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REVISED FINAL WORK PLAN ADDENDUM GOLF COURSE MAINTENANCE YARD NAS
FORT WORTH TX
3/1/1999
FANNING, PHILLIPS AND MOLNAR



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

**ADMINISTRATIVE RECORD
COVER SHEET**

AR File Number 457

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File: 17A-72
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**RISK-BASED ASSESSMENT, MANAGEMENT, AND CLOSURE
OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN
AT NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE,
CARSWELL AIR FORCE BASE, TEXAS**

**REVISED FINAL
WORK PLAN ADDENDUM
GOLF COURSE MAINTENANCE YARD
CDRL A004**



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

March 1999

Contractor Response to Golf Course Maintenance Yard Site Comments from AFCEE

Item	Page	Section	Comment	Contractor Response
1		Title Page	The word "maintenance" is misspelled. Please revise.	Not revised. Correct spelling of maintenance.
2	iv	List of Tables	It is recommended that the title listed for Table 2-1 should be the same as the title found on the actual table.	Revised.
3	v-vi	Acronyms and Abbreviations	The Contractor should update this list to include all Acronyms and Abbreviations used in the Draft Work Plan.	Revised.
4	1-1	1.0	Paragraph 3, sentence 4: The Contractor shall change the name "Mr. Charles Rice" to "Mr. Charles Pringle" to reflect the change in team chief.	Revised.
5	2-2	2.2.1	Bullet 2: This statement conflicts with the information in Table 2-2. It is recommended that the word "nickel" should be changed to "zinc".	Revised.
6	2-2	2.2.3	Paragraph 3, sentence 3: It is recommended that the word "to" should be changed to "into".	Revised.
7	3-1	3.2	Paragraph 2, sentence 1: It is recommended that the word "rules" needs to be changed to "rule," and the word "guidance" should be changed to "guide". The acronym TAC should be defined as the "Texas Administrative Code" and it should be included in the Acronym list.	Revised.
8	3-2	3.5	Paragraph 1, sentence 1; and Paragraph 2, sentence 1: It is recommended that the word "is" should be changed to "are" to agree with the word "data".	Revised.
9	3-6	3.6.2	The proposed sampling and analysis plan could impact holding times especially for VOCs and SVOCs. It is recommended that the Contractor address this problem.	Revised for clarification, added section 3.6.2.1, (now on page 3-4).

Item	Page	Section	Comment	Contractor Response
10	3-3	3.6.2	Paragraph 3, Case 1: In the opening statement, it is recommended "soil" should be changed to a subscript.	Revised.
11	3-3	3.6.2	Paragraph 6, sentence 1: The word "Case1" needs a space.	Revised.
12	3-4	3.6.2	Paragraph 3: It is recommended that the Contractor should explain the course of action if $C_{SPLP} > GW$ -Ind at 8 ft. below ground surface (bgs).	Revised for clarification.
13	3-4	3.6.2	Paragraph 4: It is recommended that the Contractor should explain the course of action if contamination is found 15 ft. from original boring.	Not revised. This comment is not applicable to this work plan addenda since no local horizontal delineation is being performed.
14	3-5	3.6.4	It is recommended that the Contractor include decon water in this section.	Revised.
15	3-5	3.6.4	It is recommended that the Contractor provide additional information in this section. For example, who will characterize the soil and who is contracted to dispose of both hazardous and non-hazardous soils.	Revised. Note that this is an Addenda and specific details, as stated in text, can be found in the Quality Program Plan to avoid duplication. FPM cannot select a contractor at this time to dispose of IDW since the selection process involves the potential contractor to submit costs based on the amount of IDW that is generated from the project. However, in the past, FPM has used the services of All Waste Recovery Systems to handle liquid waste and Phillip Services Corporation to handle solid waste. Both companies are from the Dallas/Ft Worth area.
16		Figure 3-1	It is recommended that the Contractor include an additional figure that would illustrate proposed initial sample locations.	Not revised. The initial sample locations are indicated on the figure. There is no horizontal delineation at this site.

Contractor Response to Golf Course Maintenance Yard Site Comments from USEPA/TNRCC

Item	Page	Section	USEPA/TNRCC Comment	Contractor Response
9	3-1	3.4	The discussion in this paragraph seems to indicate a risk assessment will be completed for the attainment of Risk Reduction Standard Number 2 (RRS2). For clarification the Risk Reduction Rules do not require a risk assessment to close a site under RRS2.	Revised for clarification.
10	3-3	3.6.2	The description of the different Case examples does not appear to delineate vertical and horizontal extent to background or PQLs. If the intent is to delineate the extent of contamination above RRS2 for removal and assuming that the extent of contamination, to either background or PQL has been previously determined, then this method will be adequate.	Revised for clarification. Note that the primary sampling objective at the GCMY is to replace questionable data from ITS. Therefore, horizontal delineation is not anticipated. Text revised on page 1-2, section 1.3.1.
11	3-3	3.6.2	At several of the locations soil removal has already occurred and clean soil was used for backfill. Samples should be collected to confirm that all of the contamination has been removed during the previous removal actions at this site. If only the surface samples are analyzed during the sampling, I would hope they are clean, since this was clean backfill. Based upon the procedure provided in this work plan, samples below this point would not be analyzed.	Revised for clarification. Also revised Table 3-4 for clarification.
10	3-3	3.6.2	Based upon the one nickel hit at 20.1 mg/kg and background at 19.76 mg/kg, I feel that this is a variance from background. No additional sampling for nickel would be required.	FPM concurs, text added on page 2-2 for clarification. Removed nickel analysis from Table 3-1.

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OF SOLID WASTE MANAGEMENT UNITS AND AREAS OF CONCERN
AT NAVAL AIR STATION FORT WORTH, JOINT RESERVE BASE,
CARSWELL AIR FORCE BASE, TEXAS**

**REVISED FINAL
WORK PLAN ADDENDUM
GOLF COURSE MAINTENANCE YARD
CDRL A004**

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

**Prepared for:
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March 1999

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE	Air Force Center for Environmental Excellence
AOC	Area of Concern
bgs	below ground surface
CDRL	Contract Data Requirements List
COC	Contaminant of Concern
EPA	Environmental Protection Agency
ERB	Environmental Restoration Base Realignment and Closure
FPM	Fanning, Phillips and Molnar
FSP	Field Sampling Plan
ft	feet
GCMY	Golf Course Maintenance Yard
GW-Res	Groundwater MSC for Residential Use
GWP-Res	Soil MSC for Residential Use based on Groundwater Protection
IRA	Interim Remedial Action
IRP	Installation Restoration Program
JACOBS	Jacobs Engineering Group, Inc.
JRB	Joint Reserve Base
MCL	Maximum Contaminant Level
MSC	Medium Specific Concentration
NAS	Naval Air Station
POC	Point of Contact
ppm	parts per million
PQL	Practical Quantitation Limit

ACRONYMS AND ABBREVIATIONS (Cont'd)

RRS	Risk Reduction Standard
SAI-Res	Soil MSC for Residential use based on Inhalation, Ingestion and Dermal Contact
SWMU	Soild Waste Management Unit
SPLP	Synthetic Precipitation Leaching Procedure
TAC	Texas Administrative Code
TNRCC	Texas Natural Resource Conservation Commission
VOC	Volatile Organic Copmounds

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1.0 INTRODUCTION

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

The purpose of this work plan addendum is to document the tasks planned to perform the risk-based assessment, management, and closure of the Golf Course Maintenance Yard (GCMY), Area of Concern (AOC) 9 at Carswell Air Force Base (AFB), Fort Worth, Texas. The Work Plan Addendum evaluates existing site data, refines conceptual site models, and identifies data gaps that require data acquisition to allow for the risk-based closure of the site. The project will provide risk-based closure documentation that will determine site-specific target levels for contaminants and document attainment of those target levels.

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

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

1.1 THE U.S. AIR FORCE INSTALLATION RESTORATION PROGRAM

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

1.2 HISTORY OF PAST IRP WORK AT THE GOLF COURSE MAINTENANCE YARD

The Golf Course Maintenance Yard (GCMY) (Figure 1-1) is located in the south-central portion of the former Carswell AFB, north of White Settlement Road. It occupies approximately one-half acre in area. Prior to the Interim Remedial Action (IRA) in 1996, buildings at the GCMY included a metal office storage building, a wooden pole barn and metal carport used for equipment storage, and an aboveground fuel storage tank. As part of the IRA, the wooden pole barn was demolished and disposed of offsite, and the metal carport was moved to the former

barn was demolished and disposed of offsite, and the metal carport was moved to the former location of the pole barn. A new metal storage shed was built next to the existing metal building as a replacement for the pole barn. The site is currently used, and likely to be used in the future, for golf course maintenance.

The 1996 IRA by Jacobs Engineering Group, Inc. (Jacobs) consisted of conducting soil sampling to determine the nature of impacts, identifying the chemicals of concern, excavating and removing impacted soil, and conducting confirmatory sampling. A total of 380 cubic yards of soil was disposed off-site, the excavations were backfilled with clean soil, and the surfaces were finished with gravel or a concrete slab. The Technical Report for the IRA (Jacobs, 1997) concluded that remaining pesticide concentrations in the soil were below Medium Specific Concentrations (MSCs), metals in soil represented background, and the site could be closed under Texas Risk Reduction Standard Number 2 (RRS 2).

1.3 DESCRIPTION OF CURRENT STUDY

1.3.1 Project Objectives

The overall goal of this project is to provide risk-based closure documentation for the GCMY in accordance with Resource Conservation and Recovery Act Part B permit HW50289. A closure report was submitted to the Texas Natural Resource Conservation Commission (TNRCC) and the United States Environmental Protection Agency (EPA) in December 1998. The findings of the report were partially based on samples analyzed by the contract laboratory ITS. Since data analyzed by ITS is invalid, the following are the objectives of the current project:

- Collection of soil samples from former confirmatory sampling locations.
- Preparation of closure documentation in accordance with RRS 2.

1.3.2 Project Scoping Documents

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

2.0 SUMMARY OF EXISTING INFORMATION

2.1 INSTALLATION ENVIRONMENTAL SETTING

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

2.2 SITE-SPECIFIC ENVIRONMENTAL SETTING

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

2.2.1 Contaminant Sources and Contamination

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

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

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

- The excavation and removal or decontamination of all impacted media and solid waste management units (SWMUs) at the site or remediation of contaminated media to either PQLs, applicable RRS 2 MSCs, or background concentrations, whichever is greater. Note that the applicable cleanup standard for soil is the lowest of the MSCs for (i) ingestion of soil, inhalation of vapors and particulates, and dermal contact with soil and (ii) soil concentrations protective of groundwater.
- Leachate obtained from soil samples using Synthetic Precipitation Leaching Procedure (SPLP Method 1312) should not exceed the Maximum Contaminant Level (MCL) or Texas Water Quality Standard, whichever is lower.
- The soil vapor measured at the site should not be greater than 1000 parts per million (ppm) (either weight or volume basis).

Comparison of Site Concentrations with RRS 2 MSCs

Volatile Organic Compounds (VOCs) were below detection limits at all ten locations. Table 2-1 compares post-excavation metal concentrations to basewide background levels. Concentrations of cobalt, nickel and zinc exceed background levels. Table 2-2 compares concentrations of

metals that exceed background to RRS 2. Following are the conclusions based on the comparison:

- Nickel concentration measured at TP-GCM-06K exceeds the GWP-Res RRS2.
- Cobalt and zinc concentrations are below RRS 2.

Based on the one nickel level at 20.1 mg/kg and background at 19.76 mg/kg, there is a consensus that this is a variance from background and no additional sampling for nickel is required. The only analytical work required at the Golf Course Maintenance Yard is reanalysis for pesticides and herbicides to replace ITS data.

2.2.2 Geology

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

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

2.2.3 Groundwater

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

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

2.2.4 Surface Water

There are no surface water bodies associated with the site.

2.2.5 Biology

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

2.2.6 Demographics

The GCMY is located in the south-central corner of Carswell AFB. To the east, the site is bordered by Farmers Branch. Landfills No. 6, 7, and 8 are located to the northeast, southwest, and west of the GCMY. Wooded areas are adjacent to the south and east of the site.

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3.0 PROJECT TASKS

3.1 CONCEPTUAL SITE MODEL DEVELOPMENT

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

3.2 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS IDENTIFICATION

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

3.3 CHARACTERIZATION OF BACKGROUND CONDITIONS

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

3.4 RISK REDUCTION STANDARDS

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

3.5 DATA NEEDS IDENTIFICATION

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

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

- *Soil and Sediment Characteristics Data.* Soil characteristics data are necessary to understand the geologic conditions at the site. Lithologic data will be recorded during all sampling activities.
- *Land Survey Data.* Land survey data are necessary to accurately locate property boundaries, easements, and soil boring and sample locations. Survey data will be required to fulfill deed certification requirements for site closure under RRS 2.

3.6 FIELD INVESTIGATION TASKS

Specific field investigation tasks required to achieve project objectives are described below:

- Eleven surficial soil samples will be collected as close as possible to confirmatory sampling locations TP-GCM-01K through TP-GCM-10K shown in Figure 3-1. These samples will be analyzed as follows:
 - Samples collected close to TP-GCM-01K through TP-GCM-10K for herbicides (Method 8151).
 - Samples collected close to TP-GCM-01K and TP-GCM-02K for pesticides (Method 8080).
- Due to recent construction activity at the site, Butler building has been extended towards the northwest, over the original sampling location TP-GCM-09K. As an alternative to this location, the sample will be collected close to the east wall of the new building extension.
- The contract laboratory will be instructed to achieve method detection limits that are lower than the applicable RRS 2 for the analytes (herbicides and pesticides).

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

3.6.1 Mobilization

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

3.6.2 Sampling and Analysis

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

Soil samples will be collected from depths of 0-2 feet (ft), 2-4 ft, 4-6 and 6-8 ft below ground surface (bgs). At areas where excavation to 2 ft had previously occurred, only samples in the 2-4 foot interval will be analyzed. At areas where excavation to 4 ft had previously occurred, only samples in the 4-6 foot interval will be analyzed. It is not anticipated that samples will need to be collected at a depth below 8 feet since extensive review of existing data indicates that there was no detection of any pesticides/herbicides except very low levels of chlordane at two locations. In the unlikely event that elevated levels are detected at 8 feet bgs, samples at deeper depths will be collected in a second round of sampling.

Initially, the sample collected from 0-2 ft will be analyzed for the analytes of concern (Table 3-1). The results will be compared to the RRS 2. The comparison will result in one of the following cases:

Case 1: $C_{\text{SOIL}} > \text{GWP-Res}$, $C_{\text{SOIL}} < \text{SAI-Res}$

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

Case 1(a): $C_{\text{SPLP}} < \text{GW-Res}$

Since the soil layer is protective of groundwater for the particular COC, the vertical extent has been defined and soil from above this layer will be excavated (if comparison of an analyte from 0-2 ft results in this case, no excavation is required).

Case 1(b): $C_{\text{SPLP}} > \text{GW-Res}$

Since the soil layer is not protective of groundwater for the particular COC, the next deeper sample will be analyzed and the results will be compared to the SAI-Res and GWP-Res standards (repeat entire process that will again result in one of Case 1 through Case 4).

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

Since the soil layer is not protective of ingestion, inhalation and dermal contact for the particular COC, the next deeper sample will be analyzed and the results will be compared to the SAI-Res and GWP-Res standards (repeat entire process that will again result in one of **Case 1 through Case 4**).

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

Since the soil layer is protective of groundwater as well as ingestion, inhalation and dermal contact for the particular COC, soils from this location is no longer of concern at the site.

Case 4: $C_{SOIL} > GWP-Res, C_{SOIL} > SAI-Res$

Since the soil layer is not protective of groundwater, soil ingestion, inhalation, and dermal contact for the particular COC, the next deeper sample will be analyzed. The results will be compared to the SAI-Res and GWP-Res standards (repeat entire process that will again result in one of **Case 1 through Case 4**).

Sequential sampling at 2 ft intervals and comparison to RRS 2 will result in one of the four cases described above. The above procedure will require the collection of samples at multiple depths from each boring, all of which may or may not be analyzed. All samples will be prioritized in the order of maximum holding times and extracted and analyzed accordingly. See Section 3.6.2.1. for details.

3.6.2.1 Order of Analysis

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

<i>Analysis</i>	<i>Maximum Holding Times (Matrix:Soil)</i>
Herbicides, Pesticides	14 days to extraction; 40 days after extraction

3.6.3 Land Surveys

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

3.6.4 Waste Management

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

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

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4.0 DATA ASSESSMENT, RECORDS, AND REPORTING REQUIREMENTS

4.1 DATA ASSESSMENT

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

4.2 RECORD KEEPING

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

4.3 REPORTING REQUIREMENTS

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

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5.0 PROJECT MANAGEMENT

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

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6.0 PROJECT SCHEDULE

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

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7.0 REFERENCES

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Revised Final Work Plan Addendum
Carswell AFB, TX
Risk-Based Assessment, Management, and Closure of Golf Course Maintenance Yard
Contract #F41624-95-D-8003 / Delivery Order 0023
March 1999
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TABLES

TABLE 2-1
COMPARISON OF METAL CONCENTRATIONS TO BACKGROUND
LEVELS AND RRS 2

Sample ID	Date Sampled	Depth (ft)	Aluminum (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Cadmium (mg/kg)	Calcium (mg/kg)	Cobalt (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)
TP-GCM-01K	4/30/96	3	455	0.441	5.04	<0.06	<0.9	3360	1.51	<1	1.01	3520
TP-GCM-02K	4/30/96	1.5	617	0.197	5.7	<0.06	<0.9	5520	1.1	<1	<0.7	3740
TP-GCM-04K	5/3/96	3.0 - 3.5	<5	0.981	19.2	0.446	0.033	<2	2.45	4.46	1.34	<1
TP-GCM-06K	5/3/96	3.0 - 3.5	<5	0.876	30.9	0.773	0.052	<2	6.96	5.8	5.41	<1
Mean 04K & 06K*			<5	0.929	25.05	0.610	0.0425	<2	4.71	5.13	3.38	<1
TP-GCM-08K	5/3/96	1.5 - 2.0	<5	1.23	40.9	0.448	0.101	<2	2.35	6.61	1.01	<1
TP-GCM-09K	5/3/96	1.5 - 2.0	<5	1.31	71.8	0.438	0.066	<2	1.86	6.68	<0.7	<1
RRS2 Target			NA	0.366	200	0.149	0.5	NA	NA	10	NA	NA
Background Surface			22035	5.85	233	1.02	0.5562	167788	11.05	25.86	17.373	17717
Background Subsurface			20260	6.58	128.1	1.13	0.5891	272000	6.191	16.31	13.72	17469

Sample ID	Date Sampled	Depth (ft)	Potassium (mg/kg)	Magnesium (mg/kg)	Manganese (mg/kg)	Sodium (mg/kg)	Nickel (mg/kg)	Lead (mg/kg)	Silver (mg/kg)	Selenium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
TP-GCM-01K	4/30/96	3	ND	105	44.1	30.9	1.51	0.87	<1	<4	<0.8	5.42
TP-GCM-02K	4/30/96	1.5	116	130	25.4	25.2	1.42	1.31	<1	0.142	<0.8	4.93
TP-GCM-04K	5/3/96	3.0 - 3.5	<100	<3	<0.2	<5	6.8	6.24	<1	<4	9.92	13.2
TP-GCM-06K	5/3/96	3.0 - 3.5	<100	<3	<0.2	<5	20.1	6.18	<1	<4	10.2	34.1
Mean 04K & 06K*			<100	<3	<0.2	<5	13.45	6.27	<1	<4	10.06	23.65
TP-GCM-08K	5/3/96	1.5 - 2.0	<100	<3	<0.2	<5	3.81	6.16	<1	<4	7.85	7.29
TP-GCM-09K	5/3/96	1.5 - 2.0	<100	<3	<0.2	<5	3.72	5.91	<1	<4	17.2	11
RRS 2 Target			NA	NA	NA	NA	10	1.5	18.3	5	NA	NA
**Background Surface			2895	3003	849.1	37300	14.6	30.97	0.213	0.907	46.26	38.8
**Background Subsurface			1717	2420	351.7	53200	19.76	12.66	0.1277	0.313	37.39	31.27

Note: Herbicides, VOCs, and SVOCs not detected in any sample

NA = not available ND = not detected

○ measurement exceeds relevant background concentration

* data from samples TP-GCM-04K and TP-GCM-06K were averaged since they are from the same excavation

** Jacobs Engineering, March 1998. Basewide Background Study, Final Report. NAS Fort Worth JRB, Texas

TABLE 2-2
COMPARISON OF METAL CONCENTRATIONS THAT EXCEED BACKGROUND TO
RRS 2

METALS	Site Concentration [mg/kg]	SAI-RES [mg/kg]	GWP-RES [mg/kg]
Nickel	20.1	1900	10
Cobalt	6.96	15000	220
Zinc	34.1	59000	1100

GWP-RES: soil concentrations protective of residential water use

SAI-RES: soil concentrations protective of ingestion and inhalation of vapors and dermal contact for residential scenario

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

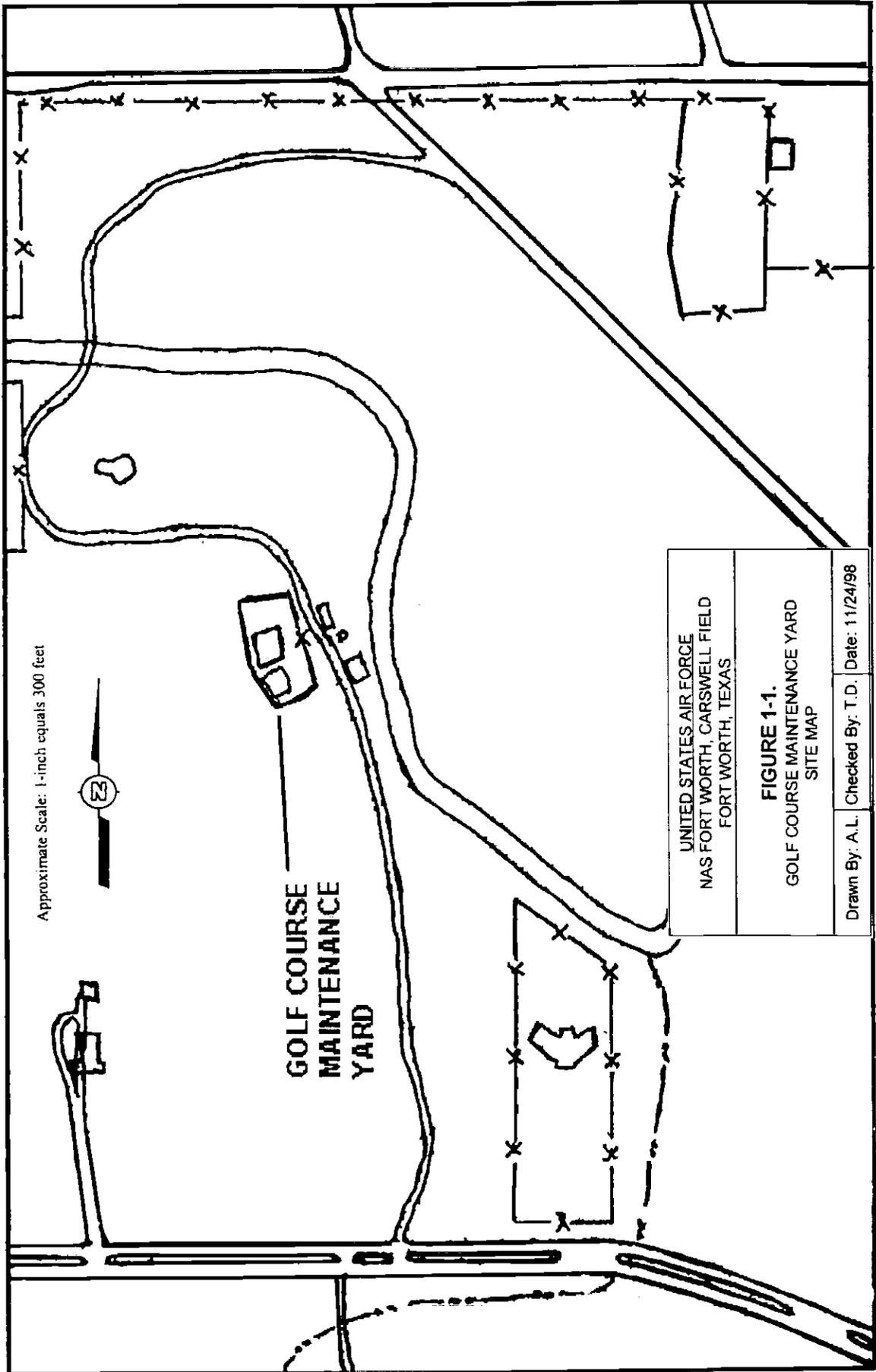
Location	Matrix	Constituents	Method	Number of Samples			Field Duplicates	MS/MSD**	Total
				Subsurface					
				0-2 FT	2-4 FT	4-6 FT			
TP-GCM-01K	Soil	Herbicides	SW 8151		1	1	1	3	
	Soil	Pesticides		SW 8080A		1			1
TP-GCM-02K	Soil	Herbicides	SW 8151	1	1			2	
		Pesticides	SW 8080A	1	1			2	
TP-GCM-03K	Soil	Herbicides	SW 8151	1	1			3	
TP-GCM-04K	Soil	Herbicides	SW 8151		1			1	
TP-GCM-05K	Soil	Herbicides	SW 8151	1	1			3	
TP-GCM-06K	Soil	Herbicides	SW 8151		1	1	1	2	
TP-GCM-07K	Soil	Herbicides	SW 8151	1	1			3	
TP-GCM-08K	Soil	Herbicides	SW 8151		1	1		2	
TP-GCM-09KA	Soil	Herbicides	SW 8151	1	1			3	
TP-GCM-09KB	Soil	Herbicides	SW 8151	1	1			3	
TP-GCM-10K	Soil	Herbicides	SW 8151	1	1	1	1	5	
				Sub-Total				38	
				Equipment				2	
				Ambient				0	
				Trip				0	
				Total				40	

** MS/MSD Matrix Spike / Matrix Spike Duplicate

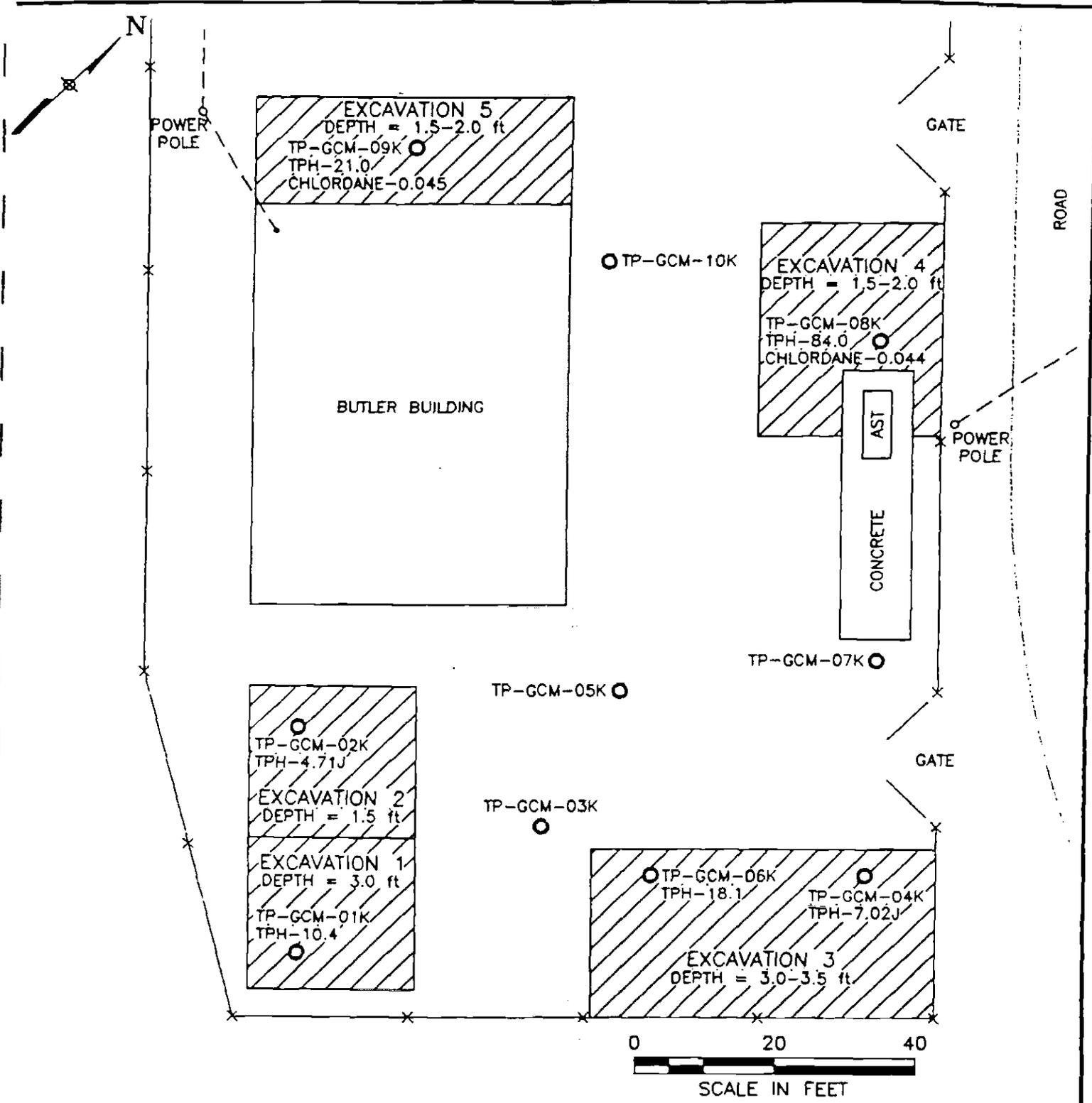
Note: soil samples may be analyzed for SPLP (EPA Method 1312) if required

Note: soil samples collected at depths greater than the initial sample will only be analyzed if RRS 2 is exceeded on the initial sample. Duplicates numbers are reflective of the total number of possible samples.

FIGURES



UNITED STATES AIR FORCE NAS FORT WORTH, CARSWELL FIELD FORT WORTH, TEXAS	
FIGURE 1-1. GOLF COURSE MAINTENANCE YARD SITE MAP	
Drawn By: A.L.	Checked By: T.D. Date: 11/24/98



LEGEND:

TP-GCM-01K



SAMPLE LOCATION

TPH - TOTAL PETROLEUM HYDROCARBONS

CHLORDANE - CHLORDANE CONCENTRATIONS

NOTES:

1. ALL CONCENTRATIONS ARE IN mg/kg, EXCEPT AS NOTED.
2. NON-DETECTED COMPOUNDS ARE NOT SHOWN.

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

FIGURE 3-1
 PROPOSED SAMPLING LOCATIONS
 AT THE GCMY

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

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE