAW WASTE SYSTEMS INC.
FT. WORTH REGIONAL LANDFILL

I/WE, THE UNDERSIGNED, CERTIFY THAT [illegible]
WASTE DELIVERED FOR DISPOSAL [illegible]
NON-HAZARDOUS SOLID WASTE MATERIALS

Credit

[illegible]

CASH TICKET

Page: 1

DATE: 05/21/94
TICKET NO: 8856

TIME In: 10:30
TIME Out: 10:30

VEHICLE NO: ENSITE
ACCOUNT NO: 50004

NAME: ENSITE ENVIRONMENTAL
NAME: ENSITE ENVIRONMENTAL SITE RESTOR

Wst Type	Description		Unit Price	Ext Price
703	CHARGE CUSTOMER PACKED		6.50/WD	130.00
Origin County: 1	TARRANT COUNTY	100.00%		

Gross: 51500
Tare: 30000 ** KEYBOARD TARE **
Net: 21500
Tons: 10.75 Veh Cap: 20

TOTAL Waste Charge: 130.00
TOTAL Surcharges: 0.00
TOTAL Tax: 0.00
TOTAL: 130.00

Replaced

WEIGHMASTER: MP Signature: John Stender

239128

ENVIRONMENTAL WASTE CONTROL

CREDIT TICKET

Page: 1

DATE: 05/21/94
TICKET NO: 8927

TIME In: 13:53
TIME Out: 00:00

VEHICLE NO: ENSITE
ACCOUNT NO: 50004

NAME: ENSITE ENVIRONMENTAL
NAME: ENSITE ENVIRONMENTAL SITE RESTOR.

Wst Type	Description
200	ENSITE CLEAN SOIL/DRUMS

Origin County: 1 TARRANT COUNTY 100.00%

Gross: 0
Tare: 0 ** MANUAL ENTRY **
Net: 3460
Tons: 1.73 Veh Cap: 20
** Note: REPLACES 8881 - WRONG PAY TYPE MA

WEIGHMASTER: MP

Signature: _____

I/WE, THE UNDERSIGNED, CERTIFY THAT T
WASTE DELIVERED FOR DISPOSAL
NON-HAZARDOUS SOLID WASTE MATERIAL

Credit

ENVIRONMENTAL WASTE CONTROL

CASH TICKET

Page: 1

DATE: 05/21/94
TICKET NO: 8881

TIME In: 11:16
TIME Out: 11:17

VEHICLE NO: ENSITE
ACCOUNT NO: 50004

NAME: ENSITE ENVIRONMENTAL
NAME: ENSITE ENVIRONMENTAL SITE RESTOR.

Wst Type	Description	Unit Price	Ext Price
200	ENSITE CLEAN SOIL/DRUMS	120.50/TO	210.00

Origin County: 1 TARRANT COUNTY 100.00%

Gross: 35080
Tare: 31620 ** KEYBOARD TARE **
Net: 3460
Tons: 1.73 Veh Cap: 20

TOTAL Waste Charge: 210.00
TOTAL Surcharges: 0.00
TOTAL Tax: 0.00

TOTAL: 210.00

Replaced 8827

WEIGHMASTER: MP

Signature: _____

I/WE, THE UNDERSIGNED, CERTIFY THAT THE WASTE DELIVERED FOR DISPOSAL IS NON-HAZARDOUS SOLID WASTE MATERIALS

238123

EMIDWARTHABEBIBMBIEMBNDRCLL

C R E D I T T I C K E T

Page: 1

D A T E : 05/23/94
ICKET NO: 9031

TIME In: 10:07
TIME Out: 10:08

VEHICLE NO: ENSITE NAME: ENSITE ENVIRONMENTAL
ACCOUNT NO: 50004 NAME: ENSITE ENVIRONMENTAL SITE RESTOR.

..st Type	Description	
200	ENSITE CLEAN SOIL/DRUMS	
Origin	County: 1 TARRANT COUNTY	100.00%

Gross: 37260
Tare: 31620 ** KEYBOARD TARE **
Net: 5640
Tons: 2.82 Veh Cap: 20

WEIGHMASTER: MP Signature:

238130

FACSIMILE TRANSMITTAL

Chemaway Transport, Inc.

P.O.Box 877

Kaufman, Texas 75142

TELEPHONE: (214) 932-7482
FACSIMILE: (214) 932-7782

FROM: Rick LaQuay (NAME) DATE: 8-4-94

(TITLE)

TO: John O'Brien (NAME) FAX: (404) 421-3573

Law Environmental (COMPANY NAME)

(ADDRESS)

(CITY, STATE, ZIP CODE)

RE:

NUMBER OF PAGES BEING SENT INCLUDING LEAD SHEET 5

IF MESSAGE IS NOT CORRECTLY RECEIVED, CALL (214) 932-7482.

239131

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087
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Form approved, OMB No. 2050-0039, Expires 09-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. TX0571924042 Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
AFRES/ 11 AEB
6801 Weir Blvd #13
Carswell AFB TX 76127

4. Generator's Phone (817) 731-8973

5. Transporter 1 Company Name: EFFLUENT TREATMENT SERVICES — US EPA ID Number: TXD980865034

7. Transporter 2 Company Name — 8. US EPA ID Number

9. Designated Facility Name and Site Address: EFFLUENT TREATMENT Services Inc. 1481 BRADLEY SPACE B Haltom City TX. 76117 — 10. US EPA ID Number: TXD980865034

E. State Transporter's ID

F. Transporter's Phone

G. State Facility's ID

11A. HM	11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. State Waste No.
	a. NON EPA REGULATED MATERIAL	01	TT	16,660 ~~0000~~	P ~~G~~	
	b.			(1997)	G	
	c.					
	d.					

J. Additional Descriptions for Materials Listed Above: 1997 est

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

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Printed/Typed Name	Signature	Month	Day	Year
MICHAEL J. BOTWIN	Michael J. Botwin	05	19	94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Ray Guyer	Ray Guyer	05	19	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year
Dorsey E. Henley	Dorsey E. Henley	5	19	94

TWC-0311 (Rev. 01/21/93) White - original Pink - TSD Facility Yellow - Transporter Green - Generator's first copy

AUG 04 94 12:40 CHEMWASTE REGION 3 NO. 2148321732

TEXAS WATER COMMISSION
P.O. Box 13087, Capitol Station
Austin, Texas 78711-3087

238132

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UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. TXD571924042 Manifest Document No. 99603	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
CARSWELL AIR FORCE BASE
AFBCA IOC-N BLDG 1215
CARSWELL AFB, TX 76127

4. Generator's Phone (817) 731-9923

5. Transporter 1 Company Name — 6. US EPA ID Number
GREGORY INDUSTRIAL WASTE Hauling

7. Transporter 2 Company Name — 8. US EPA ID Number

9. Designated Facility Name and Site Address — 10. US EPA ID Number
Cold Springs Processing
1300 Cold Springs Rd
Ft Worth, TX 76102

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol
	a. WASTE OIL/WATER SEPARATOR SLUDGE	1	TT	19,800 3,300	LB GAL
	b.				
	c.				
	d.				

15. Special Handling Instructions and Additional Information

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Printed/Typed Name	Signature	Month	Day	Year
MICHAEL J. BOTWIN	Michael J. Botwin	5	20	94

17. Transporter 1 Acknowledgement of Receipt of Materials — Date

Printed/Typed Name	Signature	Month	Day	Year
TOM FOSTER	Tom Foster	05	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials — Date

Printed/Typed Name	Signature	Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Cold Springs Processing MSW # 01225-A — Date

Printed/Typed Name	Signature	Month	Day	Year
Kenneth McMullen	K McMullen	10	5	94

EPA Form 8700-22 (Rev. 01/01/89) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

23813

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Form approved. OMB No. 2050-0039, expires 09-30-91

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. TXD571924042	Manifest Document No.	2. Page 1 of	Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
CARSWELL AIR FORCE BASE
AFRCA IOC-11 BLDG 1215
CARSWELL AFB, TX 76127

4. Generator's Phone (817) 731-8973

5. Transporter 1 Company Name	6. US EPA ID Number
GREGORY INDUSTRIAL WASTE HAULING	
7. Transporter 2 Company Name	8. US EPA ID Number
9. Designated Facility Name and Site Address Cold Springs Processing 1300 Cold Springs Rd Ft Worth, TX 76102	10. US EPA ID Number

11A. HM	11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol
	a. WASTE OIL/WATER SEPARATOR Sludge	1	TT	1860 2500	LB
	b.				
	c.				
	d.				

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Printed/Typed Name	Signature	Month	Day	Year
MICHAEL J. BOTWIN	Michael J. Botwin	5	20	94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year
TOM FOSTER	Tom Foster	05	20	94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date: Month	Day	Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in item 19.
Cold Springs Processing MSW-1225-A

Printed/Typed Name	Signature	Date: Month	Day	Year
Kenneth McMullen	K McMullen	05	20	94

TWC-0311 (Rev. 01/01/88) White - original Pink-TSD Facility Yellow-Transporter Green-Generator's first copy

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY
HAZARDOUS WASTE DIVISION
P.O. BOX 82178
BATON ROUGE, LOUISIANA 70884-2178

PLEASE PRINT OR TYPE (Form designed for use on elite (12-pitch) typewriter.)

RECYCLE / REUSE

Form Approved. OMB No. 2050-0039. Expires 9-30-94

UNIFORM HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No. / Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
	T X 0 5 7 1 9 2 4 0 4 2 9	110 05	

3. Generator's Name and Mailing Address: Carswell Air Force Base, AFBC OL-H Bldg. 1215, Carswell AFB, Texas 76127, Attn: Mike Botwin

4. Generator's Phone: (817) 731-8973

A. State Manifest Document Number: LA A 3270590

B. State Generator's ID: 65004

5. Transporter 1 Company Name: J B Hunt Transport Inc. (Pea's Commod. Hes.)

US EPA ID Number: A R D 9 8 1 9 0 8 5 5 1

C. State Transporter's ID: 41853

D. Transporter's Phone: (800)368-8539

7. Transporter 2 Company Name

8. US EPA ID Number

E. State Transporter's ID

F. Transporter's Phone

9. Designated Facility Name and Site Address: MARINE SHALE PROCESSORS, INC., 9828 HIGHWAY 90 EAST, MORGAN CITY, LOUISIANA 70380

10. US EPA ID Number: L A D 9 8 1 0 5 7 7 0 6

G. State Facility's ID

H. Facility's Phone: (504) 631-3161

11. US DOT Description (Including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	Type	13. Total Quantity	14. Unit Wt./Vol.	I. Waste No.
a. HAZARDOUS WASTE SOLID, n.o.s. CLASS 9, NA3077, PG III (CADMIUM, LEAD) RQ: 1	01	DM	200	P	D006 D008 R
b. WASTE FLAMMABLE LIQUID, n.o.s., CLASS 3, UN1993, PG I (BENZENE, TOLUENE, ETHYL BENZENE, XYLENE) RQ:10	05	DM	250	G	D001 D018 F003 F005 R
c.					R
d.					R

J. Additional Descripuons for Materials Listed Above — RECYCLE / REUSE

CHWY / CAFB / 9403434 / 55 GAL — RAGS & SAFETY EQUIPMENT
CHWY / CAFB / 9403433 / 55 GAL — WASTE WATER

K. Handling Codes for Wastes Listed Above

M032 B319
~~M032~~ M051 B101

15. Special Handling Instructions and Additional Information

SEE ATTACHED EMERGENCY RESPONSE INFORMATION. NOTIFY GENERATOR.
24 HOUR EMERGENCY RESPONSE NUMBER: (817)731-8973

16. GENERATOR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month Day Year
MICHAEL J. BOTWIN	Michael J. Botwin	06 22 94

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year
Cleave Bandy	Cleave Bandy	06 22 94

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month Day Year

19. Discrepancy Indication Space

Section 5 - Change made prior to arrival at MSP.
Section K B - Changed handling code to M051 and inserted definition for RA as per Michael J. Botwin

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month Day Year
Clara Guillot	Clara Guillot	06 25 94

EPA Form 8700-22k(Rev. 9/88) Previous edition is obsolete.

COPY 1: FACILITY TO DESTINATION STATE

DEQ FORM HW-3 (R 9/92)

COPY 1

TAB

APPENDIX C

APPENDIX C

SOIL BORING LOGS

238137

SOIL TEST BORING RECORD

JOB NO. 11-3517-0115
JOB NAME Carswell AFB
DATE: 3-26-94
WEATHER Light Rain 60°
DRILLER John Storm - ATEC

BORING NO. OT12 - SB01
G.S. ELEV. NA
HOURS MOVING NA
HOURS DRILLING NA
PAGE 1 OF 1

DEPTH (FEET)	STRATA DESCRIPTION	#	"N" 1	2	3	4	N	PID	REC	SOIL CLASSIFICATION AND REMARKS	DEPTH (FEET)
	Asphalt with gravel base									Soil samples collected continuously using 3-inch ID split spoon sampler with California Brass Rings. Hollow stem augers were not utilized.	
1	Silty SAND (SM) - Fill Slightly plastic fines 40% Fine to medium SAND 55% Fine gravel 5% Quartzose; dry; brownish yellow (10 YR 6/6) Contains thin gravel layers	1						—		25 %	1
2											2
3		2						4		100%	3
										3'-5' Sample retained for chemical analyses	
4											4
5											5
	Slightly silty SAND (SP) Fine SAND 95% Non plastic fines 5% Quartzose; moist; Strong brown (7.5 YR 5/6)	3						0		30%	
										Water in boring at approximately 6.2'	
6										5'-7' Sample retained for chemical analyses	6
	Sandy fine GRAVEL (GM) Fine GRAVEL 60%; Medium sand 30%; Silt 10%, saturated									Well rounded quartz/chert gravel. Refusal at 7.0 ft.	

BORING TERMINATED: 7.0 ft.
BORING REFUSAL: —
WATER TOB DEPTH 6.2 ft.
WATER 24 HR.: DEPTH NA
WATER LOSSES 0.0 gal
CASING: SIZE NA LENGTH NA

METHOD OF ADVANCING BORING	DEPTH
POWER AUGER	TO
HAND CHOP: W/MUD: W/WATER	TO
ROTARY DRILL: W/MUD: W/WATER	TO
DIAMOND CORE	TO

QA / QC — INSTALLED BY: TDM CHECKED BY: JLB DISCREPANCIES:

3517-0115.07

238138

SOIL TEST BORING RECORD

JOB NO. 11-3517-0115
JOB NAME Carswell AFB
DATE: 3-26-94
WEATHER Light Rain 60°
DRILLER John Storm - ATEC

BORING NO. OT12 - SB02
G.S. ELEV. NA
HOURS MOVING NA
HOURS DRILLING NA
PAGE 1 OF 1

DEPTH (FEET)	STRATA DESCRIPTION	#	"N" 1	2	3	4	N	PID	REC	SOIL CLASSIFICATION AND REMARKS	DEPTH (FEET)
	Silty gravelly coarse to fine SAND (SW) - Fill Fine SAND 40% Coarse sand 20% Fine gravel 20% Non-plastic fines 20% Quartzose sand and gravel; dry; brownish yellow (10 YR 6/6) and light gray (10 YR 7/1)									Soil samples collected continuously using 3-inch ID split spoon sampler with California Brass Rings. Hollow stem augers were not utilized.	
1		1						—		25 %	1
										Concrete layer 2.0' - 2.4'	
2											2
3											3
	Silty clayey coarse to fine SAND (SM) Fine SAND 50% Coarse sand 5% Angular fine gravel 5% Slightly plastic fines 40%; dry; mottled light gray (10 YR 7/1) and black (5 YR 2.5/1)	2						—		100%	
										3'-5' Sample retained for chemical analyses	
4											4
5		3						—		100%	5
										5'-6' Sample retained for chemical analyses	
6											6
	Auger refusal at 6.0 ft.										

BORING TERMINATED: 6.0 ft.
BORING REFUSAL: 6.0 ft.
WATER TOB DEPTH NA
WATER 24 HR.: DEPTH NA
WATER LOSSES 0.0
CASING: SIZE NA LENGTH NA

METHOD OF ADVANCING BORING	DEPTH
POWER AUGER	TO
HAND CHOP: W/MUD: W/WATER	TO
ROTARY DRILL: W/MUD: W/WATER	TO
DIAMOND CORE	TO

QA / QC — INSTALLED BY: TDM CHECKED BY: JLB DISCREPANCIES:

238139

SOIL TEST BORING RECORD

JOB NO. 11-3517-0115
JOB NAME Carswell AFB
DATE: 3-26-94
WEATHER Light Rain 60°
DRILLER John Storm - ATEC

BORING NO. OT12 - SB03
G.S. ELEV. NA
HOURS MOVING NA
HOURS DRILLING NA
PAGE 1 OF 1

DEPTH (FEET)	STRATA DESCRIPTION	#	"N" 1	2	3	4	N	PID	REC	SOIL CLASSIFICATION AND REMARKS	DEPTH (FEET)
1	Silty clayey fine to medium SAND with gravel (SM/SC) - Fill Fine SAND 25% Medium sand 25% Fine gravel 20% Slightly plastic fines 30% Quartzose; dry; brownish yellow (10 YR 6/6), and black (5YR 2.5/1)	1						—	50%	Well rounded quartz and chert gravel Black tar-like bands in soil 0'-2' Sample retained for chemical analyses	1
2	Silty, clayey and sandy GRAVEL (GM/GC) - Fill Fine GRAVEL 50% Fine sand 20% Slightly plastic fines 30% Angular limestone gravel; well rounded quartz and chert gravel; dry; dark gray (5 YR 4/1) and black (5 YR 2.5/1)	2						—	50%	Petroleum odor	2
3											3
4		3						—	100%	4'-6' Sample retained for chemical analyses	4
5	Slightly silty fine to medium SAND (SW) Fine to medium SAND 70% Coarse sand 25% Non-plastic fines 5% Moist to saturated gray (5 YR 5/1) to dark gray (5 YR 4/1)										5
6										Water @ 5.8'	6
	Auger refusal at 6.0 ft.									Soil samples collected continuously using 3-inch ID split spoon sampler with California Brass Rings. Hollow stem augers were not utilized.	

BORING TERMINATED: 6.0 ft.
BORING REFUSAL: 6.0 ft. (GC)
WATER TOB DEPTH 5.8 ft.
WATER 24 HR.: DEPTH NA
WATER LOSSES 0.0
CASING: SIZE NA LENGTH NA

METHOD OF ADVANCING BORING	DEPTH
POWER AUGER	TO
HAND CHOP: W/MUD: W/WATER	TO
ROTARY DRILL: W/MUD: W/WATER	TO
DIAMOND CORE	TO

QA / QC | INSTALLED BY: TDM CHECKED BY: JLB DISCREPANCIES:

TAB

APPENDIX D

APPENDIX D

DATA SUMMARY TABLES

ANALYTICAL DATA SUMMARY TABLE
SOIL BORING SAMPLES DO#15
CARSWEL AFB

PARAMETER				Sample	Duplicate	
		OT12SB01B	OT12SB01C	OT12SB02B	OT12SBDP1	OT12SB02C
	Sample Date:	03/26/94	03/26/94	03/26/94	03/26/94	03/26/94
	Sample Depth:	2-4'	4-6'	2-4'	2-4'	4-6'
D2216/METHOD,PERCENT						
SOLIDS, PERCENT		90	88	90	90	84
Metals (SW6010/SW3050),(MG/KG)						
ALUMINUM		2800 JH	3900 JH	4000 JH	4100 JH	2800 JH
ANTIMONY		<4.4 JL	<4.5 JL	<4.7 JL	<4.4 JL	<4.6 JL
ARSENIC		6.1	7.5	13	13	4.0
BARIUM		67	200	53	59	69
BERYLLIUM		0.23	<1.6	<1.7	<1.6	<0.16
CADMIUM		0.86	2.4	0.92	0.71	0.98
CALCIUM		9600 JH	110000 JH	200000 JH	210000 JH	38000 JH
CHROMIUM, TOTAL		5.6	9.5	7.2	8.0	5.6
COBALT		3.0	3.5	4.1	3.4	2.7
COPPER		9.4 JH	54 JH	31 JH	22 JH	11 JH
IRON		7600 JH	14000 JH	5500 JH	5200 JH	5.3 JH
LEAD		30 J	32	17	25	79
MAGNESIUM		390	1400	1900	2100	690
MANGANESE		76 JH	220	290	320 JH	120
MOLYBDENUM		<2.8	<2.9	<3.0	<2.8	<3.0
NICKEL		5.3	11	6.1	5.1	4.8
POTASSIUM		420	660	550	580	730
SELENIUM		<6.2	<6.3	<6.6	<6.2	<6.5
SILVER		<0.62	<0.64	<0.67	<0.63	<0.66
SODIUM		39	84	180	160	45
THALLIUM		<5.6	<5.8	<6.0	<5.7	<5.9
VANADIUM		10	15	16	14	10
ZINC		57 JH	280 JH	21 JH	22 JH	89 JH
Volatile Organics (SW8240/SW5030),(MG/KG)						
1,1,1-TRICHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,1,2,2-TETRACHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,1,2-TRICHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,1-DICHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,1-DICHLOROETHENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,2-DICHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
1,2-DICHLOROPROPANE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
2-CHLOROETHYL VINYL ETHER		<0.011 J	<0.012 J	<0.011 J	<0.011 J	<0.011 J
2-HEXANONE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
ACETONE		<0.011	<0.012	<0.011	0.18	0.085
BENZENE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
BROMODICHLOROMETHANE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
BROMOFORM		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
BROMOMETHANE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
CARBON DISULFIDE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
CARBON TETRACHLORIDE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
CHLOROBENZENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054

ANALYTICAL DATA SUMMARY TABLE
SOIL BORING SAMPLES DO#15
CARSWEL AFB

PARAMETER		OT12SB01B	OT12SB01C	Sample OT12SB02B	Duplicate OT12SBDP1	OT12SB02C
	Sample Date:	03/26/94	03/26/94	03/26/94	03/26/94	03/26/94
	Sample Depth:	2–4'	4–6'	2–4'	2–4'	4–6'
CHLOROETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
CHLOROFORM		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
CHLOROMETHANE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
DIBROMOCHLOROMETHANE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
ETHYLBENZENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
total–XYLENE (SUM OF ISOMERS)		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
METHYL ETHYL KETONE		<0.011	<0.012	<0.011	0.044	<0.011
METHYL ISOBUTYL KETONE		<0.011	<0.012	<0.011	<0.011	<0.011
METHYLENE CHLORIDE		0.012 JH	0.017 JH	0.013 JH	0.018 JH	0.013 JH
STYRENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
TETRACHLOROETHYLENE(PCE)		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
TOLUENE		0.0086	<0.0058	<0.0054	0.0096	<<0.0016
TRICHLOROETHYLENE (TCE)		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
VINYL ACETATE		<0.011	<0.012	<0.011	<0.011	<0.011
VINYL CHLORIDE		<0.0022	<0.0023	<0.0022	<0.0022	<0.0022
cis–1,3–DICHLOROPROPENE		<0.0011	<0.0012	<0.0011	<0.0011	<0.0011
trans–1,2–DICHLOROETHENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
trans–1,3–DICHLOROPROPENE		<0.0056	<0.0058	<0.0054	<0.0056	<0.0054
SURROGATES, %:						
1,2–DICHLOROETHANE–D4		112	111	111	109	111
1–BROMO–4–FLUOROBENZENE		93	99	98	82	94
TOLUENE–D8		98	98	101	98	99

J – Estimated quantitation based upon QC data.
JH – Estimated quantitation – possibly biased high based upon QC data.
JL – Estimated quantitation – possibly biased low based upon QC data.

ANALYTICAL DATA SUMMARY TABLE
SOIL BORING SAMPLES DO#15
CARSWEL AFB

PARAMETER		OT12SB03A	OT12SB03C
	Sample Date:	03/26/94	03/26/94
	Sample Depth:	0-2'	4-6'
D2216/METHOD,PERCENT			
SOLIDS, PERCENT		87	87
Metals (SW6010/SW3050),(MG/KG)			
ALUMINUM		3900 JH	1600 JH
ANTIMONY		<4.2 JL	<4.5 JL
ARSENIC		10	<3.4
BARIUM		66	45
BERYLLIUM		<1.5	<0.16
CADMIUM		0.68	0.32
CALCIUM		160000 JH	56000 JH
CHROMIUM, TOTAL		6.2	4.1
COBALT		3.8	1.1
COPPER		26 JH	9.1 JH
IRON		4700 JH	1800 JH
LEAD		11	5.7
MAGNESIUM		1800	450
MANGANESE		280 JH	49
MOLYBDENUM		<2.7	<2.9
NICKEL		6.6	3.5
POTASSIUM		820	210
SELENIUM		<5.9	<6.3
SILVER		<0.6	<0.64
SODIUM		110	50
THALLIUM		<5.4	<5.8
VANADIUM		14	5.8
ZINC		20 JH	7.1 JH
Volatile Organics (SW8240/SW5030),(MG/KG)			
1,1,1-TRICHLOROETHANE		<0.0061	0.0044 J
1,1,2,2-TETRACHLOROETHANE		<0.0061	<0.0056 J
1,1,2-TRICHLOROETHANE		<0.0061	<0.0056 J
1,1-DICHLOROETHANE		<0.0061	<0.0056 J
1,1-DICHLOROETHENE		<0.0061	<0.0056 J
1,2-DICHLOROETHANE		<0.0061	<0.0056 J
1,2-DICHLOROPROPANE		<0.0012	<0.0011 J
2-CHLOROETHYL VINYL ETHER		<0.012 J	<0.011 J
2-HEXANONE		<0.0061	<0.0056 J
ACETONE		<0.012	0.037 J J
BENZENE		<0.0012	<0.0011 J
BROMODICHLOROMETHANE		<0.0012	<0.0011 J
BROMOFORM		<0.0061	<0.0056 J
BROMOMETHANE		<0.0012	<0.0011 J
CARBON DISULFIDE		<0.0061	<0.0056 J
CARBON TETRACHLORIDE		<0.0061	<0.0056 J
CHLOROBENZENE		<0.0061	<0.0056 J

ANALYTICAL DATA SUMMARY TABLE
SOIL BORING SAMPLES DO#15
CARSWEL AFB

PARAMETER	Sample Date:	OT12SB03A 03/26/94	OT12SB03C 03/26/94
	Sample Depth:	0–2'	4–6'
CHLOROETHANE		<0.0061	<0.0056 J
CHLOROFORM		<0.0061	<0.0056 J
CHLOROMETHANE		<0.0012	<0.0011 J
DIBROMOCHLOROMETHANE		<0.0061	<0.0056 J
ETHYLBENZENE		<0.0061	0.0041 J
total–XYLENE (SUM OF ISOMERS)		<0.0061	0.0044 J
METHYL ETHYL KETONE		<0.012	<0.011 J
METHYL ISOBUTYL KETONE		<0.012	<0.011 J
METHYLENE CHLORIDE		0.016 JH	<0.0056 J
STYRENE		<0.0061	<0.0056 J
TETRACHLOROETHYLENE(PCE)		<0.0061	<0.0056 J
TOLUENE		<<0.0012	0.014 J
TRICHLOROETHYLENE (TCE)		<0.0061	<0.0056 J
VINYL ACETATE		<0.012	<0.011 J
VINYL CHLORIDE		<0.0024	<0.0022 J
cis–1,3–DICHLOROPROPENE		<0.0012	<0.0011 J
trans–1,2–DICHLOROETHENE		<0.0061	<0.0056 J
trans–1,3–DICHLOROPROPENE		<0.0061	<0.0056 J
SURROGATES, %:			
1,2–DICHLOROETHANE–D4		108	100
1–BROMO–4–FLUOROBENZENE		97	95
TOLUENE–D8		98	95

J – Estimated quantitation based upon QC data.
JH – Estimated quantitation – possibly biased high based upon QC data.
JL – Estimated quantitation – possibly biased low based upon QC data.

238145

TAB

APPENDIX E

APPENDIX E

TEXAS RISK REDUCTION RULES

Appendix 4

7-Day Distilled Water Leachate Test

This test is intended only for dry, solid wastes, i.e., waste materials without any free liquids.

1. Place a 250 gm. (dry weight) representative sample of the waste material in a 1500 ml. Erlenmeyer flask.

2. Add 1 liter of deionized or distilled water into the flask and mechanically stir the material at a low speed for five (5) minutes.

3. Stopper the flask and allow to stand for seven (7) days.

4. At the end of seven (7) days, filter the supernatant solution through a .45 micron filter, collecting the supernatant into a separate flask.

5. Subject the filtered leachate to the appropriate analysis.

Subchapter S. Risk Reduction Standards

§335.551. Purpose, Scope, and Applicability.

(a) Purpose. This subchapter specifies the information and procedures necessary to demonstrate compliance with the three risk reduction standards of §335.8 of this title (relating to Closure and Remediation).

(b) Scope. The requirements of this subchapter will, when adequately carried out, assure adequate protection of human health and the environment from potential exposure to contaminants associated with releases from solid waste management facilities or other areas. Cleanup levels are specified for different types of contaminated media such as air, surface water, ground water, and soil, and for cross-media contamination pathways such as soil to ground water and soil to air. General procedures based on scientific principles are provided or referenced by these regulations so that specific numeric cleanup levels can be generated. The commission will periodically review the general procedures and revise these regulations as necessary.

(c) Applicability. The requirements of this subchapter apply to persons who undertake a closure or remediation in accordance with §335.8 of this title.

§335.552. Definitions. The following words and terms, when used in this subchapter, shall have the following meanings, unless the context clearly indicates otherwise.

Carcinogen—Substances which have been classified for human carcinogenic risk based on the United States Environmental Protection Agency's Weight of Evidence System of Carcinogenicity as Group A-Human Carcinogen; Group B-Probable Human Carcinogen; or Group C-Possible Human Carcinogen.

Carcinogen Classification—The basis by which substances are classified for human carcinogenic risk based on the United States Environmental Protection Agency's Weight of Evidence System for Carcinogenicity: Group A-Human Carcinogen; Group B-Probable Human Carcinogen; Group C-Possible Human Carcinogen; Group D-Not Classifiable as to Human Carcinogenicity; and Group E-Evidence of Non-Carcinogenicity for Humans.

Long-term effectiveness—The ability of a remediation or corrective action to maintain over time the required level of protection of human health and the environment.

Non-residential property—Any real property or portion of a property not currently being used for human habitation or for other purposes with a similar potential for human exposure, at which activities have been or are being conducted, having the primary Standard Industrial Classification (SIC) major group numbers 01-48 inclusive, 49 except 4941, 50-67 inclusive, 72-79 inclusive, 80 except 8051, 8059, 8062, 8063, 8069, 81 and 82 except 8211, 8221, 8222, 83 except 8351, 8361, 84-86 except 8661, 87-91 inclusive, 92 except 9223, and 93-97 inclusive. Non-residential property includes all of the block(s) and lot(s) controlled by the same owner or operator that are vacant land, or that are used in conjunction with such business. For leased properties, non-residential property includes the leasehold and any external tank, surface impoundment, septic system, or any other structure, vessel, contrivance, or unit that provides, or are utilized, for the management of contaminants to or from the leasehold.

Permanence/permanent/permanently—The property of achieving the maximum degree of long-term effectiveness and of enduring indefinitely without posing the threat of any future release that would increase the risk above levels established for the facility or area.

Point of exposure—A location where human or environmental receptors can come into contact with contaminants; also, a location which can be arbitrarily determined for purposes of estimating or measuring the concentration of contaminants available for exposure.

Practical quantitation limit/PQL—The lowest concentration of an analyte which can be reliably quantified within specified limits of precision and accuracy during routine laboratory operating conditions. The PQL minimizes to the extent possible the effects of instrument and operator variability and the influences of the sample matrix and other contaminants or substances upon the quantitation of the analyte. "Specified limits of precision and accuracy" are the criteria which have been included in applicable regulations or which are listed in the quality control sections of the analytical method. The PQL may be directly obtained or derived from the following sources with preference given to the most recent, scientifically valid method: federal regulations; EPA guidance documents; calculation from interlaboratory studies; and experimentally determined analytical methods not available from other existing sources.

Residential property—Any property that does not exclusively meet the definition of non-residential property. Also, a portion of non-residential property that is used in part for residential activities, such as a day care center, is defined as residential.

Systemic toxicant—Substances shown either through epidemiological studies or through laboratory studies to cause adverse health effects other than cancer.

§335.553. Required Information.

(a) For risk reduction standard Number 1 or 2. The person shall provide a final report that documents attainment of the risk reduction standard in accordance with §335.554 or §335.555 of this title (relating to Attainment of Risk Reduction Standard Number 1 and Attainment of Risk Reduction Standard Number 2). The report shall include, but is not limited to, descriptions of procedures and conclusions of the investigation to characterize the nature, extent, direction, rate of movement, volume, composition and concentration of contaminants in environmental media; basis for selecting environmental media of concern; documentation supporting selection of exposure factors; descriptions of removal or decontamination proce-

dures performed in closure or remediation; summaries of sampling methodology and analytical results which demonstrate that contaminants have been removed or decontaminated to applicable levels; and a document that the person proposes to use to fulfill the requirements of §335.560(b) of this title (relating to Post Closure Care and Deed Certification), as applicable.

(b) Risk reduction standard Number 3, the person shall conduct the activities set forth in paragraphs (1)–(4) of this subsection. The results of activities required by paragraphs (1)–(3) of this subsection may be combined to address a portion of a facility or one or more facilities of a similar nature or close proximity. The submittal shall be subject to review and approval by the executive director prior to carrying out the closure or remediation. Upon completion of the approved activity, the person shall submit the final report required by paragraph (4) of this subsection.

(1) The person shall prepare a remedial investigation report which contains sufficient documentation such as, but not limited to, descriptions of procedures and conclusions of the investigation to characterize the nature, extent, direction, rate of movement, volume, composition, and concentration of contaminants in environmental media of concern, including summaries of sampling methodology and analytical results. Information obtained from attempts to attain Risk Reduction Standard Numbers 1 or 2 may be submitted for this purpose.

(2) The person shall prepare a baseline risk assessment report which describes the potential adverse effects under both current and future conditions caused by the release of contaminants in the absence of any actions to control or mitigate the release. The report shall also discuss the degree of uncertainty associated with the baseline risk assessment. Residential land use with on-site exposure shall be assumed to evaluate the future use condition unless the person demonstrates to the satisfaction of the executive director that a different land use assumption such as industrial use is more appropriate. The standard exposure factors set forth in Table 1 (located following paragraph (4) of this subsection) shall be used unless the person documents to the executive director's satisfaction that site-specific exposure data should be used instead.

(3) The person shall evaluate the relative abilities and effectiveness of potential remedies to achieve the requirements for remedies described in §335.561 of this title (relating to Attainment of Risk Reduction Standard Number 3) when considering the evaluation factors described in §335.562 of this title (relating to Remedy Evaluation Factors). Using this information, the person shall prepare a corrective measure study which recommends the remedy which best achieves the requirements for remedies described in §335.561 of this title. Persons may seek to satisfy the requirements of §335.564 of this title (relating to Post Closure Care not required for Risk Reduction Standard Number 3) by demonstrating in the corrective measure study using the procedures of §335.563 of this title (relating to Media Cleanup Requirements for Risk Reduction Standard Number 3) that no remedy needs to be performed since the existing conditions of the facility or area conform to the media cleanup requirements without the use of removal, decontamination or control measures. Persons may also seek to satisfy the requirements of §335.564 by demonstrating in the corrective measure

Table 1. Standard Exposure Factors (for use with §335.553(b)(2) and §335.563(e)).

Land Use	Exposure Pathway	Daily Intake Rate	Exposure Frequency	Exposure Duration	Body Weight
Residential	Ingestion of Potable Water	2 liters	350 daysyr	30 years	70 kg
	Ingestion of Soil and Dust*	200 mg-child, age 1–6 100 mg-adult, age 7–31	350 days/yr	6 years* 24 years**	15.1 kg* 70 kg** (*=child, **=adult)
	+These factors yield the age-adjusted soil ingestion factor of 114 mg-yr/kg-day				
	Inhalation of Contaminants	20 cu.m.-total 15 cu.m.-indoor	350 days/yr	30 years	70 kg
Commercial/ Industrial	Ingestion of Potable Water	1 liter	250 days/yr	25 years	70 kg
	Ingestion of Soil and Dust	50 mg	250 days/yr	25 years	70 kg
	Inhalation of Volatiles	20 cu.m./workday	250 days/yr	25 years	70 kg
Agricultural	Consumption of Homegrown Produce	42 g-fruit 80 g-vegetables	350 days/yr	30 years	70 kg
	Factors for ingestion of potable water, soil and dust, and inhalation of volatiles: Use the Residential Land Use of factors.				
Recreational	Consumption of Locally Caught Fish	10 g-freshwater 15 g-saltwater	350 days	30 years	70 kg

study that following completion of their recommended removal and/or decontamination activities the conditions of the facility or area will conform to the media cleanup requirements of §335.563 without the use of control measures. Upon review of the corrective measure study, the executive director may require the person to further evaluate the proposed remedy or to evaluate one or more additional remedies.

(4) The person shall submit to the executive director, for review and acceptance, a final report containing sufficient documentation which demonstrates that the remedy has been completed in accordance with the approved plan and also a document that the person proposed to use to fulfill the requirements of §335.566 of this title (relating to Deed Recordation for Risk Reduction Standard Number 3).

(c) For risk reduction standards Numbers 1, 2, and 3. In order for a treatment process to achieve decontamination in contrast to being a control measure, the person must demonstrate to the satisfaction of the executive director that the treatment process permanently alters all contaminants to levels that will not pose a substantial present or future threat to human health and the environment, and must further demonstrate that any residue remaining in place from the treatment will not pose the threat of any future release that would increase the concentrations of contaminants in environmental media above the cleanup levels determined for that particular risk reduction standard.

(d) For risk reduction standards Numbers 1, 2, and 3, attainment of cleanup levels shall be demonstrated by collection and analysis of samples from the media of concern. Persons shall utilize techniques described in SW 846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency, or other available guidance in developing a sampling and analysis plan appropriate for the distribution, composition and heterogeneity of contaminants and environmental media. A sufficient number of samples shall be collected and analyzed for individual compounds to both accurately assess the risk to human health and the environment posed by the facility or area and to demonstrate the attainment of cleanup levels. Non compound-specific analytical techniques (e.g., Total Petroleum Hydrocarbons, Total Organic Carbon, etc.) may, where appropriate for the nature of the wastes or contaminants, be used to aid in the determination of the lateral and vertical extent and volume of contaminated media; however, such non compound-specific analyses will serve only as indicator measures and must be appropriately supported by compound-specific analyses. Comparisons may be based on the following methods:

(1) direct comparison of the results of analysis of discrete samples of the medium of concern with the cleanup level;

(2) for a data set of ten or more samples, statistical comparison of the results of analysis utilizing the 95% confidence limit of the mean concentration of the contaminant as determined by the following expression: Cleanup Level $\geq \bar{x} + \frac{s \cdot t}{\sqrt{n}}$ where $\bar{x}$ is the mean concentration, s is the standard deviation and t is a value from Table 2 (located following paragraph (3) of this subsection) based on the number of samples, and sqrt (n) is the square root of the sample size; or

(3) other statistical methods appropriate for the distribution of the data, subject to prior approval by the executive director.

Table 2. Values for "t" (for use with §335.553(d)).

n	t	n	t	n	t
10	1.812	20	1.725	50	1.676
11	1.796	21	1.721	60	1.671
12	1.782	22	1.717	70	1.667
13	1.771	23	1.714	80	1.664
14	1.761	24	1.711	90	1.662
15	1.753	25	1.708	100	1.661
16	1.746	30	1.697	120	1.658
17	1.740	35	1.690	145	1.656
18	1.734	40	1.684		
19	1.729	45	1.680		

(e) For Risk Reduction Standards Numbers 2 and 3, in determining toxicity information for contaminants (e.g., Environmental Protection Agency carcinogen classification, type of toxicant, reference doses, carcinogenic slope factors, etc.), persons shall utilize values from the following sources in the order indicated. For Risk Reduction Standard Number 2, persons may utilize data from these sources that are more current than those used to derive the unadjusted MSCs listed in §335.568 of this title (relating to Appendix II), provided that substantiating information is furnished to the executive director in the report required by §335.555(f) of this title (relating to Attainment of Risk Reduction Standard Number 2):

(1) integrated Risk Information System (IRIS);

(2) health Effects Assessment Summary Table (HEAST);

(3) United States Environmental Protection Agency Criteria Documents;

(4) agency for Toxic Substances and Disease Registry (ATSDR) Toxicological Profiles; and

(5) other scientifically valid published sources.

(f) For risk reduction standards Numbers 2 and 3, persons determining cleanup levels for contaminated media characterized by non compound-specific analytical techniques (e.g., Total Petroleum Hydrocarbons, Total Organic Carbon, etc.) and for which individual compounds such as hazardous constituents are not present as contaminants, must at a minimum consider other scientifically valid published numeric criteria to address: adverse impacts on environmental quality; adverse impacts on the public welfare and safety; conditions that present objectionable characteristics (e.g. taste, odor, etc.); or conditions that make a natural resource unfit for use.

§335.554. Attainment of Risk Reduction Standard Number 1: Closure/Remediation to Background.

(a) Compliance with this standard is attained when the criteria set forth in subsections (b)-(g) of this section are met.

(b) For closure of hazardous waste management units and response to unauthorized discharges of hazardous waste, all hazardous waste and hazardous waste residues and contaminated design and operating system components such as liners, leachate collection systems and dikes must be removed from the unit or area of the unauthorized discharge. For remediation of media that have become contaminated by releases from a hazardous waste management unit or by other unauthorized discharge of hazardous waste, the contaminated media must be removed or decontaminated to cleanup levels specified in this section.

(c) For closure of non-hazardous industrial solid waste management units, response to unauthorized discharges of non-hazardous industrial solid waste, and the remediation of media that have become contaminated by discharges of non-hazardous industrial solid waste or other contaminants, all waste and waste residues, contaminated design and operating system components such as liners, leachate collection system and dikes, and contaminated media must be removed or decontaminated to cleanup levels specified in this section.

(d) Background as represented by results of analyses of samples taken from media that are unaffected by waste management or industrial activities shall be used to determine compliance with the requirements of this section. If the Practical Quantitation Limit (PQL) is greater than background, then the PQL rather than background shall be used as the cleanup level provided that the person satisfactorily demonstrates to the executive director that lower levels of quantation of a contaminant are not possible.

(e) Attainment of cleanup levels shall be demonstrated by collection and analysis of samples from the media of concern using the procedures of §335.553(d) of this title (relating to Required Information).

(f) The person must submit a report to the executive director in accordance with §335.553(a) of this title (relating to Required Information) that documents compliance with the requirements of this section.

(g) Provided that attainment of this risk reduction standard for the facility or area can be demonstrated to the executive director pursuant to this section, the person is released from deed recordation requirements of §335.5 of this title (relating to Deed Recordation of Waste Disposal) and post-closure care responsibilities.

§335.555. Attainment of Risk Reduction Standard Number 2: Closure/Remediation to Health-Based Standards and Criteria.

(a) Compliance with this standard is attained when the criteria set forth in subsections (b)-(f) of this section are met.

(b) For closure of hazardous waste management units and response to unauthorized discharges of hazardous waste, all hazardous waste and hazardous waste residues must be removed from the unit or area of the unauthorized discharge. Contaminated design and operating system components such as liners, leachate collection systems and dikes must be removed from the unit or area of the unauthorized discharge. For remediation of media that have become contaminated by releases from a hazardous waste management unit or by other unauthorized discharge of hazardous waste, the contaminated media must be removed or decontaminated to cleanup levels specified in this section or such other lower levels necessary to be in conformance with current hazardous waste regulations.

(c) For closure of non-hazardous industrial solid waste management units, response to unauthorized discharges of non-hazardous industrial solid waste, and the remediation of media that have become contaminated by discharges of non-hazardous industrial solid waste or other contaminants, all waste and waste residues, contaminated design and operating system components such as liners, leachate collection systems and dikes, and contaminated media must be removed or decontaminated to cleanup levels specified in this section.

(d) The concentration of a contaminant in contaminated media of concern such as ground water, surface water, air or soil shall not exceed cleanup levels as defined in §335.556 of this title (relating to Determination of Cleanup Levels for Risk Reduction Standard Number 3).

(1) If the Practical Quantitation Limit (PQL) and/or the background concentration, determined in a manner consistent with §335.554 of this title (relating to Attainment of Risk Reduction Standard Number 1) for a contaminant is greater than the cleanup level, the greater of the PQL or background shall be used for determining compliance with the requirements of this section.

(2) Attainment of cleanup levels shall be demonstrated by collection and analysis of samples from the contaminated media of concern using the procedures of §335.553(d) of this title (relating to Required Information).

(e) The person must prepare a document that he intends to use to fulfill the deed certification requirements of §335.560 of this title (relating to Post Closure Care and Deed Certification for Risk Reduction Standard Number 2) and include this document as part of the report of subsection (f) of this section.

(f) The person must submit a report to the executive director in accordance with §335.553(a) of this title (relating to Required Information) that documents compliance with the requirements of this section. The executive director may require additional information or analysis, such as but not limited to, consideration of cumulative health effects and cross-media contamination, prior to accepting a certification of closure or remediation under this

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performance standard. Upon approval of the report by the executive director, the person shall comply with the requirements of §335.560 of this title (relating to Post Closure Care and Deed Certification for Risk Reduction Standard Number 2).

§335.556. Determination of Cleanup Levels for Risk Reduction Standard Number 2.

(a) For purposes of this risk reduction standard, cleanup levels for individual contaminants are represented by Texas or federal promulgated health-based standards, or, when these are not available or do not provide appropriate protection for human health or the environment, persons must develop cleanup levels based on procedures specified or referenced in this section for determining other numeric criteria, referred to as Medium Specific Concentration (MSCs), and are required to perform any necessary adjustments to these numeric criteria. The MSCs address a single contaminant in a medium and consider one or more exposure pathways, specifically, water ingestion (Water MSC) and soil ingestion with inhalation of volatiles and particulates (Soil MSC). Where a contaminant in one medium has the potential to contaminate another medium, defined as cross-media contamination, additional numeric criteria are developed as cleanup levels (e.g., the soil-to-ground water contaminant pathways). To determine cleanup levels for contaminated media of concern, persons must perform the evaluation of subsections (b)–(e) of this section.

(b) In addition to the exposure pathways defined or referenced in this section, the person must evaluate other exposure pathways at or near the facility (e.g., dermal absorption, ingestion of contaminated fish, etc.) by which human populations (including sensitive subgroups) or environmental receptors (e.g., aquatic organisms, food-chain crops, etc.) are likely to be exposed to contaminants. If such evaluation indicates the need for additional remediation at the facility to adequately protect human health or environmental receptors, then the person shall develop numeric criteria by utilizing available guidance or scientific literature to serve in place of, or in addition to, cleanup levels determined pursuant to this section.

(c) The person must determine the appropriate exposure factors from §335.557 of this title (relating to Criteria for Selection of Non-Residential Soil Requirements for Risk Reduction Standard Number 2); and.

(d) The person must calculate MSCs in accordance with §335.558 of this title (relating to Medium Specific Concentrations for Risk Reduction Standard Number 2); and.

(e) The person must determine any cross-media requirements and modifications to cleanup levels in accordance with §335.559 of this title (relating to Medium Specific Requirements and Adjustments for Risk Reduction Standard Number 2).

§335.557. Criteria for Selection of Non-Residential Soil Requirements for Risk Reduction Standard Number 2. All facilities or areas shall be subject to the residential soil requirements unless one of the conditions of paragraphs (1)–(3) of this section is satisfied for use of the non-residential soil requirements.

(1) For property located within the jurisdictional area of a zoning authority, persons may provide documentation that the property is zoned for commercial or industrial use.

(2) For property not located within the jurisdictional area of a zoning authority, persons may provide documentation that the activities being conducted on the property satisfy the definition for non-residential property (§335.553) of this title (relating to Definitions)).

(3) For government-owned (local, state, or federal) property which does not satisfy either of the conditions of subsections (a) or (b) of this section but does have non-residential activities occurring on all or portions of the property, the person may provide documentation that access will be restricted such that the exposure assumptions remain valid for the duration of government control.

§335.558. Medium Specific Concentrations for Risk Reduction Standard Number 2.

(a) Medium specific concentrations (MSCs) for ingestion of surface water and ground water, and soil ingestion along with inhalation of volatiles and particulates are calculated according to the procedures specified in subsections (b)–(d) of this section based on residential exposure factors. MSCs are subject to additional numeric criteria and adjustments of §335.559 of this title (relating to Medium Specific Requirements and Adjustments for Risk Reduction Standard Number 2). The derivation of all equations is presented in §335.567 of this title (relating to Appendix I).

(b) For a contaminant which is a carcinogen, the MSC is the concentration which represents an excess upper bound lifetime cancer Target Risk (TR) of 0.000001 (also expressed as one in one million) for Class A and B carcinogens, or 0.00001 (also expressed as one in 100,000) for Class C carcinogens due to continuous lifetime exposure as calculated using the equations and factors listed in paragraphs (1) and (2) of this subsection.

(1) Water MSC for Ingestion, in units of milligrams per liter (mg/L):

$$MSC = \frac{85.16\ (TR)}{SF_o} \qquad \text{Equation 1}$$

where SF_o is the chemical-specific oral cancer slope factor.

(2) Soil MSC for Ingestion with Inhalation of volatiles and particulates, in units of milligram per kilogram (mg/kg):

$$MSC = \frac{5510\ (TR)}{[((7.98 \times 10^{-3}) \times (SF_o)(SF_i \times [(450/VF) + (9.72 \times 10^{-8})])]} \qquad \text{Equation 2}$$

where VF is the chemical-specific soil-to-air volatilization factor.

(c) For a contaminant which is a systemic toxicant, the MSC is the concentration to which human populations (including sensitive subgroups) could be exposed by direct ingestion or inhalation on a daily basis without appreciable risk or deleterious effects during a lifetime. The MSC is calculated using the equations and factors listed in paragraphs (1) and (2) of this subsection.

(1) Water MSC for Ingestion in units of milligram per liter (mg/L):

$$MSC = 36.5\ RfD_o \quad mg/L \qquad \text{Equation 3}$$

where RfD_o is the chemical-specific oral reference dose.

(2) Soil MSC for Ingestion with Inhalation of volatiles and particulates, in units of milligram per kilogram (mg/kg):

$$MSC = \frac{2190\ mg/kg}{[(7.98 \times 10^{-3}/RfD_o) + ((1/RfD_i) \times [(450/VF) + (9.72 \times 10^{-8})])]} \qquad \text{Equation 4}$$

where VF is the chemical-specific soil-to-air volatilization factor.

(d) Examples of unadjusted MSCs, standards and criteria are listed in §335.568 of this title (relating to Appendix II: "Examples of Medium Specific Concentrations, Standards and Criteria for Health-Based Closure/Remediation (§335.558)." The Commission will revise Appendix II on an annual base to reflect newly promulgated standards and MSCs based on current toxicological data.

§335.559. Medium Specific Requirements and Adjustments for Risk Reduction Standard Number 2.

(a) Numeric cleanup levels. The subsections (b)-(h) of this section specify requirements that can define or modify numeric cleanup levels such as MSCs or require non-health based criteria to be addressed.

(b) Surface water. In determining the necessity for remediation at the facility, persons shall utilize Chapter 307 of this title (relating to Texas Surface Water Quality Standards) or, if those values are not available, Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act, or if MCLs are not available or appropriate, MSCs based upon human ingestion of the water. Any discharge or release into or adjacent to surface water, including storm water runoff, occurring during or after attainment of Risk Reduction Standard Number 2, shall be compliant with the Texas Surface Water Quality Standards of Chapter 307 of this title and may be subject to the permitting requirements of Chapter 305 of this title (relating to Consolidated Permits) or other authorization from the commission.

(c) Air. In determining the necessity for remediation at the facility, persons shall observe limitations established by the National Ambient Air Quality Standards (NAAQS) and the National Emission Standards for Hazardous Air Pollutants (NESHAPS) as found in the 40 Code of Federal Regulations Parts 50 and 61, respectively, and other applicable federal standards and guidelines of the United States Environmental Protection Agency. Also, limitations established by the Texas Air Control Board (TACB) under the Texas Clean Air Act, the State Implementation Plan or other federal requirements must be observed. Permit requirements, limitations established by Standard Exemptions, or other requirements of the TACB relative to atmospheric emissions and/or air quality may also apply.

(d) Ground water. The groundwater cleanup levels shall be determined by a consideration of the following.

(1) For residential exposure, the concentration of a contaminant dissolved in ground water must not exceed the Maximum Contaminant Level (MCL), if promulgated pursuant the Federal Safe Drinking Water Act, §141, otherwise the water MSC for ingestion determined pursuant to §335.556 of this title (relating to Determination of Cleanup Levels for Risk Reduction Standard Number 2). Phase-separated non-aqueous liquids released from the unit that is undergoing closure or remediation must be removed or decontaminated.

(2) For non-residential exposure, the concentration of a contaminant dissolved in ground water must not exceed the Maximum Contaminant Level (MCL) if promulgated pursuant to the Federal Safe Drinking Water Act, §141. If no MCL has been promulgated, the ground water concentration shall not exceed the water MSC for ingestion determined pursuant to §335.556 of this title (relating to Determi-

nation of Cleanup Levels for Risk Reduction Standard Number 2), which has been multiplied by a factor of 3.36 for carcinogens or 2. 8 for systemic toxicants to account for lower ingestion rates associated with non-residential worker exposure. Persons must be able to demonstrate that the quality of ground water at the facility property boundary will be protective for residential exposure. Phase-separated non-aqueous liquids released from the unit that is undergoing closure or remediation must be removed or decontaminated to the extent practicable.

(3) For residential and non-residential exposure, if the ground water at the facility or area has a naturally occurring background Total Dissolved Solids concentration greater than 10,000 milligrams per liter, the cleanup level for a contaminant dissolved in this ground water determined pursuant to paragraph (1) or (2) of this subsection, as appropriate, may be adjusted by multiplying by 100. The resulting value becomes the maximum concentration for ground water for residential and non-residential exposure, respectively.

(4) The executive director may require the evaluation of additional exposure pathways or environmental receptors as part of the adjustment of paragraph (3) of this subsection.

(e) Soil. For all situations, concentrations of contaminants in soils must be protective of surface water, air and ground water as specified in subsections (b), (c), and (d) of this section. No soil remaining in place shall exhibit the hazardous waste characteristics of ignitability, corrosivity, or reactivity as defined in 40 Code of Federal Regulations, Part 261, Subpart C. The sum of concentrations of the volatile organic compounds in vapor phase in soil shall not exceed 1,000 parts per million by weight or volume, as measured by EPA Test Method 8015 or calculated by using soil concentrations and Henry's Law constants.

(f) Residential soil requirements. In addition to the requirements of subsection (e) of this section, the concentration of a contaminant throughout the soil column (i.e., surface and subsurface soils) shall not exceed the lower of the Soil MSC, based upon residential human ingestion of soil and inhalation of particulates and volatiles (as defined in the preceeding section), and the Residential Soil-to-Ground Water Cross-Media Protection Concentration, a numeric value which is determined as follows:

(1) a value which is one hundred times the residential ground water cleanup level determined by the procedures of paragraph (1) of subsection (d) of this section. Examples of such values are listed in Appendix II; or

(2) a concentration in soil that does not produce a leachate in excess of MCLs or MSCs for ground water when subjected to the Synthetic Precipitation Leaching Procedure, Method 1312 of SW 846, Test Methods for Evaluating Solid Waste, United States Environmental Protection Agency. Other test methods that more accurately simulate conditions at the facility may be used in the demonstration in place of this method, subject to prior approval of the executive director.

(g) Non-residential soil requirements. Non-residential soils shall conform to the requirements of subsection (e) of this section. The concentration of a contaminant in near-surface soils (i.e., within two feet of the land surface) shall not exceed the lower of the Non-Residential Soil MSC defined in paragraph (1) of this subsection, based upon worker ingestion of soil and inhalation of particulates and volatiles, and the Non-Residential Soil-to-Ground Water Cross-Media Protection Concentration defined in paragraph (2) of this subsection. In no event shall compliance be achieved with the surface soil criteria by applying two feet of clean soil onto the surface of a facility or area without prior approval from the executive director. The concentration of a contaminant in subsurface soils (i.e., greater than two feet in depth from the land surface) shall not exceed the Non-Residential Soil-to-Ground Water Cross-Media Protection Concentration.

(1) Non-residential soil MSC. The MSC is calculated using the equations and factors listed in subparagraphs (A) and (B) of this paragraph. The chemical-specific factors Sf_o, SF_i, RfD_o, RfD_i and VF are the same as for the soil MSCs of the preceding section. The derivation of all equations is presented in Appendix I.

(A) Carcinogenic Effects Equation, in units of milligram per kilogram (mg/kg):

Equation 5

$$MSC = \frac{286.16\ (TR)}{[((5 \times 10^{-3}) \times SF_o) + (SF_i \times [(20/VF) + (4.3 \times 10^{-9})])]} \quad mg/kg$$

(B) Systemic: C Toxicant Effects Equation, in units of milligram per kilogram (mg/kg):

Equation 6

$$MSC = \frac{102.2}{[(5 \times 10^{-5}/RfD_o) + ((1/RfD_i) \times [(20/VF) + (4.3 \times 10^{-9})])]} \quad mg/kg$$

(2) Non-residential soil to-ground water cross-media protection concentration. Persons must demonstrate that a contaminant in soil does not pose the potential for a future release of leachate in excess of the ground-water concentration considered to be protective for non-residential worker exposure. Persons may make this demonstration by showing that a contaminant occurs in soil at least than the concentration described in either subparagraph (A) or (B) of this paragraph:

(A) a concentration which is 100 times the non-residential ground-water cleanup level determined by the procedures of

paragraphs (2) or (3), as applicable, of subsection (d) of this section;

(B) a concentration in soil that does not produce a leachate in excess of the ground-water concentration of this paragraph when subjected to the Synthetic Precipitation Leaching Procedure, Method 1312 of SW 846, Test Methods for Evaluation Solid Waste, U.S. Environmental Protection Agency. Other test methods that more accurately simulate conditions at the facility may be used in the demonstration in place of this method, subject to prior approval by the executive director.

(h) Other criteria. For contaminants that do not exceed standards or criteria protective of human health and environmental receptors as determined by the procedures of this section but otherwise adversely impact environmental quality, or the public welfare and safety, or present objectionable characteristics (e.g., taste, odor, etc.), or make a natural resource unfit for use, other scientifically valid published criteria may be utilized such as, but not limited to, Threshold Limit Values for air and secondary maximum contaminant levels for water.

§335.560. Post Closure Care and Deed Certification for Risk Reduction Standard Number 2.

(a) Provided that attainment of this risk reduction standard for the facility can be demonstrated to the executive director pursuant to §335.555 of this title (relating to Attainment of Risk Reduction Standard Number 2), the conditions of subsections (b) and (c) of this section apply.

(b) The person is required to place in the county deed records of the county or counties in which such activities take place the information specified in paragraphs (1)-(4) of this subsection. The statements should be worded such that a lay person can easily understand them. An example format is provided in §335.569 of this title (relating to Appendix III). Proof of deed certification of the required information shall be provided to the executive director in writing no later than 90 days after acceptance of the report required by §335.555(f) of this title (relating to Attainment of Risk Reduction Standard Number 2):

(1) a certification signed by the person, showing the person's full name and title, and stating that closure or remediation of the facility or area was carried out in accordance with a plan designed to meet §335.555 of this title (relating to Risk Reduction Standard Number 2), which mandates that the remedy be designed to eliminate substantial present and future risk, such that no post-closure care or engineering or institutional control measures are required to protect human health and the environment;

(2) a metes and bounds description of the portion or portions of the tract of land on which closure or remediation of industrial solid waste, municipal hazardous waste or contaminants was achieved;

(3) for a facility that satisfies the conditions of §335.557 of this title (relating to Criteria for Selection of Non-Residential Soil Requirements for Risk Reduction Standard Number 2) for use of non-residential soil requirements, a statement that current or future owners of the facility must undertake actions as necessary to protect human health and the environment in accordance with the rules of the commission;

(4) a statement that information and documents concerning the closure or remediation of the facility or area are available for inspection upon request at the Texas Water Commission. The statement shall further describe the jurisdiction of the Texas Water Commission to review the establishment of the final cleanup criteria.

(c) The person is released from post-closure care responsibilities upon acceptance by the executive director of the proof of deed certification required by subsection (b) of this section.

§335.561. Attainment of Risk Reduction Standard Number 3: Closure/Remediation With Controls.

(a) Compliance with this standard is attained when, in the evaluation of the executive director, the person recommends the remedy which best achieves the requirements of subsections (b)-(d) of this section taking into consideration the evaluation factors of §335.562 of this title (relating to Remedy Evaluation Factors) and then following approval subsequently completes the remedy.

(b) A remedy must be permanent or, if that is not practicable, achieve the highest degree of long-term effectiveness possible.

(c) A remedy must be cost-effective in that it achieves the best balance between long-term effectiveness and cost for alternative remedies which meet the cleanup objectives for a facility.

(d) A remedy must achieve media cleanup requirements as specified pursuant to §335.563 of this title (relating to Media Cleanup Requirements for Risk Reduction Standard Number 3).

§335.562. Remedy Evaluation Factors for Risk Reduction Standard Number 3.

(a) General. For closure/remediation in accordance with Risk Reduction Standard Number 3, persons shall consider the evaluation factors set forth in subsections (b)-(g) of this section when evaluating the relative abilities and effectiveness of potential remedies to achieve the requirements for remedies described in §335.561 of this title (relating to Attainment of Risk Reduction Standard Number 3). A description of the evaluation for these factors for the proposed remedy shall be included in the corrective measure study prepared pursuant to §335.553(b)(3) of this title (relating to Required Information). Persons performing these evaluations shall submit to the executive director upon request such additional information as may reasonably be required to enable the executive director to determine whether such evaluation has been conducted in a manner compliant with this section.

(b) Compliance with other laws and regulations. Remedies shall be evaluated to determine attainment of cleanup requirements for other Texas or federal environmental laws which are either legally applicable to the facility or that address problems or situations that are sufficiently similar to those encountered at the facility that their use is well suited to the facility.

(c) Long-term effectiveness and permanence. Remedies shall be evaluated for lont-term effectiveness. Factors that shall be considered in this evaluation include:

(1) magnitude of risks remaining after completion of the closure or remedial action;

(2) the type, degree, and duration of post-closure care required including, but not limited to, operation and maintenance, monitoring, inspections, and reports and their frequencies, or other activities which will be necessary to protect human health and the environment;

(3) potential for exposure of humans and environmental receptors to contaminants remaining at the facility;

(4) long-term reliability of any engineering and voluntary institutional controls; and

(5) potential need for replacement of components of the remedy.

(d) Reduction of toxicity, mobility, or volume. Remedies shall be evaluated to determine the degree to which treatment could be used to significantly and irreversibly reduce the toxicity, mobility, or volume of contaminants. Factors to be considered in this evaluation include:

(1) the amount of contaminants that will be treated or destroyed;

(2) the degree of expected reduction in toxicity, mobility, or volume;

(3) the type, quantity, toxicity, and mobility of contaminants remaining after treatment; and

(4) the degree to which the treatment is irreversible.

(e) Short-term effectiveness. The short-term effects of remedies shall be evaluated considering the following:

(1) short-term risks that might be posed to the community, workers, or the environment during implementation of the remedy and the effectiveness and reliability of protective measures; and

(2) time until protection is achieved.

(f) Implementability. The ease or difficulty of implementing the remedies shall be evaluated by considering the following types of factors:

(1) degree of difficulty associated with constructing the remedy;

(2) expected operational reliability of the remedy;

(3) availability of necessary equipment and specialists;

(4) available capacity and location of needed treatment, storage, and disposal services.

(g) Cost. The types of costs that shall be evaluated include the following:

(1) capital costs;

(2) operation and maintenance costs; and

(3) net present value of capital and operation and maintenance costs.

§335.563. Media Cleanup Requirements for Risk Reduction Standard Number 3.

(a) General. For closure/remediation in accordance with Risk Reduction Standard Number 3, persons shall propose media cleanup levels in accordance with the conditions set forth in subsections (b)-(j) of this section.

(b) Carcinogens. For known or suspected carcinogens, media cleanup levels shall be established at concentrations which represent an excess upperbound lifetime risk of between one in 10,000 and one in million. The executive director will use one in million as a goal in establishing such concentration limits. The cumulative excess risk to exposed populations (including sensitive subgroups) shall not be greater than one in 10,000.

(c) Systemic toxicants. For systemic toxicants, media cleanup levels shall represent concentrations to which the human population (including sensitive subgroups) could be exposed on a daily basis without appreciable risk of deleterious effect during a lifetime or part of a lifetime and where:

(1) the hazard quotient which is the ratio of a single systemic toxicant exposure level for a specified time period to a reference dose for that systemic toxicant derived from the same time period, shall not exceed one; and

(2) the hazard index shall not exceed one. The hazard index is the sum of the hazard quotients for a single or multiple systemic toxicants which affect the same target organ or act by the same method of toxicity and act through a single or multiple medial exposure pathways.

(d) Additional considerations. In establishing media cleanup levels pursuant to subsections (b) and (c) of this section, the executive director may consider and may direct persons who submit plans or reports in accordance with §335.553(b) of this title (relating to Required Information) to address the following:

(1) multiple contaminants in a medium;

(2) exposure to multiple contaminated media;

(3) reasonable expected future exposure conditions at the facility; and

(4) the technical limitations, effectiveness, practicability, or other relevant features of available remedies.

(e) Standard exposure factors. In determining media cleanup levels pursuant to subsections (b) and (c) of this section, persons shall use the standard exposure factors for residential use of the facility as set forward in Table 1 (located following §335.553) unless the person documents to the satisfaction of the executive director that:

(1) site-specific data warrant deviation from the standard exposure factors; or

(2) a land use other than residential is more appropriate based on:

(A) historical, current, and probable future land use; and

(B) effectiveness of institutional or legal controls placed on the future use of the land.

(f) Air. Media cleanup levels for air will be established to meet the requirements of paragraphs (1) and (2) of this subsection.

(1) Concentrations of contaminants in air that emanate from a facility, area of soil contamination, or plume of contaminated ground water shall not exceed:

(A) National Ambient Air Quality Standards (NAAQS), National Emission Standards for Hazardous Pollutants (NESHPAS) (as found in 40 Code of Federal Regulations Parts 50 and 61 respectively, and as adopted by the Texas Clean Air Act);

(B) concentrations established by the Texas Air Control Board (TACB) under the Texas Clean Air Act, the State Implementation Plan or other federal requirements. Permit requirements, limitations established by Standard Exemptions, or other requirements of the TACB relative to atmospheric emissions and/or air quality may also apply.

(2) For residential exposure conditions, concentrations of contaminants in air that emanate from a facility, area of soil contamination, or plume of contaminated ground water shall not exceed concentrations that satisfy subsections (b)-(e) of this section at exposure points located both within the contaminated area and at the property boundary.

(3) For nonresidential exposure conditions, concentrations of contaminants in air that manage from a facility, area of soil contamination, or plume of contaminated ground water shall not exceed either OSHA permissible exposure limits, threshold limit values or other criteria applicable to an industrial exposure setting within the facility boundaries or concentrations that satisfy subsections (b)-(e) of this section at the property boundary.

(g) Surface water. In determining the necessity for remediation at the facility, persons shall utilize Chapter 307 of this title (relating to Texas Surface Water Quality Standards) or, if those values are not available, Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act or, if MCLs are not available or applicable, values calculated pursuant to subsections (b)-(e) of this section based upon human ingestion of the water or other site-specific exposure pathway. Any discharge or release into or adjacent to surface water, including storm water runoff, occurring during or after attainment of Risk Reduction Standard Number 3, shall be compliant with the Texas Surface Water Quality Standards of Chapter 307 of this title and may be subject to the permitting requirements of Chapter 305 of this title (relating to Consolidated Permits) or other authorization from the Commission.

(h) Ground water. Media cleanup levels for ground water that is a current or potential source of drinking water as defined in paragraph (1) of this subsection

shall not exceed Maximum Contaminant Levels (MCLs) promulgated under the Safe Drinking Water Act or, if MCLs are not available, values calculated according to subsections (b)-(e) of this section based upon human ingestion of the water. Cleanup levels for ground water may be subject to the modifications of paragraphs (2)-(4) of this subsection.

(1) Ground water that has a background Total Dissolved Solids (TDS) content less than or equal to 10,000 milligrams per liter (mg/L) and that occurs within a geologic zone that is sufficiently permeable to transmit water to a pumping well in usable quantities shall be considered a current or potential source of drinking water for the purpose of determining cleanup levels.

(2) The cleanup levels shall be achieved throughout the plume of contaminated ground water, with the exception of the circumstances described in subparagraphs (A)-(C) of this paragraph:

(A) when Alternate Concentration Limits of §335.160(b) of this title (relating to Alternate Concentration Limits) have been approved in a permit issued by the Commission for a hazardous waste management facility;

(B) when the selected remedy calls for waste to be left in place and when appropriate control measures are installed or operated, the executive director may authorize the zone underlying the area encompassing the original source(s) of release to be excluded from this requirement;

(C) when the person documents to the executive director's satisfaction pursuant to subsection (e) of this section that a future land use other than residential is appropriate for the facility or area and further demonstrates that institutional or legal controls will effectively prevent use of the contaminated ground water, the extent of plume remediation may be determined in a manner consistent with §335.160(b) of this title (relating to Alternate Concentration Limits).

(3) The executive director may determine that remediation of ground water to the extent required in paragraphs (1) or (2) of this subsection is not necessary if the person demonstrates to the executive director's satisfaction that:

(A) the contaminant is present in ground water that is not a current or potential source of drinking water and the contaminated ground water is not hydraulically connected with or is not likely to migrate to either surface water or to ground water that is a current or potential source of drinking water.

(B) restoration of the ground water to these levels is technically impracticable.

(4) If a determination is made pursuant to paragraph (3) of this subsection, the executive director may require any alternative measures or cleanup levels that are necessary to protect human health and the environment. At a minimum, for all cases described in this subsection, phase-separated non-aqueous liquids shall be removed from ground water zones to the extent practicable.

(i) Soil. Concentrations of contaminants in soil shall not exceed the following values:

(1) the values calculated pursuant to subsections (b)-(d) of this section based upon human ingestion of the soils at all points where direct contact exposure to the soils may occur; and

(2) values which will allow the air, surface water, and ground-water cleanup levels specified in subsections (f), (g), and (h) of this section, respectively, to be maintained over time taking into account the effects of engineering controls.

(A) Such determinations shall be based on sound scientific principles including fate and transport evaluation of contaminant migration. Procedures and conclusions shall be documented to the satisfaction of the executive director.

(B) The executive director may require the evaluation of additional migration pathways beyond those listed in this section if determined necessary. Such additional pathways may include but are not limited to food chain contamination, impairment of soil for agricultural purposes, phytotoxicity, accumulations of contaminants in sediment of surface water bodies, or other impairments of natural resources, land, or water use.

(j) Other adjustments. Cleanup levels may be adjusted according to paragraphs (1)-(3) of this subsection.

(1) If the Practical Quantitation Limit (PQL) or the background concentration (represented by results of analyses of samples taken from media that are not affected by waste management or industrial activities) for a contaminant is greater than the cleanup level determined by procedures of this section, then the greater of the PQL or background shall become the cleanup level.

(2) Other scientifically valid published criteria, such as, but not limited to. Threshold Limit Values for air and secondary maximum contaminant levels for water, shall be utilized as cleanup levels for contaminants for which the procedures of this section are not appropriate (e.g., mixtures or substances that do not have toxicological data) or that do not exceed standards or criteria protective of human health as determined by the procedures of this section but otherwise adversely impact environmental quality, or the public welfare and safety, or present objectionable characteristics (e.g., taste, odor, etc.), or make a natural resource unfit for use.

(3) More stringent cleanup levels may be established for a facility than are specified in this section if, by utilizing available guidance or scientific literature, the executive director determines that it is necessary to protect environmental receptors.

§335.564. Post Closure Care Not Required for Risk Reduction Standard Number 3. In cases under Risk Reduction Standard Number 3 where the executive director determines that neither engineering nor institutional control measures are required to protect human health and the environment, the person is released from post closure care responsibilities but is required to deed record the facility in accordance with §335.566 of this title (relating to Deed Recordation for Risk Reduction Standard Number 3).

§335.565. Post Closure Care Required for Risk Reduction Standard Number 2. In case under Risk Reduction Standard Number 3 where the executive director determines that either engineering or institutional control measures are required to protect human health and the environment, the person shall comply with the requirements of paragraphs (1) and (2) in this section, as applicable, and deed record the facility in accordance with §335.566 of this title (relating to Deed Recordation for Risk Reduction Standard Number 3):

(1) carry out the post-closure requirements as evaluated and approved by the remedy evaluation process described in §335.562 of this title (relating to Remedy Evaluation Factors);

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(2) for hazardous waste management facilities, the person must also satisfy the applicable requirements of Subchapter E and F of this chapter (relating to Interim Standards for Hazardous Waste Storage, Processing, or Disposal Facilities; and Permitting Standards for Owners and Operators of Hazardous Waste Storage, Processing, or Disposal Facilities, respectively).

§335.566. Deed Recordation for Risk Reduction Standard Number 3.

(a) Within 90 days after acceptance by the executive director of the final report referenced in §335.561(a) of this title (relating to Attainment of Risk Reduction Standard Number 3), the person must record in the county deed records of the county or counties in which such activities take place the information specified in subsections (b)-(e) of this section and submit written proof of such recordation to the executive director. The statements should be worded such that a lay person can easily understand them. An example format is provided in §335.569 of this title (relating to Appendix III).

(b) A certification, signed by the person, showing the person's full name and title, and stating: that remediation of the facility or area was carried out in accordance with a plan designed to meet §335.561 of this title (relating to Risk Reduction Standard Number 3), which mandates that the remedy be designed to eliminate or reduce to the maximum extent practicable, substantial present and future risk; and whether continued post-closure care or engineering or institutional control measures (Post-Closure Measures) are required to protect human health and the environment together with a description of any required Post-Closure Measures:

(c) a description of any institutional or legal controls placed by the person on the future use of the property. The notice shall indicate that the current or future owner must undertake actions as necessary to protect human health and the environment in accordance with the rules of the commission.

(d) a metes and bounds description of the portion or portions of the tract of land on which closure or remediation of industrial solid waste, municipal hazardous waste, or contaminants was achieved; and

(e) A statement that information and documents concerning the closure or remediation of the facility or area are available for inspection upon request at the Texas Water Commission. The statement shall further describe the jurisdiction of the Texas Water Commission to review the establishment of the final cleanup criteria.

§335.567. Appendix I. Derivation of Reduced Equations for Calculation of Medium Specific Concentrations of Risk Reduction Standard Number 2.

Equation 1 — MSC for Ingestion of Water; Carcinogenic Effects:

$$MSC = \frac{85.16\ TR}{SF_o}$$

is derived from the following expression:

$$MSC = \frac{TR \times BW \times AT_o \times 365\ days/yr}{SF_o \times IR_w \times EF \times ED \times A}$$

Equation 2 — MSC for Ingestion of Soils and Inhalation of Volatiles and Particulates; Residential Scenario; Carcinogenic Effects:

$$MSC = \frac{5110\ TR}{[((7.98 \times 10^{-3}) \times SF_o) + (SF_i \times [(450/VF) + (9.72 \times 10^{-3})])]}$$

is derived from the following expression:

$$MSC = \frac{TR \times BW \times AT_o \times 365\ days/yr}{EF\ [(BW \times SF_o \times 10^{-6}\ Kg/mg \times IF_{soil/adj.}) + (SF_i \times ED \times IR_{air} \times [1/VF + 1/PEF])]}$$

Equation 3 — MSC for Ingestion of Water; Systemic Toxicant Effects:

$$MSC = 36.5\ RfD_o$$

is derived from the following expression:

$$MSC = \frac{THI \times RfD_o \times BW \times AT_o \times 365\ days/yr}{IR_w \times EF \times ED \times A}$$

Equation 4 — MSC for Ingestion of Soils and Inhalation of Volatiles and Particulates; Residential Scenario; Systemic Toxicant Effects:

$$MSC = \frac{2190}{[(7.98 \times 10^{-3}/RfD_o) + ((1/RfD_i \times [(450/VF) + (9.72 \times 10^{-6})])]}$$

is derived from the following expression:

$$MSC = \frac{THI \times BW \times AT_o \times 365\ days/yr}{EF\ [((1/RfD_o) \times BW \times 10^{-6}\ Kg/mg \times IF_{soil/adj.}) + ((1/RfD_i) \times ED \times IR_{air}\ [1/VF + 1/PEF])]}$$

Equation 5 — MSC for Worker Ingestion of Soils and Inhalation of Volatiles and Particulates; Carcinogenic Effects:

$$MSC = \frac{286.16\ TR}{[((5 \times 10^{-5}) \times SF_o) + (SF_i) \times [(20/VF) + (4.3 \times 10^{-9})])]}$$

is derived from the following expression:

$$MSC = \frac{TR \times BW \times AT_o \times 365\ days/yr}{EF \times ED \times [SF_o \times 10^{-6}\ Kg/mg \times IR_{soil}) + (SF_i \times IR_{air} \times [1/VF + 1/PEF])]}$$

Equation 6 — MSC for Worker Ingestion of Soils and Inhalation of Volatiles and Particulates; Systemic Toxicant Effects:

$$MSC = \frac{102.2}{[(5 \times 10^{-5}/ \times RfD_o) + ((1/RfD_i) \times [(20/VF) + (4.3 \times 10^{-9})])]}$$

is derived from the following expression:

$$MSC = \frac{THI \times BW \times AT_o \times 365\ days/yr}{EF \times ED \times [((1/RfD_o) \times 10^{-6}\ Kg/mg \times IR_{soil/}) + ((1/RfD_i) \times IR_{air} \times (1/VF + 1/PEF))]}$$

VF: Parameters, Definitions and Values for the Soil to Air Volatilization Factor

$$VF(m^3/kg) = \frac{(LS \times V \times DH)}{A} \times \frac{(3.14 \times \alpha \times T)^{1/2}}{(2 \times D_{ci} \times E \times K_{as} \times 10^{-3}\ kg/g)}$$

STATE DATE/DEFAULT FACTORS:

LS	Length of contaminated area (M)	=	45
E	true soil porosity (unitless)	=	0.35
V	wind speed in mixing zone (M/s)	=	2.25
ps	true soil density (g/cm^3)	=	2.65
DH	diffusion height (m)	=	2
T	exposure interval (s)	=	7.90e+08
A	area of contamination (cm^2)	=	2.03e+07
OC	organic carbon content, soil fraction (unitless)	=	0.02

CHEMICAL SPECIFIC DATA:

D_i Molecular Diffusivity (cm^2/s).

H Henry's Law Constant (atm-m^3/mol).

K_{oc} Organic Carbon Partition Coefficient (cm^3/g).

D_{ci} Effective Diffusivity (cm^2/sec), calculated from $Di \times E^{0.33}$.

Kd Soil-water partition coefficient (cm^3/g), calculated from Koc × OC.

α Alpha, (cm^2/s) = $\frac{(Dei \times E)}{E + (p_3)\ (1-E)/K_{as}}$

K_{as} Soil/air partition coefficient (g soil/cm^3 air, calculated from $K_{as} = (H/Kd) \times 41$.

Parameters, Definitions and Values used in Equations 1 through 6 are displayed in the following table:

Parameters	Definitions (Units)	Values
MSC	Medium Specific Concentration (mg/Kg)	chemical-specific
TR	Target excess individual lifetime cancer risk (unitless)	10^{-6} for Class A and B carcinogens; 10^{-5} for Class C carcinogens
THI	Target hazard index (unitless)	1
SF_o	Oral cancer slope factor ((mg/Kg-day)$^{-1}$)	chemical-specific
SF_i	Inhalation cancer slope factor ((mg/Kg-day)$^{-1}$)	chemical-specific
RfD_o	Oral chronic reference dose - (mg/Kg-day)	chemical-specific
RfD_i	Inhalation chronic reference dose (mg/Kg-day)	chemical-specific
BW	Adult body weight (Kg)	70 Kg
AT_c	Averaging time for carcinogens (yr)	70 yr
AT_s	Averaging time for systemic toxicants (yr)	30 yr residential 25 yr worker
EF	Exposure frequency (days/yr)	350 residential 250 worker
ED	Exposure duration (yr)	30 yr residential 25 yr worker
IR_w	Daily water ingestion rate (liter/day)	2 l/day residential 1 l/day worker
IR_{soil}	Workday soil ingestion rate (mg/day)	50 mg/day
$IF_{soil/adj}$	Age-adjusted ingestion factor (mg-yr/Kg-day)	114 mg-yr/Kg-day
IR_{air}	Daily indoor inhalation rate (m^3/day)	15 m^3/day residential 20 m^3/8 hr day worker
PEF	Particulate emission factor (m^3/Kg)	4.63×10^9 m^3/Kg
VF	Soil-to-air volatilization factor	chemical-specific
A	Absorption factor	1

Reference: U.S. EPA, OSWER Directive 92857-01B, Decmeber 13, 1991, Human Health Evaluation Manual, Part B: "Development of Risk-based Preliminary Remediation Goals"

§335.568. Appendix II. Examples of Medium-Specific Concentrations, Standards, and Criteria for Health-Based Closure/Remediation (See §335.558 of this title (relating to Medium Specific Concentration of Risk Reduction Standards Number 2.)) CAS # = Chemical Abstracts Service Number for the Specific Compound.

GW = Groundwater. Maximum Concentration in Ground water (mg/L) for residential exposure conditions.

GWP-Res = Ground-Water Protection Standard for residential Use. Concentration in Residential Soil Assumed Protective of Groundwater Considering Cross-media Contamination of Groundwater from Contaminated Soil (mg/kg).

GWP-Ind = Groundwater Protection Standard for Industrial Use. Concentration in Industrial Soil Assumed Protective of Groundwater Considering Cross-media Contamination of Groundwater from Contaminated Soil (mg/kg).

SAI-Res = Soil/Air and Ingestion Standard for Residential Use. Maximum Concentration in Residential Soil Considering Cross-media Contamination of Air and the Human Ingestion and Inhalation Pathways (mg/kg). SAI-Ind = Soil/Air and Ingestion Standard for Industrial Use. Maximum Concentraton in Industrial Soil.

Considering Cross-media Contamination of Air and the human Ingestion and Inhalation Pathways (mg/kg).

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CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Acenaphthene	83-32-9	2.19e+00	2.19e+02	6.13e+02	1.34e+04 (13)	4.43e+04 (13)
Acetone	67-64-1	3.65e+00	3.65e+02	1.02e+03	3.82e+03 (13)	4.16e+03 (13)
Acetonitrile	75-05-8	2.19e-01	2.19e+01	6.13e+01	1.65e+03	1.23e+04
Acetophenone	98-86-2	3.65e+00	3.65e+02	1.02e+03	2.26e+04	8.15e+04
Acrolein	107-02-8	7.30e-01 (12)	7.30e+01	2.04e+02	1.56e+03 (12)	2.04e+04 (12)
Acrylamide	79-06-1	1.89e-05	1.89e-03	6.36e-03	1.42e-01	1.27e+00
Acrylonitrile	107-13-1	1.58e-04	1.58e-02	5.30e-02	1.15e-01 (13)	1.44e-01 (13)
Alachlor	15972-60-8	2.00e-03 (9)	2.00e-01	2.00e-01	7.95e+00	7.10e+01
Aldicarb	116-06-3	3.00e-03 (9)	3.00e-01	3.00e-01	5.69e+01	4.09e+02
Aldicarb Sulfone	1646-88-4	2.00e-03 (9)	2.00e-01	2.00e-01	8.23e+01	6.13e+02
Aldicarb Sulfoxide	1646-88-3	4.00e-03 (9)	4.00e-01	4.00e-01	5.69e+01	4.09e+02
Aldrin	309-00-2	5.01e-06	5.01e-04	1.68e-03	3.77e-02	3.36e-01
Aluminum Phosphide	20859-73-8	1.46e-02	1.46e+00	4.09e+00	1.10e+02	8.18e+02
Aniline	62-53-3	1.49e-02	1.49e+00	5.02e+00	4.18e-02 (13)	4.80e-02 (13)
Anthracene	120-12-7	1.10e+01	1.10e+03	3.07e+03	5.91e+04 (13)	1.51e+05 (13)

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Antimony	7440-36-0	6.00e-03 (9)	6.00e-01	6.00e-01	1.10e+02	8.18e+02
Arsenic	7440-38-2	5.00e-02 (9)	5.00e+00	5.00e+00	3.66e-01	3.27e+00
Atrazine	1912-24-9	3.00e-03 (9)	3.00e-01	3.00e-01	2.88e+01	2.58e+02
Barium (ionic)	7440-39-3	2.00e+00 (9)	2.00e+02	2.00e+02	1.91e+04	1.37e+05
Benzene	71-43-2	5.00e-03 (9)	5.00e-01	5.00e-01	1.33e+00 (13)	1.62e+00 (13)
Benzidine	92-87-5	3.70e-07	3.70e-05	1.24e-04	2.78e-03	2.49e-02
Beryllium	7440-41-7	4.00e-03 (9)	4.00e-01	4.00e-01	1.49e-01	1.33e+00
Biphenyl	92-52-4	1.83e+00	1.83e+02	5.11e+02	6.68e+03 (13)	1.11e+04 (13)
Bis (2-chloro-ethyl) ether	111-44-4	7.74e-05	7.74e-03	2.60e-02	2.20e-01 (13)	3.77e-01 (13)
Bis (2-chloroisopropyl) ether	39638-32-9	1.22e-02	1.22e+00	4.09e+00	4.50e+01 (13)	9.05e+01 (13)
Bis (2-ethyl-hexyl) phthalate	117-81-7	6.08e-03	6.08e-01	2.04e+00	4.57e+01	4.09e+02
Bromodichloromethane	75-27-4	1.00e-01 (9)	1.00e+01	1.00e+01	7.19e-01 (13)	9.46e-01 (13)
Bromoform	75-25-2	1.00e-01 (9)	1.00e+01	1.00e+01	8.11e+01	7.24e+02
Bromomethane	74-83-9	5.11e-02	5.11e+00	1.43e+01	2.44e+01 (13)	2.47e+01 (13)
Butyl-4,6-dinitrophenol, 2-sec-	88-85-7	3.65e-02	3.65e+00	1.02e+01	2.74e+02	2.04e+03
Cadmium	7440-43-9	5.00e-03 (9)	5.00e-01	5.00e-01	1.37e+02	1.02e+03

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Carbofuran	1563-66-2	4.00e-02 (9)	4.00e+00	4.00e+00	1.37e+03	1.02e+04
Carbon Disulfide	75-15-0	3.65e+00	3.65e+02	1.02e+03	2.45e+01 (13)	2.34e+01 (13)
CarbonTetrachloride	56-23-5	5.00e-03 (9)	5.00e-01	5.00e-01	4.14e-01 (13)	5.13e-01 (13)
Chlordane	57-74-9	2.00e-03 (9)	2.00e-01	2.00e-01	4.93e-01	4.40e+00
Chloroaniline, p-	106-47-8	1.46e-01	1.46e+01	4.09e+01	1.10e+03	8.18e+03
Chlorobenzene	108-90-7	1.00e-01 (9)	1.00e+01	1.00e+01	2.56e+02 (13)	2.56e+02 (13)
Chlorobenzilate	510-15-6	7.30e-01	7.30e+01	2.04e+02	5.49e+03	4.09e+04
Chloroethane (Ethylchloride)	75-00-3	7.30e-01	7.30e+01	2.04e+02	4.99e+03 (13)	2.30e+04 (13)
Chloroform	67-66-3	1.00e-01 (9)	1.00e+01	1.00e+01	4.37e-[illegible] (13)	5.04e-01 (13)
Chloronaphthalene, 2-	91-58-7	2.92e+00	2.92e+02	8.18e+02	2.20e+04	1.64e+05
2-chlorophenol	95-57-8	1.83e-01	1.83e+01	5.11e+01	1.37e+03	1.02e+04
Chromium (total)	7440-47-3	1.00e-01 (9)	1.00e+01	1.00e+01	3.91e+02 (12)	5.11e+03 (12)
Chromium (VI)	7440-47-3	1.00e-01 (9)	1.00e+01	1.00e+01	3.91e+02 (12)	5.11e+03 (12)
Cresol, m-	108-39-4	1.83e+00 (12)	1.83e+02	5.11e+02	3.91e+03 (12)	5.11e+04 (12)
Cresol, o-	95-48-7	1.83e+00 (12)	1.83e+02	5.11e+02	3.91e+03 (12)	5.11e+04 (12)
Cresol, p-	106-44-5	1.83e+00 (12)	1.83e+02	5.11e+02	3.91e+03 (12)	5.11e+04 (12)

CONSTITUENT	CAS #	GW (1-4)	GMP-Res (1,5)	GMP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Cyanide	57-12-5	2.00e-01 (9)	2.00e+01	2.00e+01	5.49e+03	4.09e+04
DDD	72-54-8	3.55e-04	3.55e-02	1.19e-01	2.67e+00	2.38e+01
DDE	72-55-9	2.50e-04	2.50e-02	8.41e-02	1.88e+00	1.68e+01
DDT	50-29-3	2.50e-04	2.50e-02	8.41e-02	1.88e+00	1.68e+01
Di-n-butyl phthalate	84-74-2	3.65e+00	3.65e+02	1.02e+03	2.74e+04	2.04e+05
Di-n-octyl phthalate	117-81-7	7.30e-01	7.30e+01	2.04e+02	5.49e+03	4.09e+04
Dibromo-3-chloropropane, 1,2-	96-12-8	2.00e-04 (9)	2.00e-02	2.00e-02	4.57e-01	4.09e+00
Dibromochloromethane	124-48-1	1.00e-01 (9)	1.00e+01	1.00e+01	7.62e+01	6.81e+02
Dichlorobenzene (1,2)	95-50-1	6.00e-01 (9)	6.00e+01	6.00e+01	6.69e+03 (13)	8.39e+03 (13)
Dichlorobenzene (1,3)	541-73-1	6.00e-01 (9)	6.00e+01	6.00e+01	7.61e+03 (13)	9.99e+03 (13)
Dichlorobenzene (1,4)	106-46-7	7.50e-02 (9)	7.50e+00	7.50e+00	8.64e+01 (13)	1.38e+02 (13)
Dichlorodifluoromethane	75-71-8	7.30e+00	7.30e+02	2.04e+03	5.00e+01 (13)	4.79e+01 (13)
Dichloroethane (1,1)	75-34-3	3.65e+00	3.65e+02	1.02e+03	7.30e+03 (13)	2.04e+04 (13)
Dichloroethane (1,2)	107-06-2	5.00e-03 (9)	5.00e-01	5.00e-01	4.17e-01 (13)	5.05e-01 (13)
Dichloroethylene (1,1)	75-35-4	7.00e-03 (9)	7.00e-01	7.00e-01	7.15e-01 (13)	8.72e-01 (13)
Dichloroethylene, cis-(1,2)	156-59-2	7.00e-02 (9)	7.00e+00	7.00e+00	1.08e+02 (13)	1.08e+02 (13)

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Dichloroethylene, trans-(1,2)	156-60-5	1.00e-01 (9)	1.00e+01	1.00e+01	2.56e+02 (13)	2.56e+02 (13)
Dichlorophenol, 2,4-	120-83-2	1.10e-01	1.10e+01	3.07e+01	8.23e+02	6.13e+03
Dichlorophenoxyacetic acid, 2,4-	94-75-7	7.00e-02 (9)	7.00e+00	7.00e+00	2.74e+03	2.04e+04
Dichloropropene (1,2)	78-87-5	5.00e-03 (9)	5.00e-01	5.00e-01	6.88e-01 (13)	8.43e-01 (13)
Dieldrin	60-57-1	5.32e-06	5.32e-04	1.79e-03	4.00e-02	3.57e-01
Diethyl phthalate	84-66-2	2.92e+01	2.92e+03	8.18e+03	2.20e+05	NMMB (16)
Diethylhexyl adipate	103-23-1	5.00e-01 (9)	5.00e+01	5.00e+01	5.34e+03	4.77e+04
Dimethoate	60-51-5	7.30e-03	7.30e-01	2.04e+00	5.49e+01	4.09e+02
Dimethyl phenol, 2,4-	105-67-9	7.30e-01	7.30e+01	2.04e+02	5.49e+03	4.09e+04
Dinitrobenzene, 1,3-	99-65-0	3.65e-03	3.65e-01	1.02e+00	2.74e+01	2.04e+02
Dinitrophenol, 2,4-	51-28-5	7.30e-02	7.30e+00	2.04e+01	5.49e+02	4.09e+03
Dioxane (1,4)	123-91-1	7.74e-03	7.74e-01	2.60e+00	1.55e+01 (13)	2.31e+01 (13)
Diphenylamine	122-39-4	9.13e-01	9.13e+01	2.56e+02	6.86e+03	5.11e+04
Diphenylhydrizine, 1,2-	122-66-7	1.06e-04	1.06e-02	3.58e-02	8.00e-01	7.15e+00
Disulfoton	298-04-4	1.46e-03	1.46e-01	4.09e-01	1.10e+01	8.18e+01
Endosulfan	115-29-7	1.83e-03	1.83e-01	5.11e-01	1.37e+01	1.02e+02

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Endothall	145-73-3	1.00e-01 (9)	1.00e+01	1.00e+01	5.49e+03	4.09e+04
Endrin	72-20-8	2.00e-03 (9)	2.00e-01	2.00e-01	8.23e+01	6.13e+02
Ethoxy ethanol, 2-	110-80-5	1.46e+01	1.46e+03	4.09e+03	1.10e+05	8.17e+05
Ethoxyethanol acetate, 2-	111-15-9	1.10e+01	1.10e+03	3.07e+03	8.23e+04	6.13e+05
Ethyl benzene	100-41-4	7.00e-01 (9)	7.00e+01	7.00e+01	1.14e+04 (13)	1.70e+04 (13)
Ethylene dibromide	106-93-4	5.00e-05 (9)	5.00e-03	5.00e-03	7.09e-03 (13)	4.53e-02 (13)
Ethylene glycol	107-21-1	7.30e+01	7.30e+03	2.04e+04	5.49e+05	NNHB (16)
Ethylene oxide	75-21-8	8.35e-05	8.35e-03	2.80e-02	1.11e-01 (13)	1.51e-01 (13)
Fluoranthene	206-44-0	1.46e+00	1.46e+02	4.09e+02	1.10e+04	8.18e+04
Fluorene	86-73-7	1.46e+00	1.46e+02	4.09e+02	9.60e+03 (13)	3.87e+04 (13)
Fluorides	7782-41-4	4.00e+00 (9)	4.00e+02	4.00e+02	1.65e+04	1.23e+05
Formaldehyde	50-00-0	7.30e+00 (12)	7.30e+02	2.04e+03	1.56e+04 (12)	2.04e+05 (12)
Heptachlor	76-44-8	4.00e-04 (9)	4.00e-02	4.00e-02	1.42e-01	1.27e+00
Heptachlor epoxide	1024-57-3	2.00e-04 (9)	2.00e-02	2.00e-02	7.04e-02	6.29e-01
Hexachlorobenzene	118-74-1	1.00e-03 (9)	1.00e-01	1.00e-01	4.00e-01	3.57e+00
Hexachlorobutadiene	87-68-3	1.09e-02	1.09e+00	3.67e+00	8.21e+01	7.33e+02

CONSTITUENT	CAS #	GV (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Hexachlorocyclohexane, alpha	319-84-6	1.35e-05	1.35e-03	4.54e-03	1.02e-01	9.08e-01
Hexachlorocyclohexane, beta	319-85-7	4.73e-04	4.73e-02	1.59e-01	3.56e+00	3.18e+01
Hexachlorocyclohexane, gamma	58-89-9	2.00e-04 (9)	2.00e-02	2.00e-02	8.23e+01	6.13e+02
Hexachloroethane	67-72-1	6.08e-02	6.08e+00	2.04e+01	4.57e+02	4.09e+03
Isobutyl alcohol	78-83-13	1.10e+01	1.10e+03	3.07e+03	8.23e+04	6.13e+05
Lead (inorganic)	7439-92-1	1.50e-02 (9)	1.50e+00	1.50e+00	5.00e+02 (14)	1.00e+03 (14)
Mercury	7439-97-6	2.00e-03 (9)	2.00e-01	2.00e-01	8.23e+01	6.13e+02
Methamyl	16752-77-5	9.13e-01	9.13e+01	2.56e+02	6.86e+03	5.11e+04
Methoxy ethanol	109-86-4	1.46e-01	1.46e+01	4.09e+01	1.10e+03	8.18e+03
Methoxychlor	72-43-5	4.00e-02 (9)	4.00e+00	4.00e+00	1.37e+03	1.02e+04
Methoxyethanol acetate	110-49-6	7.30e-02	7.30e+00	2.04e+01	5.49e+02	4.09e+03
Methyl Ethyl Ketone	78-93-3	1.83e+00	1.83e+02	5.11e+02	7.58e+03 (13)	1.40e+04 (13)
Methyl Isobutyl ketone	108-10-1	1.83e+00	1.83e+02	5.11e+02	1.37e+04	1.02e+05
Methyl methacrylate	80-62-6	2.92e+00	2.92e+02	8.18e+02	6.74e+02 (13)	6.63e+02 (13)
Methylene Chloride	75-09-2	5.00e-03 (9)	5.00e-01	5.00e-01	1.07e+01 (13)	1.38e+01 (13)
Naphthalene	91-20-3	1.46e+00	1.46e+02	4.09e+02	4.91e+03 (13)	7.72e+03 (13)

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Nickel	7440-02-0	1.00e-01 (9)	1.00e+01	1.00e+01	1.56e+03 (12)	2.04e+04 (12)
Nitrate	14797-55-8	1.00e+01 (9)	1.00e+03	1.00e+03	4.39e+05	NHMB (16)
Nitrite	14797-65-0	1.00e+00 (9)	1.00e+02	1.00e+02	2.74e+04	2.04e+05
Nitrobenzene	98-95-3	1.83e-02	1.83e+00	5.11e+00	6.48e+01 (13)	1.06e+02 (13)
Nitroso-methyl-ethyl-amine, n-	10595-95-6	3.87e-06	3.87e-04	1.30e-03	2.91e-02	2.60e-01
Nitrosodi-n-propylamine, n-	621-64-7	1.22e-05	1.22e-03	4.09e-03	9.15e-02	8.17e-01
Nitrosodiethylamine, n-	55-18-5	5.68e-07	5.68e-05	1.91e-04	4.27e-03	3.81e-02
Nitrosodimethylamine, n-	62-75-9	1.67e-06	1.67e-04	5.61e-04	1.26e-02	1.12e-01
Nitrosopryyolidine, n-	930-55-2	4.06e-05	4.06e-03	1.36e-02	3.05e-01	2.72e+00
Pentachloronitrobenzene	82-68-8	3.28e-03	3.28e-01	1.10e+00	2.46e+01	2.20e+02
Pentachlorophenol	87-86-5	1.00e-03 (9)	1.00e-01	1.00e-01	5.34e+00	4.77e+01
Phenol	108-95-2	2.19e+01	2.19e+03	6.13e+03	1.65e+05	NHMB (16)
Phthalic anhydride	85-44-9	7.30e+01	7.30e+03	2.04e+04	5.49e+05	NHMB (16)
Polychlorinated biphenyls	1336-36-3	5.00e-04 (9)	5.00e-02	5.00e-02	1.00e+01 (15)	2.50e+01 (15)
Pronamide	23950-58-5	2.74e+00	2.74e+02	7.67e+02	2.06e+04	1.53e+05
Pyrene	129-00-0	1.10e+00	1.10e+02	3.10e+02	8.20e+03	6.10e+04

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Pyridine	110-86-1	3.65e-02	3.65e+00	1.02e+01	2.74e+02	2.04e+03
Selenium	7782-49-2	5.00e-02 (9)	5.00e+00	5.00e+00	1.37e+03	1.02e+04
Silver	7440-22-4	1.83e-01	1.83e+01	5.11e+01	1.37e+03	1.02e+04
Strychnine	57-24-9	1.10e-02	1.10e+00	3.07e+00	8.23e+01	6.13e+02
Styrene	100-42-5	1.00e-01 (9)	1.00e+01	1.00e+01	2.13e+01	1.91e+02
Tetrachlorobenzene, 1,2,4,5-	95-94-3	1.10e-02	1.10e+00	3.07e+00	8.23e+01	6.13e+02
Tetrachloroethane (1,1,1,2)	630-20-6	3.28e-02	3.28e+00	1.10e+01	4.59e+01 (13)	6.29e+01 (13)
Tetrachloroethane (1,1,2,2)	79-34-5	4.26e-03	4.26e-01	1.43e+00	8.00e+00 (13)	1.17e+01 (13)
Tetrachloroethylene	127-18-4	5.00e-03 (9)	5.00e-01	5.00e-01	7.93e+01 (13)	2.07e+02 (13)
Tetrachlorophenol, 2,3,4,6-	58-90-2	1.10e+00	1.10e+02	3.07e+02	8.23e+03	6.13e+04
Tetraethyl dithiopyrophosphate	3689-24-5	1.83e-02	1.83e+00	5.11e+00	1.37e+02	1.02e+03
Toluene	108-88-3	1.00e+00 (9)	1.00e+02	1.00e+02	3.58e+03 (13)	3.63e+03 (13)
Toxaphene	8001-35-2	3.00e-03 (9)	3.00e-01	3.00e-01	5.82e-01	5.20e+00
TP Silvex, 2,4,5-	93-72-1	5.00e-02 (9)	5.00e+00	5.00e+00	2.20e+03	1.64e+04
Trichlorobenzene (1,2,4)	120-82-1	7.00e-02 (9)	7.00e+00	7.00e+00	6.78e+02 (13)	8.28e+02 (13)
Trichloroethane (1,1,1)	71-55-6	2.00e-01 (9)	2.00e+01	2.00e+01	9.63e+03 (13)	1.40e+04 (13)

CONSTITUENT	CAS #	GW (1-4)	GWP-Res (1,5)	GWP-Ind (1,6)	SAI-Res (1,7, 10,11)	SAI-Ind (1,8, 10,11)
Trichloroethane (1,1,2)	79-00-5	5.00e-03 (9)	5.00e-01	5.00e-01	1.27e+01 (13)	1.62e+01 (13)
Trichloroethylene	79-01-6	5.00e-03 (9)	5.00e-01	5.00e-01	2.40e+00 (13)	2.85e+00 (13)
Trichlorofluoromethane	75-69-4	1.10e+01	1.10e+03	3.07e+03	8.73e+00 (13)	8.36e+00 (13)
Trichlorophenol (2,4,5)	95-95-4	3.65e+00	3.65e+02	1.02e+03	8.08e+03 (13)	1.04e+04 (13)
Trichlorophenol, 2,4,6-	88-06-2	7.74e-03	7.74e-01	2.60e+00	5.82e+01	5.20e+02
Trichlorophenoxyacetic acid, 2,4,5-	93-76-5	3.65e-01	3.65e+01	1.02e+02	2.74e+03	2.04e+04
Trichloropropane, 1,1,2-	598-77-6	1.83e-01	1.83e+01	5.11e+01	1.37e+03	1.02e+04
Trichloropropane, 1,2,3-	96-18-4	2.19e-01	2.19e+01	6.13e+01	1.65e+03	1.23e+04
Trinitrobenzene, 1,3,5-	99-35-4	1.83e-03	1.83e-01	5.11e-01	1.37e+01	1.02e+02
Vinyl acetate	108-05-4	3.65e+01	3.65e+03	1.02e+04	2.74e+05	2.04e+06
Vinyl Chloride	75-01-4	2.00e-03 (9)	2.00e-01	2.00e-01	1.99e-02 (13)	2.41e-02 (13)
Xylene	1330-20-7	1.00e+01 (9)	1.00e+03	1.00e+03	5.47e+03 (13)	5.80e+03 (13)

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(1) Concentrations for constituents are expressed in scientific notation. Examples 2.20E-00 = 2.2; 2.20E+02 = 220; and 2.20E-01 = 0.22.

(2) The development of final cleanup levels may involve other factors as described in this subchapter, such as cumulative health effects, that are not considered in this table.

(3) Groundwater concentrations are based on Maximum Contaminant Levels (MCLs) or the formula and parameters for residential use of groundwater which are contained in §335.567 of this title (relating to Appendix I). For non-residential exposure conditions, the groundwater concentrations are calculated using the procedures of §335.559(d)(2) or (3).

(4) For some constituents, the Practical Quantitation Limit (PQL) may be the appropriate Groundwater MSC as described in §335.555(d)(1) of this title. See 40 Code of Federal Regulations, Part 264 (Appendix IX) for a list of groundwater PQLs.

(5) Residential soil groundwater protection concentrations are based on a multiplication factor of 100 times the groundwater MSC.

(6) Industrial soil groundwater protection concentrations are based on a multiplication factor of 100 times the MCL or, when an MCL is not available, a factor of 100 times the groundwater concentration calculated using the formula and parameters which are contained in §335.559(d)(2) or (3) of this title.

(7) Residential soil concentrations (maximum) are calculated using the formula and parameters for residential land use which are contained in §335.567 of this title (relating to Appendix I). The person must also demonstrate that groundwater is protected and that no nuisance conditions exist (§335.559(a)-(h) of this title).

(8) Industrial soil concentrations (maximum) are calculated using the formula and parameters for industrial land use which are contained in §335.567 of this title (relating to Appendix I). The person must also demonstrate that groundwater is protected and that no nuisance conditions exist (§335.559(a)-(h) of this title).

(9) The final, proposed on listed Maximum Contaminant Level (MCL), from Section 141 of the Federal Safe Drinking Water Act. For lead, the Action Level for lead in drinking water is used as the MSC.

(10) All concentrations were calculated using data from the Integrated Risk Information System (IRIS) Chemical Files, or data from the Health Effects Assessment Summary Tables (HEAST), developed by the United States Environmental Protection Agency, Office of Research and Development and Office of Health and Environmental Assessment, Washington, D.C. 20460. The toxicity information, and the MSCs, will be updated as new information becomes available.

(11) In some cases, an oral Reference Dose (RFD) or an oral Slope Factor (SF) was substituted for the inhalation RFD or inhalation SF in calculating MSC. This MSC will be updated when this information becomes available.

(12) The MSCs calculated for this compound are based on noncarcinogenic effects. The following formula was used for calculating the soil MSCs: MSC = [(oral RFD)(Body Weight)(ED)(365 days/yr)]/[(EF)(ED)(IR)(CF)]. For residential soils, the following exposure factors were used: BW = 15 Kg; ED = five years; EF = 350 days/year; IR = 200 mg/day. For industrial soils, the following exposure factors were used; BW = 70 Kg; ED = 25 years; EF = 250 days/year; IR = 100 mg/day. In both cases, the CF is 0.000001 kg/mg. When oral slope factors become available, these MSCs will be revised.

(13) As described in §335.559(e) of this title, the sum of concentrations of the volatile organic compounds in vapor phase in soil shall not exceed 1,000 ppm by weight or volume.

(14) The MSC for lead in soil is based on values calculated by the United States EPA using the Lead Uptake/Biokinetic Model, Version 0.4, which has been developed by the United States EPA Office of Health and Environmental Assessment.

(15) Soil MSCs for polychlorinated biphenyls are based upon the April 2, 1987 TSCA regulations, 40 Code of Federal Regulation, §761.125 (see 52 FR 10688).

(16) NHHB = Not Human Health Based. The SAI-Ind MSC for this compound exceeds 10e+6 ppm, which means it is not toxic to humans when exposed to soils under these assumptions. Persons must consider other criteria of §335.559 of this title (relating to Medium Specific Requirements and Adjustments for Risk Reduction Standards Number 2) to develop numeric cleanup values.

§335.569. Appendix III

MODEL DEED CERTIFICATION LANGUAGE

STATE OF TEXAS (_____) COUNTY

INDUSTRIAL SOLID WASTE

CERTIFICATION OF REMEDIATION

KNOW ALL MEN BY THESE PRESENTS THAT: Pursuant to the Rules of the Texas Water Commission pertaining to Industrial Solid Waste Management, this document is hereby filed in the Deed Records of _____County, Texas in compliance with the recordation requirements of said rules:

I

(Company Name) has performed a remediation of the land described herein. A copy of the Notice of Registration (No.), including a description of the facility, is attached hereto and is made part of this filing. A list of the known waste constituents, including known concentrations (i.e., soil and ground water, if applicable), which have been left in place is attached hereto and is made part of this filing. Further information concerning this matter may be found by an examination of company records or in the Notice of Registration (No.) files. which are available for inspection upon request at the central office of the Texas Water Commission in Austin. The Texas Water Commission derives its authority to review the remediation of this tract of land from the Texas Solid Waste Disposal Act, §361.002, Texas Health and Safety Code, Chapter 361, which enables the Texas Water Commission to promulgate closure and remediation standards to safeguard the health, welfare and physical property of the people of the State and to protect the environment by controlling the management of solid waste. In addition, pursuant to the Texas Water Code, §5.012 and §5.013, Texas Water Code, Annotated, Chapter 5, the Texas Water Commission is given primary responsibility for implementing the laws of the State of Texas relating to water and shall adopt any rules necessary to carry out its powers and duties under the Texas Water Code. In accordance with this authority, the Texas Water Commission requires certain persons to provide certification and/or recordation in the real property records to notify the public of the conditions of the land and/or the occurrance of remediation. This deed certification is not a representation or warranty by

the Texas Water Commission of the suitability of this land for any purpose, nor does it constitute any guarantee by the Texas Water Commission that the remediation standards specified in this certification have been met by (Company name).

II

Being a _____ acre tract, more or less, out of the (Company Name)'s _____ acre tract in the (Name) League (No.), Abstract (No.), recorded in Volume (No.), Page (No.) of the Deed of Records _____ County, Texas, said _____ acre tract being more particularly described as follows: (Insert metes and bounds description here) For Standard 2 cleanups: (Contaminants/contaminants and waste) deposited hereon have been remediated (to meet residential soil criteria/to meet non-residental (i.e., industrial/commercial) soil criteria)), in accordance with a plan designed to meet the Texas Water Commission's requirements in 31 Texas Administrative Code, §335.555), which mandates that the remedy be designed to eliminate substantial present and future risk such that no post-closure care or engineering or institutional control measures are required to protect human health and the environment. Future land use is considered suitable for (residential, non-residential (i.e., industrial/commercial)) purposes in accordance with risk reduction standards applicable at the time of this filing. Future land use is intended to be (residential, non-residential).

For Standard 3 cleanups: (Contaminants/contaminants and waste) deposited hereon have been remediated (to meet residential soil critiera/to meet non-residential (i.e., industrial/commercial) soil criteria) in accordance with a plan designed to meet the requirements of 31 Texas Administrative Code §335.561 (Risk Reduction Standard Number 3), which mandates that the remedy be designed to eliminate or reduce to the maximum extent practicable, substantial present or future risk. The remediation plan (does/does not) require continued post-closure care or engineering or institutional control measures. Future use of the property is considered appropriate for (describe) in accordance with risk reduction standards applicable at the time of this filing. Institutional or legal controls placed on the property to ensure appropriate future use include (describe).

For both Standard 2 and 3 cleanups where the remedy is based upon non-residential soil criteria: The current or future owner must undertake actions as necessary to protect human health or the environment in accordance with the rules of the Texas Water Commission.

III

The owner of the site is (Company Name), a Texas corporation, and its address is (P.O. Box or Street), (City), Texas (Zip Code), where more specific information may be obtained from the (plant manager, owner).

EXECUTED this the _____ day of _____, 19___.

(Company name)

a Texas corporation

_____

(Name)

Plant Manager

STATE OF TEXAS

(_____) COUNTY

BEFORE ME, on this the _____ day of _____, personally appeared (Name, (Plant Manager, Owner) of (company Name), a Texas corporation, known to me to be the person and agent of said corporation whose name is subscribed to the foregoing instrument, and he acknowledged to me that he executed the same for the purposes and in the capacity therein expressed.

GIVEN UNDER MY HAND AND SEAL OF OFFICE, this the _____ day of _____, 19___.

_____

Notary Public in and for the State of Texas, County of

_____

My Commission Expires

_____

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