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PHASE 2 GROUNDWATER MONITORING WELL INSTALLATION AT AIR FORCE PLANT 4
NAS FORT WORTH TX
4/1/1994
GEOMARINE

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NAVAL AIR STATION FORT WORTH JRB CARSWELL FIELD TEXAS

ADMINISTRATIVE RECORD COVER SHEET

AR File Number 218

PHASE II REPORT
GROUNDWATER MONITOR WELL INSTALLATION

U.S. AIR FORCE PLANT NO. 4
CARSWELL AIR FORCE BASE
FORT WORTH, TEXAS

Prepared for

Department of the Army
Fort Worth District Corps of Engineers
Fort Worth, Texas 76102-0300

Contract No. DACA63-90-D-0061
Delivery Order No. 052

Prepared by

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April 1994

TABLE OF CONTENTS

APPENDICES

LIST OF FIGURES

LIST OF TABLES

EXECUTIVE SUMMARY

Geo-Marine, Inc. (GMI) has completed the first 10 two-inch monitor wells under the Phase II groundwater sampling program at Carswell Air Force Base (CAFB) located in Fort Worth, Texas, for the U.S. Army Corps of Engineers (USACE), Fort Worth District, under Contract No. DACA63-90-D-0061, Delivery Order No. 52. Phase II included the drilling, completion, and development of 25 wells; these first 10 are located throughout CAFB. Data collection included detailed subsurface descriptions and water level measurements.

The 10 locations were selected by United States Geological Survey personnel for the primary purpose of providing water level information. Eight of the locations are in the GMI-defined North area; one is in the previously defined Landfill 04 area; and the tenth is northeast of Air Force Plant 4 (AFP4) in the newly defined Northwest area. Nine of the drill holes encountered water and were completed as monitor wells. The AFP4 location was dry and was cemented to ground surface as a soil boring.

Field work, including drilling, soil description, completion, development, and water level measurement, was conducted between February 22 and March 10, 1994. The wells were drilled using GMI's truck-mounted drill rig. Proper decontamination practices were followed for all equipment in contact with soil or water. Development was performed to remove suspended sediments from the well. Static water levels were obtained from the nine wells, both before and after development.

1.0 INTRODUCTION - SCOPE AND OBJECTIVES

The U.S. Army Corps of Engineers (USACE), Fort Worth District, contracted Geo-Marine, Inc. (GMI) to perform two phases of groundwater sampling at Air Force Plant No. 4 (AFP4), Carswell Air Force Base (CAFB), Fort Worth, Texas, under Contract No. DACA63-90-D-0061, Delivery Order No. 52 (Figure 1). This report covers the installation of the first 10 monitor wells under Phase II. The Phase I report was delivered in November 1992, and the Phase II Groundwater Sampling Report was delivered in November 1993.

The objective of this portion of Phase II was the installation of 10 two-inch wells with PVC screen and casing to be used for static water level measurements and possible future water sampling. The previous Scope of Work (SOW), Modification 002, July 15, 1993, specified up to 20 six-inch production/extraction wells with stainless steel screen and casing. The modification (T0001) substituted 15 two-inch monitor wells for 10 of the larger diameter extraction wells. The wells were located throughout CAFB in response to needs of the United States Geological Survey (USGS).

The 10 holes were drilled to bedrock with the subsurface continuously described. Seven wells were completed aboveground with risers and protective bars (Appendix A - Records of Communication). Two flush-mounted wells were completed near the flightline. Each well was drilled in bare ground or vegetated areas. Following Texas Natural Resource Conservation Commission (TNRCC) requirements, a four-foot by four-foot concrete surface pad was built around each wellhead. The wells were developed until clear following the setting of the bentonite seal above the sand and gravel pack interval. Groundwater levels were measured, but no samples were collected. The well at AFP4 was a dry hole; thus, the location was designated a boring, and no well was completed.

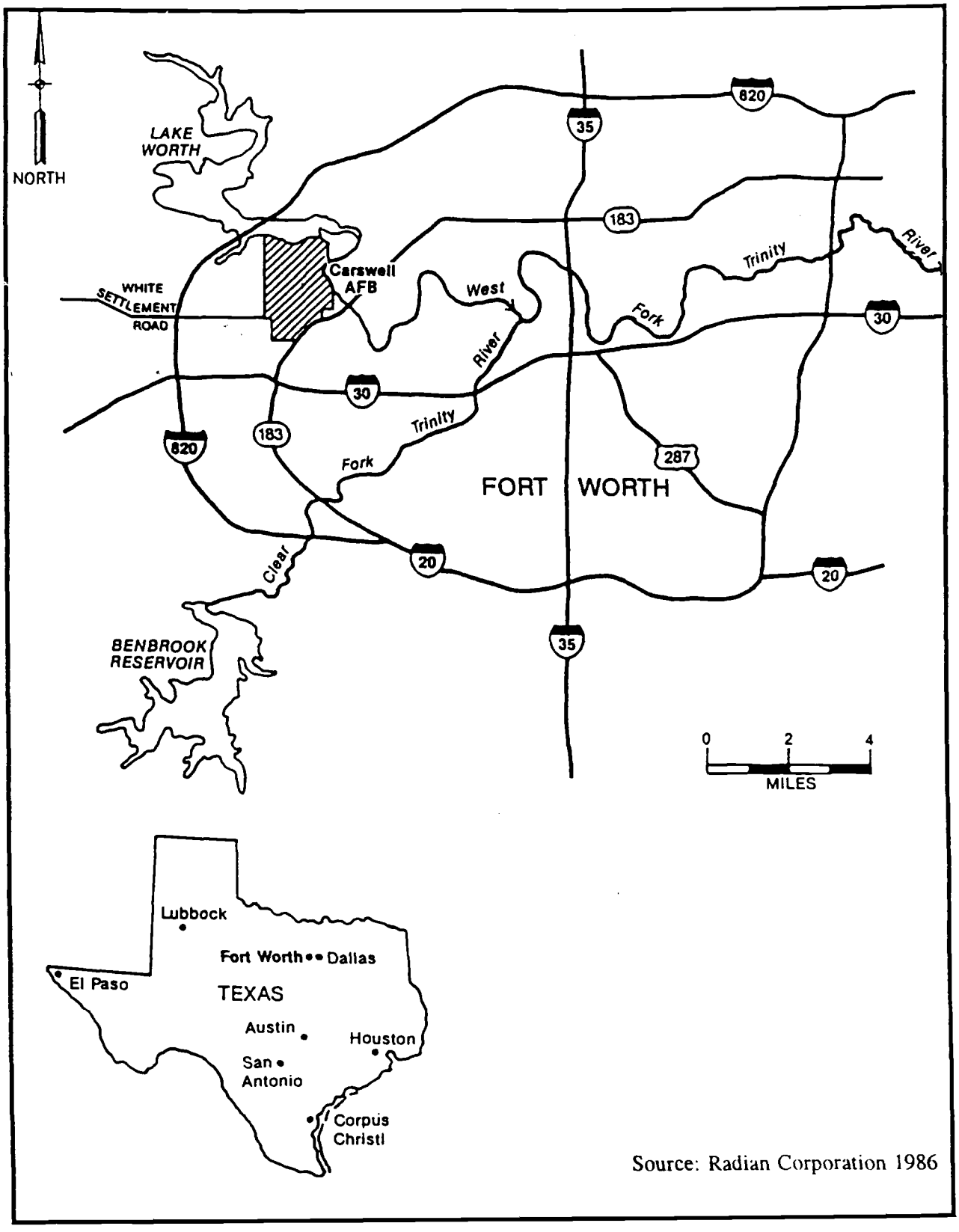

Figure 1. Regional location map of Carswell Air Force Base, Fort Worth, Texas

2.0 FIELD PROCEDURES

2.1 Introduction

The USACE supplied GMI with a site map of the 10 well locations: one is on AFP4, two are on the CAFB flightline, one is on the golf course, and the remaining six are on the northern part of CAFB east of the flightline (Figure 2). Specific sample sites were located by GMI personnel using roads, buildings, and other mapped landmarks for reference. Mr. Alan Flolo of the Carswell Air Force Base Conversion Agency (AFBCA) coordinated the utility clearance efforts of base personnel, public utilities, and private companies for each location.

The 10 holes were drilled and nine wells completed and developed between February 22 and March 10, 1994. Delays resulted from thunderstorms, soft ground conditions due to heavy rain, and training exercises which prevented access to portions of CAFB between February 26 and March 6 (see Appendix A). Descriptive soil information for subsurface delineation was collected from each wellsite during the drilling. Two-inch diameter screen and casing were set in each hole immediately following drilling, and wells were completed to ground surface using sand, pellet bentonite, and concrete grout (Appendix B - Site Photographs). All core barrels and augers were decontaminated between use. All sampled material, drill cuttings, and decon water were contained in closed drums located in a fenced area pending off-site disposal. Each day's field activities are described in a log book (Appendix C - Field Log Book).

Wells were developed after the bentonite seal had set. Depending upon the volume of flow, either a pump or a hand bailer was used. Development continued until water ran clear, or until several hours had elapsed. Development water was held in closed drums until it could be treated and disposed of at the on-base treatment plant built by International Technology Corporation (IT). The plant is located north of White Settlement Road near the former radar station Building 4102, built over former Landfill 04.

The Safety, Health, and Emergency Response Plan (SHERP), developed for the earlier Phase II tasks, was reviewed and revised to include current certifications and relevant activities; emergency contacts and numbers were verified. A GMI safety officer was on site at all times to convene safety meetings as needed and to assure compliance with the SHERP. As in previous work, breathing zone air was

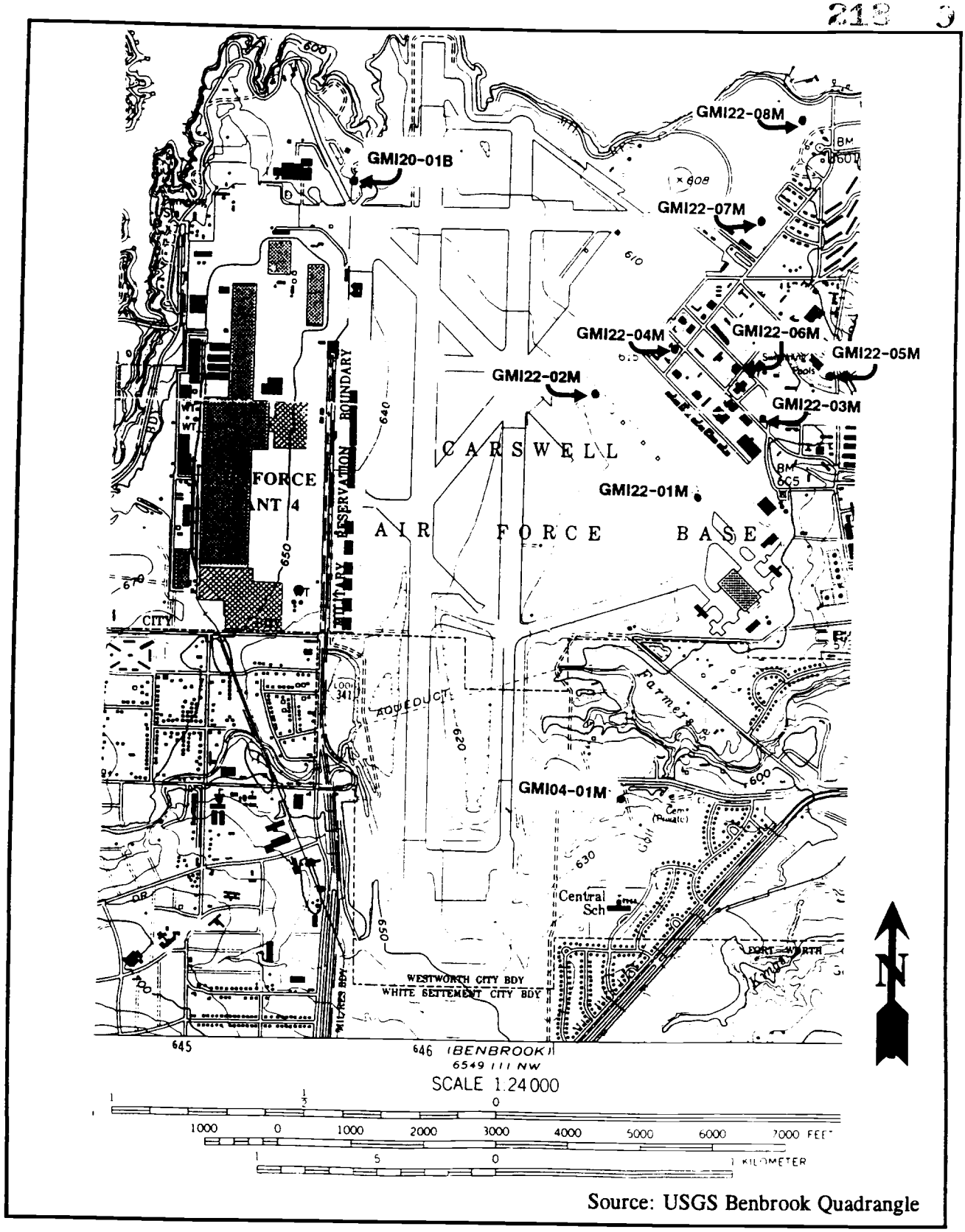

Figure 2. General location map of Phase II monitor wells at Carswell Air Force Base

monitored for organic vapors using an HNu instrument at each sampling site following drilling and emplacement of screen and casing.

2.2 Sample Site Location and Utility Clearance

The well locations were initially proposed during a meeting held November 18, 1993, at the Fort Worth USACE offices (see Appendix A). The attendees included Randy Niebuhr of the USACE, Fred Oelrich of the Aeronautical Systems Center (ASC), Jim Bartolino of the USGS, and Lyle Winnette and Louise Delano of GMI. At that time the USGS had recently completed a phase of well installations, but required additional small diameter (two-inch) wells for water level delineation.

Nine of the wells are located in two previous GMI investigation areas (eight in the North area and one in Landfill 04 area which overlaps GMI's West area); the tenth well was located in the northeast corner of AFP4 near the boundary line with CAFB in a newly defined area designated Northwest (Figures 3, 4, and 5). Well site locations were marked using permanent structures on maps such as roads, buildings, and some fences as references. Obstructions, such as utilities and rocky fill, resulted in deviation from the original locations in a few instances. Individual locations were flagged and labeled with two-foot high one-half-inch by 2-inch wooden stakes spray-painted bright orange.

The decon area and three of the sites were in the flightline, requiring special training for GMI personnel and flightline passes for all vehicles. Available roads, driveways, parking lots, and runways provided ready access to all sites and minimized the potential for surface damage; sheets of three-quarter-inch plywood were used under vehicle wheels to minimize ruts in rain-softened ground. Care was taken not to impact traffic flow by the well installation procedures.

Utility clearance was coordinated through Alan Flolo of the AFBCA; however, GMI contacted the following utility representatives: Marv Reynolds of the 301st Civil Engineering Squadron (CES), Jeffrey Harvey with Carswell Redevelopment Authority (CRA), Ricky Palacios (CAFB golf course maintenance), Earl Grandy (Communications), Ron Allen (301 CES Electrical and Fuel Maintenance), and Mike Brumster (SM & P Conduit Co., locator for Southwestern Bell Telephone). Maps were provided with underground utilities marked including gas lines, water lines, sewer lines (storm and sanitary), phone cables, and liquid fuel pipelines. Each flagged location was checked individually by the relevant utilities

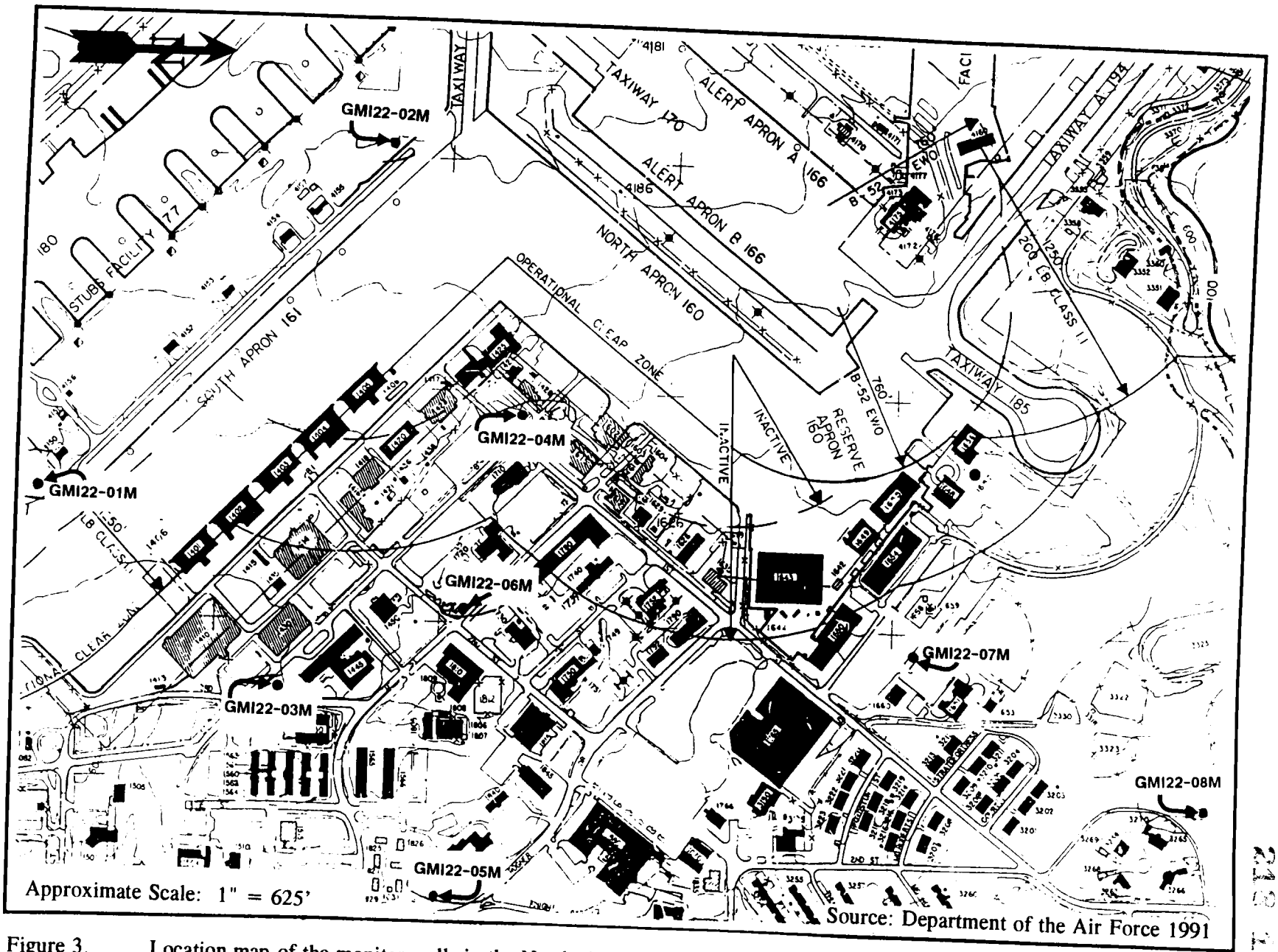

Figure 3. Location map of the monitor wells in the North site

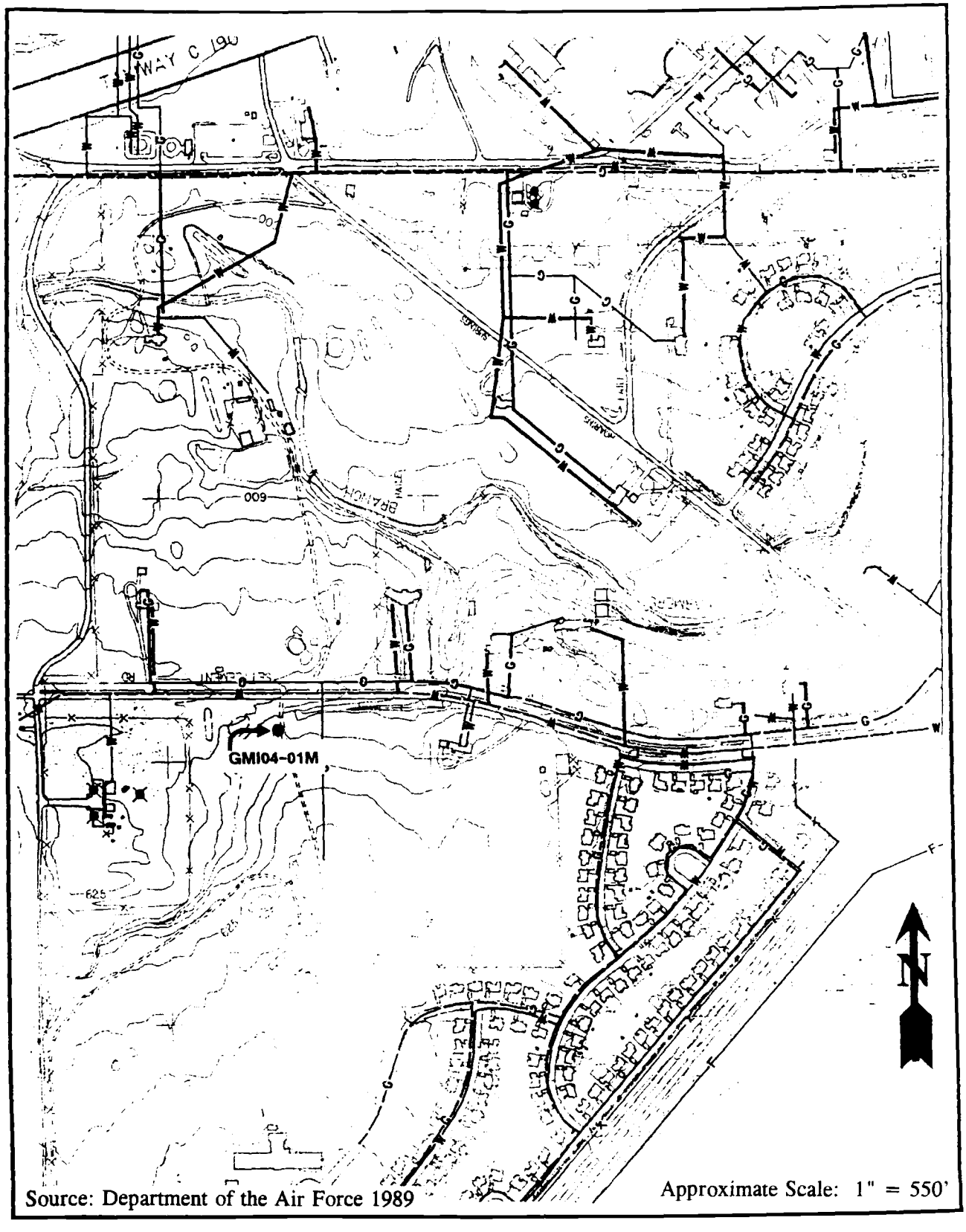

Figure 4. Location map of the monitor well near the Landfill 04 site

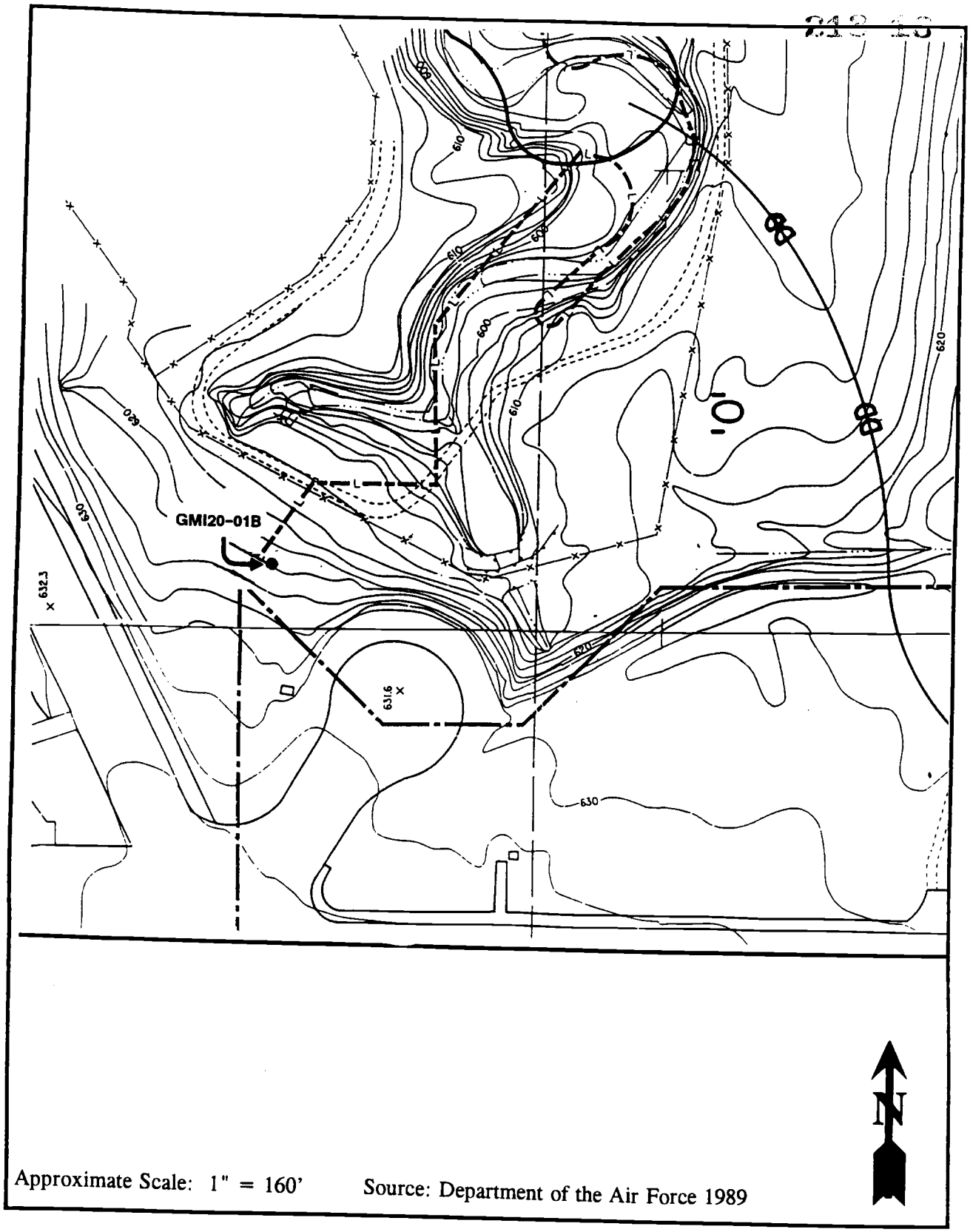

Figure 5. Location map of the soil boring in the Northwest site

to assure non-impact and safety. Where appropriate, subsurface utilities were located with colored flags and/or lines spray-painted on the ground surface. During Phase II no subsurface utilities were hit and/or damaged by the drill rig.

2.3 Well Installation

2.3.1 Drilling Operations

The wells were drilled by GMI using a truck-mounted, Simco model 2800 drill rig with seven and five-eighths-inch outside diameter hollow stem augers. The holes were cored continuously from ground surface to the depth where loose sand and/or wet conditions or hard material prevented sample retention in the core barrel. The remainder of each hole was then drilled to total depth (TD) with a hollow stem auger. Each hole was described from ground surface to TD using cored intervals, driller's observations, and drill cuttings. The holes were bottomed in bedrock as defined by the response of the subsurface to the drillbit; bedrock was visually confirmed by remnants on the bit (see Appendix B).

Cores and drill cuttings were collected and drummed, and the drums were stored inside a locked, fenced area at CAFB which had previously been a radar station on the south side of White Settlement Road just east of the flightline. GMI also stored drilling equipment and supplies in this secured area during field operations.

2.3.2 Soil Descriptions

The 10 drill holes were cored continuously either to water or to unconsolidated sand, so that cored samples could be described in detail. Each core interval was checked for evidence of contamination using an HNu model PI-101 in addition to visual and olfactory inspection. Soil profiles were prepared for each hole from this examination plus drill cuttings for the lower intervals which could not be cored (Appendix D - Soil Logs and Well Completions). The described soil logs record sediment type, texture, structure, color changes, cohesivity, drilling parameters, HNu results, and other features including the driller's observations of depth to water, hard layers encountered while drilling, and bedrock.

2.3.3 Well Completion

Following the modifications to the SOW with additional instructions from the client (see Appendix A), the nine wells were completed using two-inch PVC casing and 0.01-inch slotted screen. The screen extended from TD to at least two feet above the water level with schedule 40 PVC casing to two and one-half feet above ground surface. The annular space between the screen or casing exterior and wall of the borehole was filled with 10/20 sand from TD to approximately two feet above the top of the screen. A two-foot seal of pellet bentonite and water was placed above the sand, and each hole was grouted to surface. The dry hole was cemented from TD to surface without well completion. Well completion diagrams are included in Appendix C. At the surface a four-foot by four-foot concrete pad was constructed around the pipe following TNRCC directives because each well was located in dirt rather than paved areas. Seven wells were completed aboveground using a metal waterproof riser. Two wells on the flightline were completed in a similar fashion except manhole-type well covers were installed in the concrete pad rather than metal risers. The well caps were locked to prevent unauthorized access, and the keys were turned in to Mr. Alan Flolo of the AFBCA.

2.4 Well Development

After allowing the bentonite seal to set at least 24 hours, each well was developed using either a manual pump or a hand bailer (with a volume of approximately 1200 milliliters (ml)), depending on production rate. The wells were pumped or bailed until the water came clear or until several hours had elapsed, and the client representative concurred that enough water had been removed (see Appendix A). Development water was contained in closed and labeled drums stored at the former radar station site pending proper disposal.

2.4.1 Static Water Measurements

Static water level measurements were taken before and after development. The initial measurements are often adversely affected by sediment in the hole which was removed during the development process. The post-development measurements will provide a baseline for future data and may help monitor seasonal variations.

2.5 Decontamination

All equipment which came in contact with soil and/or water and, therefore, had the potential to be contaminated, were decontaminated between each drill site to avoid the potential for cross contamination. Augers, bits, and core barrels were cleaned with hot water and alconox, an approved detergent, using a high pressure steam cleaner. The decon station was set up on the flightline near Hangar 1027 in an area where the pavement was depressed to expedite drainage to a storm sewer drain. The grate over the sewer opening was covered with heavy plastic to contain the wash water which was pumped at regular intervals into a barrel. The sewer opening was uncovered each evening in case of rain. This station served for deconning operations throughout drilling.

2.6 Disposal

Following the SOW all solid and liquid waste generated during the Phase II monitor well installation has been placed in closed 55-gallon drums and temporarily stored at CAFB in the locked and fenced location at the former radar station south of White Settlement Road (with the approval of Mr. Alan Flolo of the AFBCA).

The drum inventory included 12 drums of soil from the drilling operations, two drums of wash water from the decon operations, and 12 drums of development water. The drum disposal documentation is included as Appendix E.

2.6.1 Soil Cores and Drill Cuttings

The contents of 12 drums of drill cuttings will sampled for analysis by Heat Environmental and treated by incineration within the 90-day holding time (see Appendix E).

2.6.2 Decon Water

The contents of two drums of decon water will be filtered and treated at the IT facility on White Settlement Road near the old radar station (see Appendix E).

2.6.3 Development Water

The 12 drums of development water will be processed through the IT treatment facility on White Settlement Road which is scheduled to be on-line in April.

2.7 Safety, Health, and Emergency Response Plan

Prior to the initiation of the Phase II field activities as described in the November 1993 report, a SHERP was approved by USACE industrial hygiene personnel. This SHERP included a discussion of health and safety issues associated with drilling. However, it was revised to include the operations of well completion and well development. In addition training certificates were updated to current status and emergency information was checked and updated as needed. A copy of the revised SHERP is included as Appendix F.

Prior to the initiation of Phase II monitor well installation, a site safety meeting was held and attended by all field personnel to discuss pertinent safety issues and assure that all members had reviewed the revised SHERP and were familiar with the hospital route. Hospital route maps were placed in all vehicles. Additional safety issues discussions were convened by the site safety officer on an "as needed basis" during the field activities.

Per the SOW the breathing zone air was monitored at each sample location for volatile organics for the protection of the field crew and others in the area. The instruments used were an HNu model PI-101 which measures total organic vapors in parts per million (ppm) and an Enmet CGS-80 Tritector, which measures percent oxygen, lower explosive limit (LEL), and toxicity in ppm hydrogen sulfide. Although neither instrument identifies specific compounds (except for oxygen), elevated readings (those above 2 ppm on the HNu and 10 ppm on the CGS-80) would provide an indication of possible concern. The decision of whether or not to instruct the crew to use air purifying respirators (APR) with chemical filter cartridges would be made by the site safety officer. If breathing space readings had exceeded 5 ppm on the HNu, the site safety officer would have evacuated the immediate area, including both field personnel and others nearby (such as CAFB personnel or visitors). All field personnel had APRs readily available; however, their use was never warranted as the HNu and CGS-80 readings in the breathing zone never exceeded the action level.

Flightline training at CAFB is required for any person working on or near any of the runways or taxiways. This training includes an illustrated lecture and a tour of the areas under the jurisdiction of this training. The key elements of the training are: (1) aircraft always have the right-of-way, (2) posted speed limits are strictly enforced, and (3) red lines painted on the pavement indicate restricted areas and are not to be crossed by either individuals or vehicles. GMI personnel who worked on the flightline section of the project underwent this training and received the necessary clearance passes for themselves and the vehicles.

3.0 DISCUSSION AND INTERPRETATION OF FINDINGS

3.1 Introduction

Nine two-inch monitor wells were completed for subsurface information and water levels; a tenth hole was dry. At each drill site the soil profile from ground surface to bedrock was described and water level noted. Wells were completed and developed; the dry hole was cemented to ground surface. State of Texas Well Reports were submitted to the TNRCC (Appendix G).

3.2 Subsurface Stratigraphy

The objective of the subsurface delineation component of the SOW was to describe the soil types encountered, especially those associated with groundwater occurrence, as well as the water depths and characteristics (Table 1).

The soil in the flightline area (the locations with identification numbers beginning with GMI22) is dominantly sand and gravel. Most of the borings in this area revealed that the area has a surface layer of clay and occasionally a clay lense within the sand section. The sand section often contains gravel ranging in grain size from very small to very large pebbles. Approaching two feet from bedrock a coarse gravel unit is usually encountered. Exceptions to this description include GMI22-03M which had several feet of weathered fissile shale above bedrock and GMI22-05M which also had a clay layer on bedrock.

The lithology at GMI04-01M was comparable to other wells in the area. The gravel section in this paleochannel is about 12 feet thick, with the rest of the section composed of sand. The soils of GMI20-01B are primarily clay with poorly sorted gravel up to one-inch in diameter.

3.3 Distribution of Groundwater

The distribution and static water levels of most of the wells were predictable based on water levels obtained from former groundwater sampling projects. The water levels in all but two of the wells ranged in depth from 14 to 19 feet below ground level (BGL). The two exceptions are GMI22-02M and GMI22-05M, both having water levels at approximately 8 feet BGL (Table 2).

TABLE 1

Sedimentologic Data

Well Number	Depth to Bedrock[1]	Depth to Basal Sand[2]	Thickness of Sand	Evidence of Contamination[3]	Remarks
GMI22-01M	28.5 ft	6.0 ft	22.5 ft	no	lower 8.5 ft poorly sorted sand/gravel, basal 1 ft gravel
GMI22-02M	30.5 ft	2.0 ft	28.5 ft	no	
GMI22-03M	32.5 ft	13.5 ft	5.5 ft	NA (no visual evidence or smell; HNu not working)	13.5 ft of weathered shale below sand to limestone bedrock
GMI22-04M	21.0 ft	15.0 ft	6.0 ft	no	
GMI22-05M	10.6 ft	none	0.0 ft	no	basal 6 inches wet gray gravel
GMI22-06M	23.0 ft	15.5 ft	7.5 ft	no	basal 2 ft large sub-angular gravel
GMI22-07M	20.5 ft	15.0 ft	5.5 ft	no	
GMI22-08M	22.5 ft	12.5 ft	2.5 ft	no	sand water-bearing; not at base of section
GMI04-01M	32.0 ft	6.5 ft	21.0 ft	NA (no visual evidence or smell; Hnu not working)	
GMI20-01B	11.0 ft	none	0.0 ft	no	

[1] not always equal to TD - hole may penetrate weathered and fresh bedrock

[2] basal sand may include gravel - observation limited to cuttings because loose sand interval often cannot be sampled

[3] based on HNu reading plus odor and visual observation

TABLE 2

Static Water Level Data

Well Number	Date/Time	SWL (ft)[1]	Date/Time	SWL (ft)[2]
GMI22-01M	3/08-1745	19.1	3/10-0830	19.0
GMI22-02M	3/08-1740	8.6	3/09-1605	8.08
GMI22-03M	3/02-1030	16.5	3/04-0755	18.0
GMI22-04M	2/22-1600	17.0	3/04-0730	17.0
GMI22-05M	2/23-1520	7.4	3/04-0740	9.6
GMI22-06M	2/23-1010	16.0	3/04-0735	16.0
GMI22-07M	2/23-1700	14.0	3/04-0745	14.6
GMI22-08M	2/24-1445	12.0	3/04-0750	14.0
GMI04-01M	3/02-1615	19.0	3/04-0800	17.2

SWL - static water level
[1] SWL at time of drilling
[2] SWL after development

The boring at AFP4, GMI20-01B, was predictably a dry hole (based on surface observation and a nearby borehole), but it was anticipated that it might provide an answer to the question of whether the Upper Zone groundwater is hydraulically connected to Lake Worth. In an attempt to intercept the groundwater/bedrock boundary, the hole was apparently located in an area of shallow bedrock and much clay.

The occurrence of water at GMI22-03M was questionable; however, there was about one foot of water resting above a weathered shale layer. In July 1993, a penetrometer was used at a nearby location and was unable to penetrate the shale, thus, making it impossible to take a water sample.

The relationship between well completion and water production during well development was also predictable. Four of the wells were completed partially with natural sand at the bottom few feet of the well and then with clean 10/20 sand to two feet above the screen. These wells, with the exception of

GMI22-02M, produced water at a much slower rate than the wells which were completed with 10/20 sand from TD (Table 3). GMI22-02M contained 22 feet of water, enabling it to produce 50 gallons per hour (gal/hr) as opposed to 8 gal/hr at GMI22-08.

TABLE 3

Well Development Parameters

Well Number	Amount (gal.)	Time (hr.)	Remarks
GMI22-01M	60	3.5	bailed by HST - very cloudy water
GMI22-02M	160	3.0	pumped by HST until clear
GMI22-03M	180	3.0	pumped by HST - initially mud, then gradually cleared to cloudy
GMI22-04M	40	1.5	bailed by TCM - somewhat cloudy
GMI22-05M	30	1.5	bailed by TCM and HST until clear
GMI22-06M	60	2.0	pumped by HST until completely clear
GMI22-07M	20	4.0	production rate of approx. 1 quart/10 minutes
GMI22-08M	30	3.75	bailed and pumped by HST - cloudy water
GMI04-01M	80	3.0	pumped by HST

4.0 SUMMARY AND CONCLUSIONS

4.1 Summary

Ten of the 25 wells that were contracted through the USACE have been drilled, completed, and developed by GMI. Subsurface lithologic data and static water level measurements were collected. Several drums of soil cuttings, wash water, and development water have been staged until proper disposal procedures are followed.

4.2 Conclusions

The Phase II program of monitor well installation, soil description, and groundwater data at nine locations at CAFB and one at AFP4 revealed the following.

1. The major soil types encountered in the areas which were drilled are sand, clayey sand and gravelly sand.
2. Water levels are generally greater than 12 feet from surface.
3. Drill sites are too widely spaced to permit correlation of sedimentologic horizons between them.

5.0 REFERENCES AND CONTACTS

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6.0 ACRONYMS AND ABBREVIATIONS

AFBCA	Carswell Air Force Base Conversion Agency
AFP4	Air Force Plant No. 4
ASC	Aeronautical Systems Center
APR	air purifying respirator
BGL	below ground level
CAFB	Carswell Air Force Base
CES	Civil Engineering Squadron
CRA	Carswell Redevelopment Authority
Fm	Formation
gal/hr	gallons per hour
GMI	Geo-Marine, Inc.
HNu	a photo-ionization detector for organic vapors
IT	International Technology Corporation
IRP	Installation Restoration Program
LEL	lower explosive limit
LF	landfill
ml	milliliters
MSDS	material safety data sheet
ND	non-detect
ppm	parts per million
SHERP	Safety, Health, and Emergency Response Plan
SOW	scope of work
TD	total depth
TNRCC	Texas Natural Resource Conservation Commission
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey

APPENDIX A

Records of Communication

GMI RECORD OF COMMUNICATION

213 28

Copies To: file, LCW, TCM

Project Name:/Number: 1161-052 CARSWELL M.W. installation

___ Telephone Call _Y_ In Person Interview

Date: 2/24 Time: 4:30 PM

Contact Name: Roy Guerrero

Title:/Affiliation: CAFB BASE OPS.

Contact Telephone Number:/Extension:

GMI Employee: LLD

Title:/Department:

TOPICS DISCUSSED

① "ORE" (war game training exercises) to occur at CAFB 2/26 - 3/06 inclusive. Activity areas include several well locations. RG strongly advises that wells GMI22-04M & GMI22-07M and preferably GMI22-06M be completed (including pad construction and development) before Sat. 2/26. He will "work with us" re accessing the other locations next week

② "ORI" (the "real thing" for which ORE is preparatory) will occur @ CAFB 4/26 - 5/11 (dates approximate). Apparently it will not be possible to work in some areas @ CAFB AT ALL during this time.

ACTION RECOMMENDED OR TAKEN

① Build pads & develop 04M and 07M and (if possible) 06M by end of 2/25

② Work to be done later in spring should be scheduled around ORI

Signature RRD

GMI RECORD OF COMMUNICATION

219 23

Copies To: File, LCW, TCM

Project Name:/Number: CARSWELL PH II 1161-052 M.W.S

___ Telephone Call X In Person Interview

Date: 2/22 Time: 11 AM

Contact Name: Fred Oelrich

Title:/Affiliation:

Contact Telephone Number:/Extension:

GMI Employee: LLD

Title:/Department:

TOPICS DISCUSSED

① I.T.T. treatment plant on White Settlement Road should be willing and able to take development water (not decon) & process it provided sediment and free product are minimal. Plant currently shut down, but should be operative in a week or two.

(2) F.O. asked how many wells left on contract. Has been informed by TNRCC that additional monitoring needed at AFP4. He will talk to Peggy Grubbs about GMI doing the work.

ACTION RECOMMENDED OR TAKEN

① pursue possibility of using plant to process development water so we do not have to dispose off-site

Signature LLD

GMI RECORD OF COMMUNICATION

2130

Copies To: file, LCW, TCM

Project Name:/Number: CARSWELL PH 2 M.W. 1161-052

___ Telephone Call ✓ In Person Interview

Date: 2/23 Time: 3:50 PM

Contact Name: Alan Flolo

Title:/Affiliation: BASE DISPOSAL AGENCY

Contact Telephone Number:/Extension:

GMI Employee: L.L.D.

Title:/Department: Haz Mat

TOPICS DISCUSSED

① OK to leave barrels temporarily at individual well sites. A.F. aware that drums not labeled but will be by early next week.

② OK to stage drums at locked equipment storage area at former radar station site on White Settlement Rd.

ACTION RECOMMENDED OR TAKEN

Get labels and mark drums as soon as possible

Signature LLD

GMI RECORD OF COMMUNICATION

212 31

Copies To: file, LCW, TCM

Project Name:/Number: CALSWELL PH II 1161-052

___ Telephone Call ✓ In Person Interview

Date: 2/23 Time: 10 30

Contact Name: Randy Nicholson

Title:/Affiliation: Tech. Contact USACE

Contact Telephone Number:/Extension:

GMI Employee: LLD

Title:/Department: Hyg Mgt

TOPICS DISCUSSED

Asked re monitor well report + other procedures, when not covered in SOW's or specific to extraction, not monitor wells

① S.W.L. measurement type - after development

② U.S.G.S. requested that screen "straddle" water - did not specify minimum number of feet above water level

③ We are to install protective pipes around each well.

④ Report should include: procedures, location map, geologic logs, well construction logs, and any evidence of contamination

⑤ Development should proceed until water is clear, but not more than 4 hrs/well

ACTION RECOMMENDED OR TAKEN

② place screen at least 2 yr. above water level

④ propose schedule to R.N for report submission post drilling phase

Signature RZN

GMI RECORD OF COMMUNICATION

212 32

Copies To: File, LCCO, TCM, HST

Project Name:/Number: CARSWELL II M.W. Installation 1161-052

X Telephone Call ___ In Person Interview

Date: 2/24 Time: 3:30 PM

Contact Name: Randy Niebuhr

Title:/Affiliation: USACE Technical Contact

Contact Telephone Number:/Extension: 817-334-3223

GMI Employee: LLD

Title:/Department: Haz Mat

TOPICS DISCUSSED

Bentonite seals should set 24 hours, and wells should be developed as soon as possible after that. R.N. feels that leaving wells undeveloped could impact future analytic results

ACTION RECOMMENDED OR TAKEN

Revamp drilling schedule so that drilling and development ~~Continuing~~ occur concurrently instead of the current plan to complete all drilling before starting development.

Signature LLD

GMI RECORD OF COMMUNICATION

218 33

Copies To:

Project Name:/Number: CALSWGLC PH. II
M.W. Installation IRP-05

___ Telephone Call ✓ In Person ~~Interview~~ Meeting

Date: 11/18/93 Time: 8:15 – 10:20 A.M.

Contact Name:	Title:/Affiliation:
Contact Telephone Number:/Extension: Randy Niebaur	USACE
Fred Oelrich	ASC
James Bartolino	USGS
GMI Employee: Lyle Winnette	Title:/Department:
Louise Delano	HAZMAT

TOPICS DISCUSSED

① USGS recently installed 9 monitn wells on CAFB/AFP4 for water depth info in particular. Need additional locations, also for water data. Would be 2-inch wells. Could be sampled but not large enough for extraction/production. Proposed 10 locations, some of which have already had utility clearance.

② Question raised re possibility of additional, not yet identified source of TCE on CAFB. Meeting participants agreed that west edge of northern part of plume not defined. Will be difficult because on flightline and much of ground surface is concrete.

ACTION RECOMMENDED OR TAKEN

① GMI to follow USGS locations for first 10 monitn wells. Will need Mod. to SOW because size and materials differ from regional specs.

Signature L L Delano

GMI RECORD OF COMMUNICATION

212 34

Copies To: file, LLD, LCW

Project Name:/Number: Carswell Sampling / 1161-052

X Telephone Call ___ In Person Interview

Date: 2-17-94 Time: 10:00 am

Contact Name: RANDY NIEBUHR

Title:/Affiliation: TECH. CONTACT / USACE

Contact Telephone Number:/Extension: (817) 334-3223

GMI Employee: Tony Mills

Title:/Department: HAZMAT

TOPICS DISCUSSED - PHASE II MONITOR WELLS

What type of well completions. How deep to drill, water table vs. bedrock. What method is recommended for developing wells. Will the wells be sampled?

ACTION RECOMMENDED OR TAKEN

Randy wants stick-up type well completions every where but on the flightline. Drill to bedrock, use .010 slot screen and allow enough screen above WTable for fluctuations. Develop wells with a bailer. Begin on Tuesday and let him know where we will be. No sampling. Bail until clear or 4 hours.

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

213 35

Copies To: file, LLD, LCW

Project Name:/Number: CARSWELL SAMPLING / 1161-052

X Telephone Call ___ In Person Interview

Date: 3-03-94 Time: 1435

Contact Name: Mike Brunter

Title:/Affiliation: CABLE LOCATER SM&P

Contact Telephone Number:/Extension: (817) 595-4028

GMI Employee: Tony Mills

Title:/Department: HAZMAT

TOPICS DISCUSSED

Mike will meet us at the gate on Cherry Lane at 8:00 at Lockheed. He and Luis Cardoza looked for the stake earlier and could not find it.

ACTION RECOMMENDED OR TAKEN

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

212 36

Copies To: file, LLD, LCW

Project Name:/Number: CARSWELL SAMPLING 1161-052

X Telephone Call ___ In Person Interview

Date: 3-03-94 Time: 9:30 am

Contact Name: RANDY NIEBUHR

Title:/Affiliation: TECHNICAL CONTACT USACE

Contact Telephone Number:/Extension: (817) 334-3223

GMI Employee: TONY Mills

Title:/Department: GEOL. / HAZMAT

TOPICS DISCUSSED

LEFT A MESSAGE FOR RANDY WITH THE SECRETARY. WE ARE DEVELOPING TWO WELLS TODAY. THE AIR FORCE, (ROY QUESTIONED) DID NOT ALLOW OUR DRILLING CREW TO DRILL ON THE FLIGHTLINE ON WED, 3-02-94. A DECISION WAS MADE TO DRILL THE WELL AT THE GOLF COURSE ON WED., DEVELOPE THE TWO WELLS THURSDAY, AND RESUME DRILLING MONDAY. THE ORE EXERCISES SHOULD BE OVER BY MONDAY.

ACTION RECOMMENDED OR TAKEN

RANDY WILL CALL BACK IF HE HAS ANY QUESTIONS

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

213 37

Copies To: file: LLD, LCW

Project Name:/Number: CARSWELL SAMPLING / 1161-052

X Telephone Call ___ In Person Interview

Date: 3-03-94 Time: 1400

Contact Name: LUKE GILPIN

Title:/Affiliation: ENVIRONMENTAL RESOURCES MANAGEMENT LOCKHEED

Contact Telephone Number:/Extension: (817)777-8203 PAGER 61713

GMI Employee: Tony Mills

Title:/Department: HAZMAT

TOPICS DISCUSSED

PLANS WERE MADE TO MEET LUKE GILPIN AT THE GATE ON CHERRY LANE ON THE WEST SIDE OF LOCKHEED TO DRILL MONITORING WELL GMI-20-01M. LUKE WARNED THAT WE PROBABLY WILL NOT HAVE WATER THERE AND THAT THE WELL WILL BE SHALLOW. THE WELLS LOCATED WEST OF THE SITE ARE 5'TO 6' DEEP TO BEDROCK AND HAVE ABOUT ONE FOOT OF WATER. DRY HOLES WERE DRILLED APPROXIMATELY 500' W. AND ONE ≈ 1000' S.

THE OUTFALL NEARBY IS DISCHARGE FROM LAKE WATER COOLING SYSTEM.

THE AIRFORCE IS WORRIED ABOUT FOD, SO IT WOULD BE BETTER NOT TO TAKE THE FLIGHTLINE.

THE SOIL AT THAT AREA HAS BEEN DESIGNATED AS CLEAN. WE CAN EITHER SPREAD THE DIRT OUT OR BACKFILL A DRY HOLE.

LUKE SHOWED Jim BARTELINO, USGS, THE BEDROCK OUTCROP AROUND LAKE SHORE LAST OCTOBER-NOVEMBER 93.

ACTION RECOMMENDED OR TAKEN

ARRIVE AT GATE AT 8:00, CALL LUKE OR HAVE GUARDS PAGE HIM.

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

212 38

Copies To: FILE,

Project Name:/Number: CARSWELL SAMPLING 1161-052

___ Telephone Call X In Person Interview

Date: 3-07-94 Time: 1050

Contact Name: LUKE GILPIN

Title:/Affiliation: SENIOR ENVIRONMENTAL ENGINEER LOCKHEED

Contact Telephone Number:/Extension: (817)777-8203

GMI Employee: T. MILLS

Title:/Department: HAZMAT

TOPICS DISCUSSED

LUKE GILPIN ESCORTED THE DRILLING CREW TO GMI-20-01M LOCATION. HE GAVE PERMISSION TO USE A DRUM STORAGE AREA FOR STORAGE OF CUTTINGS AND WATER. HE ALSO MENTIONED THAT THE SOIL WOULD BE CLEAN SINCE IT CAME FROM A DESIGNATED CLEAN AREA AND THAT WE COULD DISPOSE OF THE SOIL IN THEIR "CLEAN SOIL PILE".

WHEN ASKED ABOUT THE OCCURRENCE OF GROUNDWATER IN THE AREA HE POINTED TOWARD A DRY HOLE TO THE NORTH AND ONE TO THE WEST. I INFORMED MR. GILPIN THAT IF THIS HOLE IS DRY, IT WOULD BE GROUTED TO SURFACE AND ALL EQUIPMENT AND DRUMS WOULD BE REMOVED TODAY.

ACTION RECOMMENDED OR TAKEN

SOIL WAS STORED IN A BARREL AND HAULED TO "RADAR SITE/DRUM STORAGE AREA" AT CARSWELL ON WHITE SETTLEMENT ROAD.

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

212 33

Copies To: file, LLD, LCW

Project Name:/Number: CARSWELL SAMPLING 1161-052

X Telephone Call ___ In Person Interview

Date: 3-08-94 Time: 1545

Contact Name: RANDY NIEBUHR

Title:/Affiliation: USACE

Contact Telephone Number:/Extension: (817) 334-3223

GMI Employee: TONY MILLS

Title:/Department: HAZMAT

TOPICS DISCUSSED

GMI 22-02M ON FLIGHTLINE - WHETHER TO SET SCREEN FROM WATER LEVEL TO BEDROCK (WOULD BE 25' OF SCREEN). RANDY SAID TO SCREEN THE WHOLE INTERVAL.

PUT 3 OR 4 PIPES AROUND EACH STICK-UP WELL. MANHOLES ON THE FLIGHTLINE DO NOT NEED THEM.

ACTION RECOMMENDED OR TAKEN

Signature Tony C. Mills

GMI RECORD OF COMMUNICATION

218 50

Copies To: FILE, LLD, LCW

Project Name:/Number: CARSWELL SAMPLING 1161-052

___ Telephone Call \ In Person Interview

Date: 3-07-94 Time: 10:00

Contact Name: MIKE BRUMPTER

Title:/Affiliation: LOCATOR / SM&P

Contact Telephone Number:/Extension: (817)545-4028

GMI Employee: T. MILLS

Title:/Department: HAZMAT

TOPICS DISCUSSED

MR. BRUMPTER VIEWED HIS UTILITIES MAPS. THERE WERE NONE IN THE AREA OF THE WELL AT LOCKHEED SO HE GAVE US A VERBAL "OK" TO DRILL THE WELL.

ACTION RECOMMENDED OR TAKEN

HE DID NOT ACCOMPANY US TO LOCKHEED. THE BOREHOLE WAS DRILLED SUCCESSFULLY.

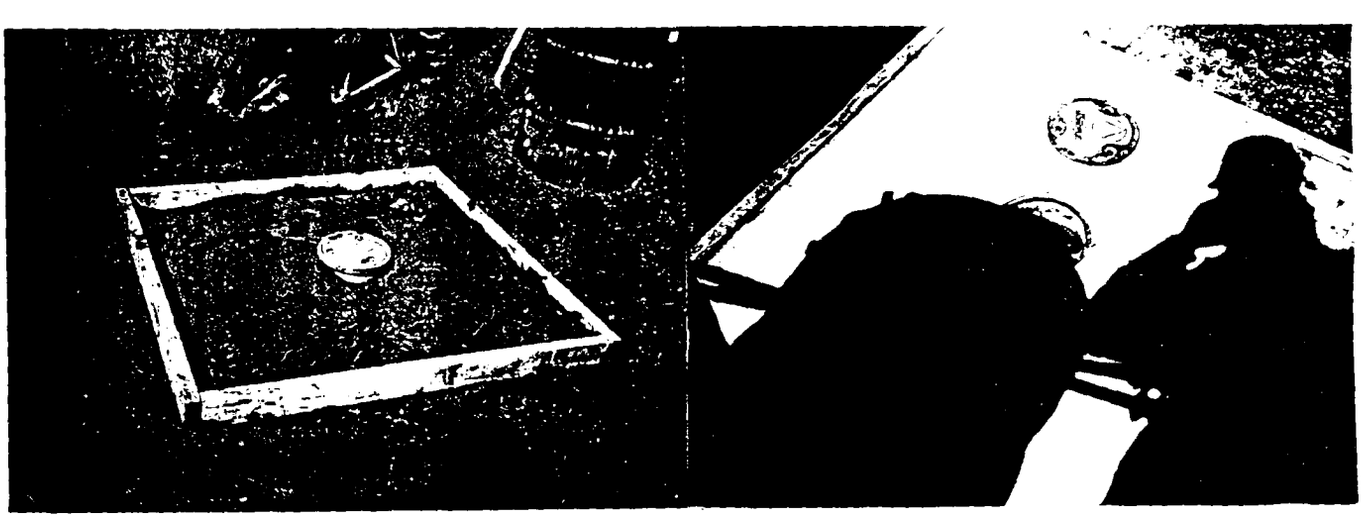
Signature Tony C. Mills

APPENDIX B

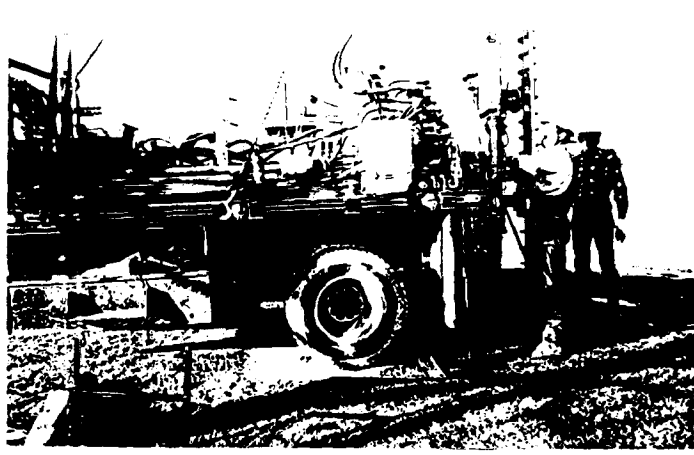
Site Photographs

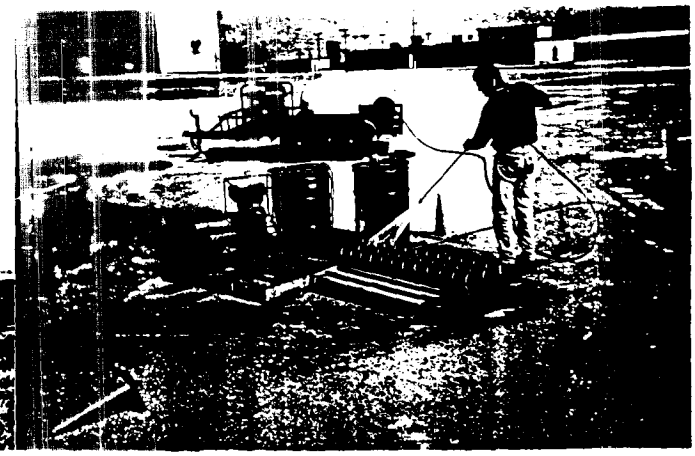
Above: Two-inch PVC casing and screen have been installed through the augers. As the augers are removed the gravel is poured inside the hollow stem. Right: Occasionally it was too difficult to pour a gravel pack when the weak formation sand would interfere. In this case gravel was poured into open hole above the natural sand.

Above: Upright wells before and after pad construction. Seven of the wells were completed in this manner with a four-foot riser mounted in a 4' by 4' concrete pad and three pipes for bumper protection.

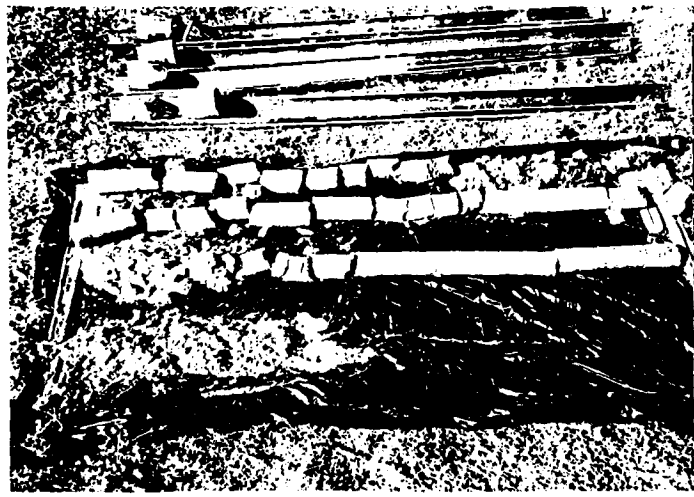


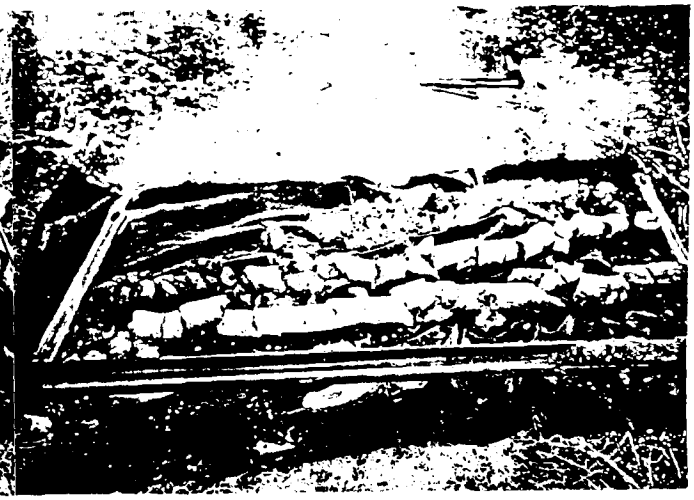
Above: Wells with ground surface completions under construction. The two wells on the flightline were constructed in this manner with manhole covers mounted in a 4' by 4' concrete pad.



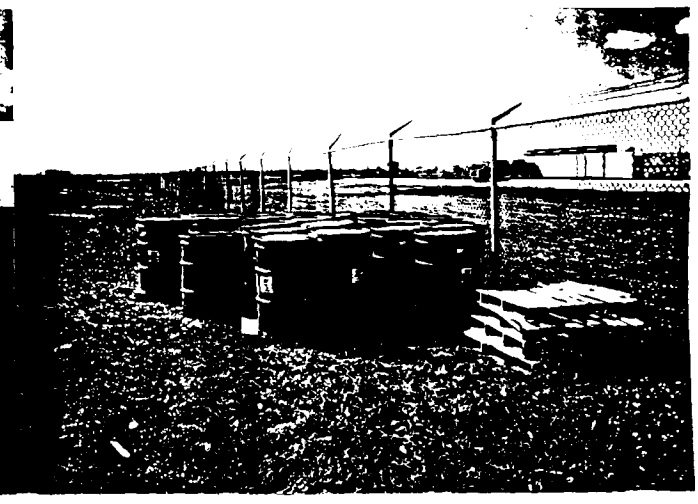


Left: Geo-Marine's drill rig was used in boring the
drilled a few inches into bedrock and cored continuo
installed, and wells were completed to surface. Righ
Decon water was caught in plastic sheeting and pum
and well developing pumps and bailers were decon
for wells and one borehole. Hol ere
-inch PVC screen and casing w en
con area was set up over a storm n.
barrel as needed. Augers, core s.
and after use.





Left: Soil cuttings from GMI22-03M; 0 to 20 feet increasing in depth from right to left and from the top of the photo to the bottom. Photo shows clay and sand before hitting the shale. Right: Soil cuttings of GMI22-07; contains primarily sand from zero to fifteen feet beginning at the bottom of the photo and increasing in depth from left to right.



Left: Drums of soil cuttings, decon water, and development water are stored at the old radar site on White Settlement Road. Right: Another angle of the drum storage area showing the IT groundwater recovery and treatment system in the background.

APPENDIX C

Field Log Book

JAN 27, '94 [illegible] CONTINUED

1245 GMI-03 (USGS T6). AFTER DRIVING AROUND N. SIDE OF CAMP [illegible] AND LOOKING AT LAKE SHORE FOR LIMESTONE OUTCROP, THEN STUDYING AREA AROUND ALPHA TAXIWAY ALONG THE WEST SIDE, A SPOT WAS CHOSEN NOT FAR FROM USGS ORIGINAL LOCATION. BEGINNING AT THE corner in the fence AT THE CULVERT BELOW AND N OF THE OVAL AT LOCKHEED, MEASURE NW 210', and 90' SW PERPENDICULAR TO FENCE. GMI-03 IS ALSO LOCATED 132' FROM SHED NEAR OVAL.

1300 RETURNED RADIO TO BASE OPS

1315 GMI-05 (USGS T1) 60' N OF CURB AT 1ST AND "B" ST, 40' W OF "B".

1330 GMI-04 (USGS T8) 85 from curb at 3RD & "B" ALONG A LINE FROM CORNER OF STREET TO CORNER OF BLDG. 1445.

1400 CONFIRM GMI-08 (USGS T2) 55' W OF CURB IN CENTER OF GRASSY AREA BETWEEN PARKING LOTS OF BLDG 1650 AND 1651.

1410 Confirmed GMI-09 (USGS T12) 373' W of "J" in line w/ J St., 140' N. of corner of WHITE FENCE.

1420 [illegible] GMI-06 (USGS T?) 180' N [illegible] PARKING LOT BY BUILDING 1830. 35 W OF KNIGHTS LAKE ROAD.

1500 GMI-10 (LF04-4H TO BE REDRILLED) (~~USGS~~ IT REQUESTED WELL) 196'S OF WHITE SETTLEMENT ROAD 20' EAST OF GRAVEL ROAD. 7' E OF WELL LF04-4H.

1530 TALK TO ALAN FLOLO AT BLDG 1215. GAVE HIM COPIES OF MAPS. FLOLO WILL GET UTILITY CLEARANCE STARTED TOMORROW. HE SAID THE WEST PART OF FLIGHTLINE BELONGS TO CARSWELL (TO ORIGINAL BOUNDARY LINE) WHICH IS CONTRADICTORY TO WHAT ROY QUERETARO SAID ABOUT IT BELONGING TO LOCKHEED.

1600 LEFT BASE TO GO TO GMI.

Tony C. Mills
1-27-94

213 45

3/22/94

0735 W.L. Delano arrived @ CAFB main site - met w/ Plant Field to get digging permit and requests for base & flightline passes

0920 H. Thompson & T. Mills arrived @ CAFB

1045 F. Cetrich stopped by to discuss GW. that IT treatment plant might handle purge water & (2) additional monitor wells may be needed @ AFP4

1100 L. Lewis arrived w/ steam cleaner - obtained all necessary passes & flightline training

1215 gravel and supplies delivered & unloaded - purchased cement, plywood and other supplies

1420 set up steam pad

1520 safety meeting led by T. Mills

1550 set up and drilled GW122C4A (near Base Ops Bldg) - first attempt stopped @ 12" by conc, wire, & rebar in fill - moved 2 ft south for successful second attempt refusal @ 17 ft

1815 T.D. of well at 23.3 ft. Completed with 10 ft of 0.01" screen @ base and 16.4 ft of casing w/ casing cut 2 ft below 2.5 ft for aboveground completion - sand from T.D. to 15 ft - bentonite pellets to 13 ft

1900 W.L. Delano left site

1930 Thompson, Mills, & Lewis left site

Note that because of delayed start (gaining entry, weather and other reasons) Rand, Nichols expected not to have site today will come tomorrow

W.L. Delano

9/23/94
0720 H [illegible] drills, [illegible] arrive @ GM22-04M. Mechanical problem w/ rig required borrowing tools to [illegible]
0740 L. Deleno [illegible] main gate
0810 [illegible] Pump [illegible] arrived + unloaded at fenced storage area @ dismantled former radar station (near Landfill 4)
0830 [illegible] GM22-04M to surface and pulled up Alan Fields drilled 0850 - 0900.
0920 called R. Nietcher - left message re next location
0930 moved to GM22-06M and set up in corner of parking lot corner of D & 2nd
0955 drill GM22-06M to 23'10" with water at 16', Bottomed in Walnut identified by fossils
11:05 set 10' of screen + 17' of casing - [illegible] - through pipe. Randy Nietcher was here to observe 1010 - 1145

11:15
1120 [illegible] from T.D. to [illegible] [illegible] bentonite to 9'
1220 LUNCH BREAK
1255 Safety Meeting
1300 [illegible] to surface.
1420 move to GM22-05M and set up
1440 called [illegible] re (1) working in [illegible], (2) [illegible] + (3) drum labels
1455 drill GM22-05M - Water @ 8', T.D. 10'8" Alan Fields [illegible] Checked with him on leaving drums temporarily @ wells and staging drums @ locked storage area.
1550 T.D. of GM22-05M @ 10' [illegible] water @ 8 ft. Set 5 ft of [illegible] screen and 8 ft of casing. [illegible] to 3½', bentonite to 2' and [illegible] to surface. Cleaned site [illegible]
1645 Set up @ GM22-07M in parking lot median. Visit from unidentified man (civilian) [illegible]

213 47

[illegible] prepared concrete [illegible] of [illegible] exercises
1740 T.D. of GMW22-CMI @ 26.5' with water at approximately 14' in fine clean sand. Complete well & [illegible] of 12' screen (to [illegible] depth) tremie to 6ft & concrete to surface w/ [illegible] completion
1830 L. Delano left site
1845 H. Thompson, T. Mills & L. Lewis left site.
Returned to site in PM to winterize steam cleaner because of predicted freeze

L.L. Delano

2/24/97
0710 T. Mills + H. Thompson arrive at GMW22-CMI to finish completion. L. Lewis arrive at [illegible] station
0735 L. Delano arrive at site
0755 Move to GMW22-CEM - set up and start drilling
0830 Down with broken U-joint @ 6.0' depth. Located and replaced part. Purchased cement & 2 by 4s for [illegible] the wells. Started pads
1320 Break
1400 Continued GMW22-CEM
1510 T.D at 22.5 with water at 12 ft. Installed 12.5' of screen and 13 ft of casing. Poured sand to 7ft and bentonite to 5ft. L. Delano called R. Niebuhr re timing of development after well completion. R.N. said wells should be developed 24 hours after bentonite seal is placed. Therefore, told RN that tomorrow

will be spent conducting plans and developing wells (Christ to upcoming exercises (which last until 3/06)
1600 A. Flolo visited site. He will be involved in the exercises but will check messages daily
1615 Moved to GMI 22-08 M, Completed pads @ GMI ~~22~~ 22-07 M & GMI 22-04 M (wells to be developed tomorrow).
1630 Discussed schedule w/ Roy Queretaro regarding exercises and priority order of wells to be completed first.
1650 Began decontamination of augers and completed GMI ~~22~~ 07 M and GMI 22-04M.
1745 Tony, Albert, Louise left the base

[signature]

2/25/95
0730 TONY MILLS, ALBERT THOMPSON LAMBERT LEWIS OF GEO-MARINE ARRIVED ON SITE AT GMI 22-07M. UNLOADED EQUIPMENT AT THE WELL. LAMBERT LEWIS PICKED UP BARRELS FOR DEVELOPMENT WATER.
0750 TONY MILLS AND ALBERT THOMPSON DECONNED PIPE AND BEGAN TO SET UP AT GMI 22-07M. LEWIS WAS AT PASS & ID TO GET ANOTHER VEHICLE PASS FOR RED CHEVY.
0815 HAD SAFETY MEETING. TALKED ABOUT CONTAMINANTS IN THE WELLS THAT WERE PRE-DETERMINED TO BE DEVELOPED TODAY.
0830 BEGAN PUMPING GMI 22-07M WATER IS VERY SILTY WITH LIGHT REDDISH TAN HUE. ONLY ABOUT ONE ~~GALLON~~ QUART PER 10 minutes Comes IN.
0845 ALAN FLOLO CAME BY. TOLD HIM BRUCE MORENO WILL BE HERE NEXT WEEK, HE SAID HE WOULD HAVE PAPERWORK READY ON HIS DESK ON MONDAY - ALSO CALL LUKE GILPIN

2-2-94

ONE DAY BEFORE GOING TO LOCKHEED WELL GMI 20-01M.

0920 CALLED RANDY NIEBUHR TO LET HIM KNOW WE WERE DEVELOPING THE FIRST WELL. HE WILL NOT BE ABLE TO COME TODAY. DAVE LOUISE CALL MONDAY AND GET HIM KNOW WHERE THEY WILL BE TUESDAY.

0850 L. LEWIS PICKED UP SUPPLIES AT GMI 22-03M.

0930 Hubert and Tony drove to Ron Allen's Fuels Shop to make plans with him. HE WAS NOT THERE. MET Jim Ansul (spelling?) with 301 ST plumbing shop.

1000 met Lambert at GMI 22-07M. made plans for developing wells. Hubert will pump 07M, Tony will bail 06M and Lambert will build a PAD at 08M.

1010 Called Louise Pelano at GMI. We have a scriber and Isabel will be ready Monday am.

for Tony { We are leaving Monday at 3:15, get back at 6:30 Tuesday for Austin - IRPM's

TALKED TO LYLE WINNETTE.

1100 TONY BEGAN BAILING GMI 22-06M GW LEVEL IS 16.61' Below Top of casing & 13.75' BGL. FILLED 5gal with muddy reddish tan water. Water is coming in faster than bailer rate. decided to use pump, 20 will clean bailer and try GMI 22-04M with bailer. 04M.

1145 Removed the Bailer and took water level at GMI 22-03M. 19.75' Below TOP of casing approximately 17.34' From PAD LEVEL. 04M TM

1310 Quit BAILING 03M for 10 minutes water looks fairly clean. picked up a bottle to sample for a look at sediment. 04M TM

1320 began bailing 03M again water looks fairly clean so left well site 1330 and drove to GMI 22-06M.

1340 HUBERT AND TONY WENT TO GMI-22-05 TO INSPECT L. LEWIS' PAD AND SEE IF DEVELOPMENT OF WELL IS POSSIBLE.

1350 Water level (static) measurement at 05M is 11.01' Below Top of casing

1400 TO 1425 FINISHED PAD AT 05M.
BEGIN TO DEVELOP WELL. DECONNED water level meter and bailer prior to Development. water was gray in color and silty - no odor. There was approximately two feet of water in the well. Bailed approximately
1500 15 gallons - still silty but has cleared up some.

1445 Hubert finished developing well # GMI 22-06M. water is clear. Will want to finish pad until Monday.
1300 THE time that Hubert finished GMI22-07M.
1225 Glenn Rivers and Tod Sandlin (USGS) Came by and talked to Tony Mills at GMI22-04M. They asked about depth to limestone and static water levels. Asked when we would continue drilling and I told them Monday afternoon.
1600 Hubert Thompson continued Developing 05M. L. LEWIS TOOK supplies to the staging area (RADAR SITE). Tony Mills WENT TO MEET Ron ALLEN

AT FUEL AND ELECTRIC SHOP.
1635 Ron Allen DECIDED THAT THE STAKE FOR GMI22-01M WAS ok where it WAS.
1650 Tony Mills AND HUBERT PUT LID ON LAST BARREL AT 05M AND INVENTORIED [illegible] EACH WELL.
1700 PARKED THE RIG AT RADAR SITE AND LEFT CARSWELL

2/28/91

1115 ARRIVED C.AFB
1120 ARRIVED FLO LOW
1125 FLIGHT TOWER
1130 ARRIVED PASS & ID
1300 ARRIVED AT FLIGHT TOWER
1345 ARRIVED AT PASS & ID
1415 COMPLETED AT PASS & ID
FOUND [illegible] & SENT FOR SIR CRATE
1300 WATER LEVEL IS 14' GMI-22-08M STARTED TCM BAILING SWITCHED TO PUMP AT 13.15
1400 HAMBART ARRIVED WITH SAC CRATE WENT TO WELL GMI22-06M TO POUR PAD

213 51

GMI 22 [illegible]

1645 FINISHED DEVELOPING WELL TO PULLED PUMP, PUMPED 30 GALS. WATER CLOUDY

1700 SECURED SCALE ! WANT TO FILL UP FORD LAMBERT ? BRUCE FINISHED PAD AT WELL 22 GMI 22-C8 M

3/1/94

0700 MET AT OLD RADAR STATION SENT LAMBERT TO PICK UP TRAILER & WE WANT TO CHECK OUT OTHER WELL SITES

0800 SECURED EVERYTHING WANT TO PLANO

3/01/94
Shut down by heavy rain & thunderstorms
Crew to Plano

[signature]

3/02

0715 L. Delano arrive @ storage area - called Mike Bramsky re Lockheed hole [called L. [illegible]] Called Randy Niebuhr

0745 B. [illegible] & H. Thompson arrive. Move rig to GMI 22-C3.4 & set up

0830 Alan Field stopped by to sign extension for utility clearance. ←

0905 Drilled GMI 22-C3M. Water @ 16'; shale @ 19' - changed to bit

1000 L. Lewis drilling at site

1115 T.D. @ 32.5' - pulled augers - set 20' screen & 15' casing - sand to 11' bentonite to 8'4", cement to surface

1320 R. Niebuhr visited - gave him index map & well locations he left 1340.

1355 [illegible]

1400 L. Delano to talk w/ R. Guerrero & confirmed clearance of pipeline back contractors until Monday

1415 Lunch

1435 Met A Field - informed him that we'll do "Site Coordinate" this PM & then what was the... Also - Called L. [illegible] "Site Coordinating" personnel except [illegible] development

213 52

1300 Set up & drilled GMI 21-01M - water @ 19'

1700 T.D @ 32. Completed well through auger w/ 15' of screen and 10' of casing. Sand to 10'; bentonite to 13' cement to surface w/ riser

1815 Capt. Lewis left site
1830 L. Delaure left site
1910 H. Thompson & B. Morning left site

[signature]

3/3/94
0700 ARRIVED RADAR SITE WORKING ON EQUIPMENT
0830 MOVING AROUND & DROPPING OFF BARRELS FILLING UP WITH WATER BRUCE MOVING OVER TO MAKE PAD ON WELL #
1000 DEVELOPING WELL # GMI 22-03M WATER AT 16'
1100 BRUCE FINISHED UP PAD AT WELL # PUMPED 60 GALS FROM WELL # GMI 22-03 M (MUDDY) SHEEN ON TOP OF WATER WHILE PUMPING WILL SETTLE OR DISAPPEAR
1115 BRUCE ON HIS WAY TO WELL # GMI 21-01M
1200 PUMPED 40 GAL CLOUDY
1315 BRUCE FINISHED PAD ON GMI 21-01 M
1335 STOPPED FOR LUNCH PUMPED 80 GALS.
1430 CALLED OFFICE
1530 STARTED CEMENT OF PAD AT WELL # GMI 22-03M

1535 WATER LEVEL @ 17' AT WELL # LMI 21-01M RUNNING PUMP
1545 FINISH (3 hrs.)
1845 PUMPED 80 GALS WATER CLOUDY & SAND PULLED PUMP
1630 BRUCE FINISHED PAD WELL # LMI 22-03M

3/4/94
0725 ARRIVED ON BOARD BASE
RECEIVING WATER LEVELS IN

LMI	22-04M	23'3 =	17'
LMI	22-06M	23'10 =	16'
LMI	22-05M	10'8 =	8'
LMI	22-07M	20.4 =	13.8'
LMI	22-08M	22.6 =	15'
LMI	22-03M	32.6 =	19'
LMI	21-01M	32' =	18'

0805 FINISHED ROUNDS
0825 LEAVING BASE FOR FAC.

MONDAY 3-07-94

DRILLING MONITOR WELLS AT LOCKHEED AND CARSWELL.

0750 HUBERT THOMPSON & BRUCE MOONEY ARRIVED AT RADAR SITE AND GOT RIG READY TO GO. DROVE TO OUR LOCATIONS NEAR CONTROL TOWER TO CLEAN UP AROUND WELLS.

0830 TONY MILLS AND RAJ MEHTA ARRIVED AT LOCKHEED GATE. Called Luke Gilpin (LOCKHEED ENVIRONMENTAL) Heard to call him back when we are ready to come on to the site. WE DROVE to the Radar Site, then to Allen Flolo's office. FLOLO BEGAN TO GET RAJ MEHTA'S BASE PASS.

0930 MET DRILL CREW (HUBERT & BRUCE) AT GMI 22-05M WHERE THEY WERE CLEANING UP THE BOARDS AT THE PADS. HUBERT TOLD MIKE (Sm'sP) to meet us AT FLOLO'S OFFICE AT 10:00.

0945 HELD SAFETY MEETING. RAJ MEHTA, Bruce Mooney, Hubert Thompson and Tony Mills ATTENDED.

10:00 MIKE Brumpton (Sm'sP) looked AT THE LOCATION ON HIS MAP. IT WAS CLEAR OF UTILITIES SO GAVE US A VERBAL OK.

1030 DROVE TO LOCKHEED. CALLED USGS GLENN RIVERS TO RETURN HIS CALL. HE WAS IN THE FIELD. LEFT HIM ~~ATTEMPT~~ TO CALL LYLE WINNETTE (GMI). CALLED LUKE GILPIN. HE ESCORTED US TO THE SITE GMI 22-01M. SHOWED US A BARREL STAGING AREA. ALSO TOLD US THE SOIL HAS BEEN DISCHARGED CLEAN, AND WE CAN DUMP IT IN A CLEAN SOIL AREA. TOLD HIM I WOULD RELAY THAT TO LYLE.

11:10 BEGAN RIGGING UP ON LOCATION.

11:30 BEGAN DRILLING.

CALIBRATED GAS METER AND HNu.

12:15 DRILLED TO TD 11.5' NO WATER

12:35 CEMENTED HOLE UP TO SURFACE

13:00 LEFT LOCKHEED

1315 MET L. LEWIS WITH STEAMCLEANER AT THE GATE.

1330 LUNCH

1415 Hubert AND RAJ WENT TO DECON AREA TO SET UP. BRUCE AND TONY TALKED TO Ray Quereta ABOUT Drilling on THE FLIGHTLINE. PERMISSION WAS GRANTED.

1430 NOTICED THE RIG HAD A FLAT ON OUTSIDE TIRE. CHANGED FLAT. HUBERT & BRUCE TOOK TIRE IN TOWN TO GET A NEW ONE.

1445 RAJ DECONNED WHILE WAITING.

1445 TO 16 RIG SHUT DOWN.

1545 FINISHED DECON

1550 HUBERT BACK WITH TIRE.

1630 SET RIG UP AT GMI22-01M. WILL DRILL TOMORROW. TONY, RAJ, HUBERT, BRUCE LEFT SITE.

Tony C. Mills

3-08-94

0730 Hubert Thompson and Bruce Morning arrived to set up for drilling at GMI-22-01M.

0743 STARTED DRILLING

~~0750~~

0750 Tony Mills AND RAJ MEHTA arrived on Base. CALLED ALAN FLORO ABOUT STICK UPS VS. FLUSH-mounted well covers on the flightline. He WANTED US TO CALL LATER ABOUT IT.

CALLED LYLE WINNETTE AT GMI. He talked to Randy [illegible] (USACE). RANDY WANTS FLUSH mounted on Flightline.

0810 DROVE TO FLIGHTLINE WHERE DRILL CREW WAS DRILLING. HIT ~~WET~~ SAND AT 17'. WENT IN WITH BIT TO DRILL TO TD.

840 TD AT 28.5'. BIT IS STUCK IN augers. WILL PULL AUGERS AND GO BACK IN W/ PLUG TO SET CASING.

930 FREED THE BIT FROM AUGERS AND BACK IN THE HOLE WITH AUGERS & BOTTOM PLUG.

940 HAVE 15' screen in HOLE WITH 2-10' RISERS.

1000 CASING BROKE OFF 10' DOWN AT THE THREADS. PULLING OUT AUGERS.

1100 AFTER PROBLEMS WITH SAND-LOCKING THE SCREEN IN THE AUGER, WE FINALLY OPTED TO SET THE SCREEN IN NATURAL SAND, THEN POURED .010 SAND THE REST OF THE SCREEN LENGTH. ALAN FLOLO CAME BY, SAID FLUSH MOUNT THE WELLS ON THE FLIGHTLINE

1145 HOLE HAS BEEN CEMENTED TO SURFACE AND PREPARED FOR A GROUND-LEVEL WELL COVER TO BE COMPLETED TOMORROW.

LEFT THE FLIGHTLINE FOR LUNCH

1245 CAME BACK TO DRILL GMI22-02M

1400 STARTED DRILLING

1515 TD AT 30.5'

1545 CALLED RANDY NIEBUHR HE SAID TO PUT SCREEN ALL THE WAY TO LIMESTONE. ALSO PUT 3 or 4 BUMPER POSTS AT EACH STICK-UP WELL.

TRIED TO PUT SCREEN IN OPEN HOLE, COULD NOT GET THROUGH THE WET SAND.

1740 Completed GMI 22-02M ~~TD~~ Sounding = 30.4 BGL, water at 8.65 BGL. 25' screen

1745 measured water at GMI22-01M at 19.05' BGL. Sounding 27.9

1810 FINISHED DECON AND LEFT SITE

1840 LEFT RADAR SITE

[signature]

03-09-94

0730 REACHED RADAR SITE TRUCK NO STARTED

0815 WENT ON BASE STARTED LOADING BARRELS AND MOVING TO RADAR SITE

0900 WENT TO HEME DEPOT

0930 RETURN TO SITE MOVING BARRELS

1345 WENT TO LUNCH

1415 MOVING BARRELS

16.05 SOUNDED WELL # GMI22-02M 8'08"

1610 SETTING PUMP

1845 PUMPED 160 GALS OF FLUID

CLOUDY: FINE SAND PACKED PUMP: SHUT DOWN

[signature]

03-10-94

0735 ARRIVED RADAR SITE LOADED UP WENT TO BASE

830 WATER LEVEL AT 19' WELL GMI 22-01M SET PUMPED A LITLE PULLED PUMP AT

0900 BRUCE WORKING ON PAD AT GMI 22-02M

1212 BAILED 60 GALS OF FLUID FLUID VERY CLOUDY BRUCE FINISHED PAD AT 1100 COUNTED BARRELS LOAD BACK TO RADAR SITE TO SECURE UP

1300 LEFT RADAR SITE

03/14/94

0930 ARRIVED RADAR SITE LOADED UP WENT & CHECKED IN WITH FLIGHT TOWER

1000 FILLING BARREL WITH WATER FOR SACCARTE MIXTURE STARTED PAD AT GMI 22-01M

1050 ENGRAVER NOT WORKING VERY WELL WATER LEVEL AT GMI 22-02M 8' FROM GROUND LEVEL

1130 FINISHED PAD AT GMI 22-01M WENT TO PAD GMI 22-02M PICKED UP 3 BARRELS OF DEVELOPMENT WATER PICKED UP 1 BARREL FROM PAD GMI 22-01M

1155 CALLED LYLE

1230 OFF BASE TO RADAR SITE

1245 UNLOADED BARRELS WENT TO GET PIPE & SACCARITE

1445 CHECKED WITH FLIGHT TOWER & WENT TO PAD # GMI 22-01M FINISHED UP PAD WATER LEVEL 19'

1510 MOVED ON TO OTHER PAD

1515 ARRIVED AT PAD # GMI 22-08M MADE POST HOLES SOUNDED WELL AT 14'

21 SS

CONT.

1625 TOOK PICTURE & LEFT PAD

1630 ARRIVED AT PAD GMI 22-07M CUT PIPE

1650 STARTED POST HOLES WATER LEVEL AT 14.6' ENGRAVER QUIT WORKING

1700 LEFT PAD

1705 ARRIVED AT PAD GMI 22-04M STARTED POST HOLES

1725 WATER LEVEL AT 17'

1800 FINISHED UP WENT TO RADAR SITE

1815 ARRIVED AT RADAR SITE MOVED SACRETE UNDER PLASTIC

1820 LOCKED GATE -OORING FOR ~~1836~~ RICHARD WICK

1835 FOUND SAME & LEFT MOTEL

Richard Thompson

03/15/94

0726 ARRIVED AT RADAR SITE STARTED UP EQUIPMENT & MISSED WITH SACRETE

0745 LEFT RADAR SITE WENT TO FLIGHT TOWER

0800 WANDED AT PAD GMI 22-01M TOOK BOARDS OFF & CLEANED UP SITE

0925 LEFT PAD WENT TO DRCON AREA CLEANED UP AROUND DRAIN

0840 TOOK OFF TO PAD GMI 22-03M STOPPED OFF TO USE HAND & PHONE

0900 ARRIVED AT PAD GMI 22-03M FILLED UP WITH WATER STARTED POST HOLES

0930 WATER LEVEL AT 18'

0950 LEFT PAD GMI 22-03A

0955 ARRIVED PAD GMI 22-06M STARTED POST HOLES

1017 WATER LEVEL AT 16'

1035 LEFT PAD GMI 22-06M

1040 ARRIVED AT PAD GMI 22-05M STARTED POST HOLES

1057 WATER LEVEL AT 9.6'

1120 LEFT PAD GMI 22-05M

CONT.

1145 ARRIVED AT PAD LOC 04-01M STARTED POST HOLES

1210 WATER LEVEL AT 17.2'

1240 LEFT PAD LOC 04-01M WENT TO LUNCH

1340 WENT TO RADAR SITE TO CLEAN UP STAGING AREA & LOAD UP TRAILER

1500 WENT TO ALAN FLOLD OFFICE TO RETURN KEY & CLEAN WALL KEYS

1530 RETURNED TO RADAR SITE TO LABEL DRUMS

1630 LEFT RADAR SITE JOB TERMINATED

Richard Thompson

APPENDIX D

Soil Logs and Well Completions

RECORD OF SUBSURFACE EXPLORATION

212 82

Project No.: 1161-052
Project: CARSWELL PH II MONITOR WELL INSTALLATION
Drilling Co: Geo-Marine
Driller: H.S. Thompson
Drilling Method: HSA / CT-5'

(Well) / Boring #: GMI04-01M
Depth of Boring: 32 ft.
Depth of Well: 31 ft 6 in.
Length of Screen: 15 ft.
Length of Casing: 19 ft 6 in
Logged By: L.L. Deland

Date Drilled: 3/02/94
Diameter of Boring: 7 5/8 in.
Diameter of Screen: 2 in.
Diameter of Casing: 2 in.
Slot Size: 0.01 in.
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None	Unkeen*		recovered 5'/5'
	LOAM: sandy, black					
	SAND: fine-grained, clayey, dark brown					
2.5						2.5
	SAND: medium-grained, quartz, clayey but decreases with depth, medium red-brown					
5.0						recovered 3.5'/5' 5.0
	SAND. medium-grained, quartz, clean, loose, dry, mottled light red-brown and tan					
7.5						7.5
10.0						recovered 1.5'/5' 10.0
12.5						12.5
15.0	barrel almost empty - presumed same SAND as above					recovered 2 in. of wet sand 15.0
17.5	▼					17.5
	● ▽					Bottom ft. of barrel wet
20.0						20.0
	Driller: alternating layers of SAND & GRAVEL					recovered 6 in. of wet sand & gravel
22.5	SAND: as above					22.5
	GRAVEL: sub-angular to sub-rounded pebbles of Qtz & Limestone 1/8" to 1 1/2"					
25.0						25.0 Changed to bit
27.5	SHALE: weathered, limey, medium gray					Driller: hard layer 27.5
30.0						Driller: very hard layer 30.0
	LIMESTONE: argillaceous, light grey					
32.0						

ABBREVIATIONS AND SYMBOLS

SS-Driven Split Spoon
ST-Pressed Shelby Tube
CA-Continuous Flight Auger
RC-Rock Core
THD-Texas Highway Department Cone
CT-5' Continuous Sampler

HSA-Hollow Stem Augers
CFA-Continuous Flight Augers
DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement-Grout Seal

* HNU not working

RECORD OF SUBSURFACE EXPLORATION

2.13 63

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc.
Driller: H. S. Thompson
Drilling Method: HSA/CT-5'

Well/(Boring) #: GMI 20-01B
Depth of Boring: 11.5'
Depth of Well: NA
Length of Screen: NA
Length of Casing: NA
Logged By: T.C. Mills

Date Drilled: 3/07/94
Diameter of Boring: 7 5/8"
Diameter of Screen: NA
Diameter of Casing: NA
Slot Size: NA
Well Material: NA

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None			
	CLAY: organic; humic; black			< 1		recovered: 4' 15'
2.5	CLAY: with angular gravel to 3/8", brown to tan (yellowish)					
	CLAY: tan					
5.0	CLAY: sandy; dark brown					recovered: 2.5'/5'
	CLAY: sandy; with gravel; tan crumbly					
7.5	CLAY: hard, dry, dark brown					
	CLAY: limy streaks ½" to 2" limestone gravel					
10.0	CLAY: silty; brown; with gravel to 2½"					recovered: 20" hard layer at 11.5'
12.5						
15.0						
17.5						
20.0						
22.5						
25.0						
27.5						
30.0						

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CT-5' Continuous Sampler

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DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

GEO-MARINE

Project No.: 1161-052
Project: Carswell Phase II. Monitor Well Installation
Drilling Co: Geo-Marine, Inc.
Driller: H.S. Thompson
Drilling Method: HSA/CT-5'

(Well)/Boring #: GMI 22-01M
Depth of Boring: 28.5'
Depth of Well: 27.9'
Length of Screen: 15'
Length of Casing: 15.'
Logged By: T.C. Mills

Date Drilled: 3/08/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None			
	CLAY: reddish-brown			41		recovered 5'/5'
2.5	CLAY: plastic, black					
5.0	CLAY: silty & sandy; gray to tan, mottling increases with depth					recovered 3'/5'
7.5	MISSING INTERVAL: Possibly SAND					
10.0	SAND & SILT: sand component fine-grained & well-sorted; reddish brown & reddish tan					recovered 4'/5'
12.5						
15.0						recovered 1'/5'
17.5						● ▽
20.0	SAND: with some gravel; poorly sorted with pebbles to 1/2"					
22.5						
25.0						
27.5						hard layer, probably gravel
30.0	LIMESTONE: at TD = 28.5'					

ABBREVIATIONS AND SYMBOLS

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THD-Texas Highway Department Cone
CT-5' Continuous Sampler

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CFA-Continuous Flight Augers
DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

GEO-MARINE

Project No.: 1161-052
Project: CARSWELL Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc
Driller: H.S. Thompson
Drilling Method: HSA / CT-5'

Well/Boring #: GMI 22-024
Depth of Boring: 30.5'
Depth of Well: 30.1'
Length of Screen: 25.'
Length of Casing: 8.'
Logged By: T.C. Mills

Date Drilled: 3/08/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None			
	SILT: with humous & organics			< 1		recovered 2'4"/5'
2.5	SAND: coarse-grained; with silt & gravel; poorly sorted; medium yellow-brown					
5.0	SAND: fine-grained; well-sorted; tan					apparent washout: 3.1-6.' recovered 2.5'/5' 8 bags of sand 17.' to 3.'
7.5	SAND: wet; as above; with occasional pebbles to 1/2"; limited recovery			not applicable		▽ recovered 2'/5'
10.0						
12.5						
15.0						
17.5						Loose formation sand in annular space from T.D. to 17'
20.0						
22.5						
25.0						
27.5						
30.0	T.D. at 30'6" in bedrock					hard layer

ABBREVIATIONS AND SYMBOLS

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CT-5' Continuous Sampler

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CFA-Continuous Flight Augers
DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

212 86

Project No.: 1161-052 (Well) Boring #: GMI 22-03A Date Drilled: 3/02/94
Project: CARSWELL PH. II Depth of Boring: 32'6" Diameter of Boring: 7 5/8"
MONITOR WELL INSTALLATION Depth of Well: 32' Diameter of Screen: 2"
Drilling Co: Geo-Marine Inc. Length of Screen: 20' Diameter of Casing: 2"
Driller: H.S. Thompson Length of Casing: 15' Slot Size: 0.01"
Drilling Method: HSA / CT-5' Logged By: L.L. Deland Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
		NONE	NONE	UNKNOWN *		
0	LOAM: sandy, fine grained, dark brown					recovered 4'/5' 3" limestone slab @ 1'
2.5	SAND: medium-grained, very clayey; tan, gray					
	CLAY: slick, tough, with silt + fine-grained sand, dark gray-brown					
5.0	CLAY: tough, silty, medium orange-brown with black blebs					recovered 5'/5'
7.5						occasional small pebble in this interval: rounded quartz or flat ferrous-cemented mudstone
10.0						recovered 4.5'/5'
12.5	SAND: medium to coarse-grained, quartz, loose, dry,					pebbles to 2" in this interval - sub-angular
15.0	SAND / GRAVEL: coarse-grained, clean, wet, quartz, sub-rounded to sub-angular, pebbles to 1"			Not Applicable		recovered 1.5'/4' ▽
17.5						• Changed to bit @ 19.' on hard layer
20.0	(from cuttings) dark gray SHALE: somewhat fissile, limy					
22.5						
25.0						
27.5						
30.0	T.D. at 32'6" in LIMESTONE: moderately hard, argillaceous, light gray with crystalline carbonate					very hard at 32'6"

ABBREVIATIONS AND SYMBOLS

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CFA-Continuous Flight Augers
DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
• Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

* HNU not working

RECORD OF SUBSURFACE EXPLORATION

212 87

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc.
Driller: H.S. Thompson
Drilling Method: HSA / CT-5'

(Well)/Boring #: GMI22-044
Depth of Boring: 23' 3"
Depth of Well: 23'
Length of Screen: 10'
Length of Casing: 15'
Logged By: L.L. Delano

Date Drilled: 2/22/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
		None	None			
0	LOAM; sandy, dark brown-gray			2 1		recovered 5'/5'
2.5	CLAY: with fine-grained sand, dark olive-gray with orange mottles					
5.0	SAND: medium-grained, well-sorted, quartz, clayey, dark red-brown					recovered 3'/5' loose sand
7.5	SAND: finer-grained & more clayey than above, variegated					colors included red-brown, orange, & black
10.0	CLAY: slick, silty, medium olive-gray					recovered 5'/5'
12.5	SAND: fine to medium-grained, very clayey, sticky, mottled orange brown & gray (less clayey); occasional small round pebble stained by iron oxide					
15.0	SAND: medium-grained, well-sorted, clean, loose, light gray, dry until 19'					recovered 2.5'/5'
17.5						△
20.0				Not Applicable		changed to bit hard layer at 21'
22.5	(from cuttings:) weathered SHALE: limy, medium gray					very hard layer at 22'6"
	LIMESTONE: white, fine-grained, argillaceous					
25.0	T.D. 23' 3"					
27.5						
30.0						

ABBREVIATIONS AND SYMBOLS

SS-Driven Split Spoon
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WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

213 68

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc
Driller: H. S. Thompson
Drilling Method: HSA / CT-5'

(Well)/Boring #: GMI 22-054
Depth of Boring: 11'
Depth of Well: 10'8"
Length of Screen: 5'
Length of Casing: 9'
Logged By: L.L. Delano

Date Drilled: 2/23/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0	LOAM: sandy; dark brown	None	None	< 1		recovered 1.5/5'
2.5	CLAY: soft, medium brown with sand and gravel (hard white pebbles to 1/4"					rocky interval at 2.'
5.0	SAND: fine-grained; clayey; black					recovered 2.5/5.
7.5	SAND & GRAVEL: clayey; brown, light gray, & black; with sub-angular limestone pebbles to 1 1/2"					▽
10.0	SAND: medium-grained, clayey, pebbly, brown & red-brown					recovered .5/1.0
12.5	SAND: fine-grained, clayey, no pebbles					
15.0	CLAY: sticky; sandy; dark olive-gray; with wet gravel					
17.5	TD = 11' at base on gray LIMESTONE					
20.0						
22.5						
25.0						
27.5						
30.0						

ABBREVIATIONS AND SYMBOLS

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WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

GEO-MARINE

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc.
Driller: H.S. Thompson
Drilling Method: HSA/CT-5'

Well/Boring #: GMI 22-06M
Depth of Boring: 24'
Depth of Well: 23' 6"
Length of Screen: 10'
Length of Casing: 17'
Logged By: L.L. Delano

Date Drilled: 2/23/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0	TOP SOIL/FILL: pebbles, medium brown	None	None	< 1		recovered 3.5'/5'
2.5	SAND: clayey, red-brown CLAY: sticky, with fine-grained sand, medium gray, uniform					
5.0	CLAY: as above, except mottled with red-brown					recovered 5'/5'
7.5	SAND: medium-grained quartz, very clayey, red-brown color changes to yellow-brown below 8.5'					
10.0						recovered 3'/5'
12.5	SAND: Texture as above, mottled light gray + yellow-brown - no sample below 15.5 - presumed to be loose, water-bearing SAND					
15.0				Not Applicable		recovered 0.5'/5' Δ
17.5						
20.0						change to bit
22.5	DRILLER: alternating hard + soft layers, could be SAND + GRAVEL					
25.0	(from cuttings:) SHALE, limy, medium-gray with fossils distinctive of Walnut Fm.					
27.5						
30.0						

ABBREVIATIONS AND SYMBOLS

SS-Driven Split Spoon
ST-Pressed Shelby Tube
CA-Continuous Flight Auger
RC-Rock Core
THD-Texas Highway Department Cone
CT-5' Continuous Sampler

HSA-Hollow Stem Augers
CFA-Continuous Flight Augers
DC-Driving Casing
MD-Mud Drilling

WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

213 70

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine Inc.
Driller: H. S. Thompson
Drilling Method: HSA /CT-5'

(Well)/Boring #: GMI22-07M
Depth of Boring: 20'6"
Depth of Well: 20'
Length of Screen: 10'
Length of Casing: 13'
Logged By: L. L. Deland

Date Drilled: 2/23/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None			
	SAND: somewhat clayey, medium-grained, gray			< 1		recovered 3./5.
2.5	SAND: fine-grained, clayey, red-brown					
	SAND & GRAVEL: clayey, olive-tan, angular pebbles to 1½"					
5.0	SAND: fine-grained, clayey, red-orange with bands of light gray toward bottom of interval, scattered round pebbles up to 1/4"					recovered 4./5.
7.5						
10.0	SAND: medium-grained, clayey, light gray with narrow orange bands, scattered small pebbles toward bottom of interval					recovered 4./5.
12.5						
15.0	SAND: wet, loose, medium to coarse-grained, sub-rounded, dominantly quartz			Not Applicable		Δ ● recovered 1.5/5.
17.5						
20.0	(no samples) probable SHALE with probable limestone at T.D. @ 20'6"					hard layer at 19.' change to bit very hard layer at 20.5'
22.5						
25.0						
27.5						
30.0						

ABBREVIATIONS AND SYMBOLS

SS-Driven Split Spoon
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DC-Driving Casing
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WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

Bottom Cap
Sand Pack
Bentonite Seal
Factory-Slotted Well Screen
Well Casing
Cement Grout Seal

RECORD OF SUBSURFACE EXPLORATION

Project No.: 1161-052
Project: Carswell Phase II Monitor Well Installation
Drilling Co: Geo-Marine, Inc.
Driller: H.S. Thompson
Drilling Method: HSA / CT-5'

(Well) / Boring #: GMI 22-08M
Depth of Boring: 22'6"
Depth of Well: 22'
Length of Screen: 12'6"
Length of Casing: 13'
Logged By: L.L. Delano

Date Drilled: 2/24/94
Diameter of Boring: 7 5/8"
Diameter of Screen: 2"
Diameter of Casing: 2"
Slot Size: 0.01"
Well Material: PVC

DEPTH FEET	SOIL DESCRIPTION	SAMPLE NUMBER	SAMPLE TYPE	OVA (PPM)	WELL DESIGN	REMARKS
0		None	None			
2.5	SAND: medium-grained, well-sorted, quartz, sub-rounded, silty, clayey; medium red-brown			< 1		recovered 2.5'/5'
5.0	SAND: as above, but less silt & clay, loose, color changes from red-brown to light brown by 15'					recovered 4.'/5'
7.5						
10.0						recovered 3.5'/5'
12.5						Δ
15.0	GRAVEL: (most of this interval not recovered) sub-angular to sub-rounded pebbles ~ 1/4"; very loose & wet			Not Applicable		recovered 2.'/5'
17.5	CLAY: silty with fine grained sand, red-brown					
20.0	CLAY: slicker & harder than above; no sand; somewhat silty; grades down to gray-green SHALE; limy, weathered					changed to bit
22.5	T.D. 22'6"					
25.0						
27.5						
30.0						

ABBREVIATIONS AND SYMBOLS

SS-Driven Split Spoon
ST-Pressed Shelby Tube
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WATER LEVEL
▽ At Completion
▼ After Hours
● Water on Rods

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APPENDIX E

Drum Disposal Documentation
(No drums have been disposed
as of the date of this report)

APPENDIX F

Safety, Health, and Emergency Response Plan (Revised)

SAFETY, HEALTH, AND EMERGENCY RESPONSE PLAN (SHERP)

PHASE II
GROUNDWATER SAMPLING, SUBSURFACE SOIL DELINEATION, & MONITOR/EXTRACTION WELL INSTALLATION

FOR

US AIR FORCE PLANT NO. 4
FORT WORTH, TEXAS

Prepared for:

Department of the Army
Fort Worth District Corps of Engineers
Fort Worth, Texas 76102-0300

Contract # DACA63-91-D-0061
Modification to Delivery Order #0052

Prepared by:

Geo-Marine, Inc.
550 East 15th Street
Plano, Texas 75074
(214) 423-5480

February 1994

TABLE OF CONTENTS

1.0 FIELD ACTIVITIES

The Phase II Groundwater Sampling, Subsurface Soil Delineation, and Monitor/Extraction Well Installation field program at U.S. Air Force Plant No. 4 will include the following elements:

- Locate approximately 140 client-determined groundwater sampling locations
- Locate approximately five client-determined soil sample borehole locations
- Accurately plot all sampling locations on base map
- Check all sampling sites for surface obstructions, underground utilities and other structures with assistance of appropriate private utility and government personnel
- Sample groundwater using truck-mounted penetrometer sampler for solvent and petroleum analyses
- Drill boreholes through soil to bedrock and sample groundwater for solvent and petroleum analyses
- Drill and develop extraction/monitor wells as required by the client and sample the groundwater
- Analyze all groundwater samples on site using method 8021 in a mobile laboratory for client-specified compounds
- Describe subsurface soil column at all sample stations using either visual soil descriptions (borehole locations) or electronic ("piezocone") profiles which have been calibrated with an actual, described soil column (penetrometer locations)
- Pressure grout all penetrometer holes and boreholes to the surface and repair surface to pre-investigation condition
- Decontaminate all subsurface penetrometer, drilling, and sampling equipment between each station
- Drum all decontamination liquids and all drilling soil cuttings and fluids for future analyses as needed for proper disposal
- Monitor breathing space air with HNu at each sample location for elevated levels of organic vapors
- Monitor drilling operations with explosimeter for possible explosive atmosphere

2.0 RESOURCES

Reference documents used in the development of this Safety, Health, and Emergency Response Plan (SHERP) include:

- OSHA regulations in 29 CFR 1910
- US Army Corps of Engineers Safety and Health Requirements Manual EM 385-1-1
- Geo-Marine, Inc. Corporate Safety Manual
- NIOSH Pocket Guide to Chemical Hazards (1990)
- Chemical Hazards of the Workplace by Proctor, Hughes, & Fischman (1989)
- Merck Index: an Encyclopedia of Chemicals, Drugs, and Biologicals (1989)
- NIOSH Guidance Manual for Hazardous Waste Sites (1985)

3.0 KEY PERSONNEL

Geo-Marine, Inc. (GMI) and subcontract personnel responsible for the safe completion of this project include:

- GMI Corporate Safety Committee Chair - Mary Alice Garza
- GMI Project Manager - Lyle Winnette
- GMI Field Supervisor - Louise Delano
- GMI Sampler - Tony Mills
- GMI Site Safety Officer - Tony Mills
- GMI Driller - Hubert Thompson
- GMI Driller's Helper - Tony Mills
- GMI Decon Technician - Lambert Lewis
- Laboratory Subcontractor Supervisor - not available
- Laboratory Subcontractor Technician - not available
- Penetrometer Equipment Subcontractor Supervisor - not available
- Penetrometer Equipment Subcontractor Operator - not available

3.1 Corporate Safety Committee Chair/Project Manager

The GMI Corporate Safety Committee Chair and Project Manager will have the ultimate responsibility for implementation of all parts of the SHERP and to make certain that all applicable federal, state, and local safety regulations and guidelines are followed.

3.2 Field Supervisor

The Field Supervisor will observe field activities of GMI and subcontractor personnel to insure that safety and health procedures outlined in this SHERP are followed. The Field Supervisor will assure that daily calibration of the HNu, measuring of background ambient air for organic vapors, and recording of such data be done in the vicinity of each penetrometer or drilling site. The Field Supervisor will also assure that an explosimeter is used at each drilling site to monitor for explosive atmosphere. The meter will be periodically checked during operations.

3.3 Site Safety Officer

The Site Safety Officer will oversee all field procedures to check that SHERP guidelines are followed. The Site Safety Officer has the authority to invoke disciplinary action in the event any stipulations of the SHERP are willfully ignored and to suspend field activity for safety and/or health reasons. Specifically, the responsibilities of the Site Safety Officer include:

organizing the field sampling area so that support facilities are in uncontaminated areas

introducing the field operations to the local emergency response/accident personnel

overseeing appropriate use and care of personal protective equipment (PPE)

monitoring external physical conditions, especially temperature, wind strength and direction, and potential for electrical storms

running site safety meetings as needed (Site Safety Review form attached)

responsibility for all verbal and written notification of the COE in the event of any emergencies, accidents, or injuries

3.4 Field Sampler

The Field Sampler will make certain that the appropriate PPE is worn and used and that the samples are collected with decontaminated equipment using procedures which minimize the potential of exposure via either respiration or eye/skin contact. The Field Sampler will also monitor organic vapor levels in breathing air space and check for explosive atmosphere whenever one or both of these tasks are delegated to him.

3.5 Subcontractor Penetrometer Supervisor and Equipment Operator

Subcontractor personnel will operate the sampler in a safe manner and will insure that the appropriate PPE is worn and used and that proper decontamination procedures are carried out. They will insure that each sampling site is left clean and undisturbed.

3.6 Subcontractor Laboratory Technician and Supervisor

Subcontractor personnel will operate the mobile lab equipment in a safe manner and will wear and use appropriate PPE. They will insure that all required analytic methodology and QA/QC procedures are used and documented.

3.7 Driller and Technicians

Each member of the drilling crew will exercise care at all times around the drilling rig and associated equipment. Protective head gear and foot gear will be worn at all times, and appropriate PPE will be readily available to be used when necessary. Decontamination, using approved methods and materials, will be done at a client-designated location for all sampling-related equipment between each location.

3.8 Field Team

Each member of the field team individually has the responsibility to read, understand, and follow each section of this SHERP. Each team member will attend all site safety meetings called by the Site Safety Officer and will acknowledge his authority to upgrade PPE or to evacuate the site in the event of emergency health or safety situations. Any unsafe work practices will be reported to the Site Safety Officer immediately.

4.0 PERSONAL PROTECTIVE EQUIPMENT

The appropriate level of PPE for this project will be either level C or level D. The determinant will be the concentration of airborne organic vapors measured in the atmosphere in the sampling location area.

4.1 Level D PPE

Level D protection includes long sleeve shirt and trousers, hard hat, steel-toed boots, and gloves. When splashing is likely, boots and gloves should be made of rubber and clothes and skin protected with liquid-resistant coveralls like tyveks. Goggles or safety glasses will be available on site for eye protection.

4.2 Level C PPE

Level C protection includes all the elements of level D plus the addition of an air purifying respirator with the appropriate chemical cartridges, either half or full face. Air purifying respirators for all crew members will be readily available on site at all times.

5.0 DOCUMENTS

The GMI Project Manager will maintain safety and health records on file which document the following for each team member:

(a) annual occupational health examination with physician clearance to wear a respirator

(b) OSHA-approved 40-hour hazardous material handling course or 8-hour refresher within the last 12 months

(c) successful respirator fit-testing performed

In addition, one member of the GMI team has current certification as an OSHA Supervisor

Copies of OSHA certifications for the GMI team are attached. Other related documents are available for review on request.

GEO-MARINE, INC.
SITE SAFETY PLAN

GENERAL INFORMATION

PROJECT TITLE/NUMBER: Phase II - Groundwater Survey at U.S. Air Force Plant No. 4

PROJECT MANAGER: Lyle Winnette

PROJECT LOCATION(S): Fort Worth, Texas

PLAN PREPARED BY: Louise Delano and Tony Mills DATE: July 14, 1993

PLAN APPROVED BY: Lyle Winnette DATE: July 15, 1993

PLAN REVIEWED BY SITE SAFETY OFFICER: Tony Mills DATE: July 16, 1993

SCOPE/OBJECTIVE OF WORK: Sample groundwater at 140 client-determined penetrometer sites and at 5 client-determined soil boring sites for analysis for TCE, BTEX, and other organic compounds, in order to establish boundaries of plume(s) of affected water. Based on results, drill, and install up to 25 monitor and/or extraction wells as client directs.

PROPOSED DATES OF FIELD ACTIVITIES: February 2, 1994 - Phase II

SUMMARY:

Overall Chemical Hazard:	low [ ]	moderate [X]	serious [ ]	unknown [ ]
Overall Physical Hazard:	low [ ]	moderate [X]	serious [ ]	unknown [ ]

GEO-MARINE, INC.
SITE SAFETY PLAN

SITE/WASTE CHARACTERISTICS

WASTE TYPE(S):

gas/vapor [ ]	liquid [X]	sludge [ ]	solid [X]

CHARACTERISTICS:

flammable/ ignitable [ ]	volatile [X]	corrosive [ ]	acutely toxic [ ]
explosive [ ]	reactive [ ]	carcinogen [ ]	radioactive [ ]

other:_____

PHYSICAL HAZARDS:

overhead [X]	confined space [ ]	below grade [ ]	trip/fall [X]
puncture [ ]	burn [ ]	cut [ ]	splash [X]
noise [ ]	other:_____		

BRIEF SITE HISTORY/DESCRIPTION, INCLUDING UNUSUAL FEATURES (see Scope of Work for details):

A confirmed plume of TCE has been migrating across the base from multiple sources presumed to include Plant #4 (Lockheed, formerly General Dynamics) and a drum storage area adjacent to the west side of the golf course. One or more jet fuel releases may also have affected local groundwater.

LOCATIONS OF CHEMICALS/WASTES: extent of plume(s) not yet delineated

ESTIMATED VOLUMES(S) OF CHEMICAL/WASTES: volume(s) of chemicals unknown

Site currently in operation yes [X] no [ ]

GEO-MARINE, INC.
SITE SAFETY PLAN

HAZARD EVALUATION

List hazard by task (i.e. drilling, sampling, etc.); number tasks; assign physical and chemical hazard(s) and evaluation (s):

NO.	TASK	CHEMICAL HAZARD/ EVALUATION	PHYSICAL HAZARD/ EVALUATION
1	air monitoring	fumes/slight	none/none
2	"punching" holes	fumes/slight	heavy equipment usage/slight
3	drilling holes	fumes/slight	heavy equipment usage/slight
4	collecting samples	splashing/slight	none/none
5	well development	splashing/slight	minor/slight
6	equipment decon	splashing/slight	steam burn/slight
7	sample analyses	splashing/slight	none/none
8	drum contents sampling	splashing/slight	drum moving/slight to none

Completed Hazard Evaluation forms attached for each major known contaminant?

yes [X] no [ ]

If not, why?

HAZARD CONTROL

Task-associated chemical hazards on the site include fumes and possible splashing by contaminated water. The possibility of either occurring is considered slight. Splashing can be prevented or mitigated by watchfulness, care, and the appropriate use of PPE. Fume accumulation is unlikely in the open air setting of the sampling locations; however, the consistent and regular use of an air monitor will detect any above-background levels of organic vapors so that chemical respirators can be put on and/or the site evacuated if needed.

Task-associated physical hazards on the site include injury from heavy equipment, back injury from improper lifting, and season-related heat stress. All are considered preventable. Potential

for injury from heavy equipment can be minimized by attentiveness to proper procedures. Injury from lifting or carrying can be minimized by sensible practices (including wearing a safety belt) and the appropriate use of transporting equipment such as a dolly for drums and drill stem. To minimize the possibility of heat stress, the Site Safety Officer will monitor temperature and heat index. Fluids will be available on site at all times and rest breaks will be taken as deemed appropriate by the Site Safety Officer.

GEO-MARINE, INC.
SITE SAFETY PLAN

SITE SAFETY WORK PLAN

SITE CONTROL: site maps are attached

perimeter identified [X]	work area(s) identified [X] (by sample points pending utility clearance)
contaminated area(s) [ ] (not yet delineated)	decontamination station(s) [ ] (will be located near site)

ANTICIPATED LEVEL OF PROTECTION TO BE USED:
(cross-reference with task numbers from Hazard Evaluation section):

Task No.	Anticipated Protection Level*
1	level D
2	level D
3	level D
4	level D
5	level D
6	level D
7	level D
8	level D

* with capability to go immediately to level C if conditions (as described on the following page) warrant

NOTES:

1.) Anticipated amounts and contamination levels of hazardous materials will not require the specific designation of site control zones.

2.) All sampling procedures will be performed outdoors in an open air setting on level ground. Confined space and/or below ground situations will not be encountered.

GEO-MARINE, INC.
SITE SAFETY PLAN

SITE SAFETY WORK PLAN (cont.)

ACTION LEVELS FOR

(I.) UPGRADE TO LEVEL C PPE, INCLUDING USE OF CHEMICAL RESPIRATOR:
(II.) EVACUATION OF WORK ZONE FOR REASSESSMENT OF CONDITIONS:

I. If field team members are operating in level D PPE and organic vapors are 5 ppm or more above local background, they will either upgrade to level C PPE, including APRs with chemical cartridges, or evacuate the site at the discretion of the Site Safety Officer.

II. If field team members are operating in either level D or level C PPE and organic vapors exceed 1,000 ppm above local background, they will immediately evacuate the site following instructions from the Site Safety Officer.

Air monitoring to determine background levels and to check for the below listed organic vapor action levels and explosive limits will be performed at each sample location using an HNu and an explosimeter. Both machines will be calibrated daily using accepted calibration procedures and checked frequently during the day.

Samples of the two air monitoring forms are attached; complete monitoring records will be maintained on site throughout the project.

The HNu does not identify compounds; therefore, it will be assumed that readings above local background result from contaminant vapors. The numbers used below represent the worst case scenario, i.e., they are consistent with guidelines for benzene and vinyl chloride, the two most hazardous substance which might be encountered during this project.

Level D: O_2 < 19.5% or > 25%
explosive atmosphere 10% to 25% LEL
organic vapors 0 to 1 ppm
particulates > __ mg/m NOT APPLICABLE
other _____

Level C: O_2 < 19.5% or > 25%
explosive atmosphere > 25% LEL
unknown organic vapor 1 to 5 ppm
particulates > __ mg/m NOT APPLICABLE
other _____

GEO-MARINE, INC.
SITE SAFETY PLAN

SITE SAFETY WORK PLAN (cont.)

DECONTAMINATION SOLUTIONS & PROCEDURES:

All cone-penetrometer, drilling, and sampling equipment will be decontaminated between sample locations at a decon station picked by the client. Large equipment will be steam-cleaned with hot water and non-phosphate, non-volatile cleaner. Hand-sampling equipment will be decontaminated by hand, using the same cleaner. All equipment will be rinsed thoroughly, and the samplers will have distilled water final rinse.

PERSONNEL DECON PROTOCOL:

All disposable PPE will be decontaminated and disposed of as "clean trash". Goggles, outer gloves, and APR (if needed) will be cleaned with appropriate cleaners/sanitizers for reuse.

WORK LIMITATIONS (TIME OF DAY, WEATHER, ETC.):

Work limitations include: weekdays 8 A.M. to 5 P.M. (set by client), electrical storms (requiring shut-down), and heat stress. To reduce incidence of heat stress induced by temperature, frequent breaks will be taken and adequate fluids will be available at all atimes for consumption.

DISPOSAL OF INVESTIGATION-DERIVED MATERIALS (DECON WASTE, CUTTINGS, ETC.):

All investigation-derived waste materials, including but not limited to: (1) sampled water not retained for analyses, (2) drill cuttings, (3) groundwater encountered during drilling, and (4) decon waste water, will be contained on site in a client-designated location in sealed 55-gallon drums, until analytic results indicate proper mode and location of treatment and/or disposal.

SAMPLE HANDLING PROCEDURES (INCLUDING PPE):

Samples will be collected, handled, and analyzed by personnel wearing protective coveralls and latex surgical gloves if appropriate. Samples will be handled with care, kept on ice, and analyses will be conducted in a timely fashion.

GEO-MARINE, INC.
SITE SAFETY PLAN

EMERGENCY INFORMATION

LOCAL RESOURCES
PHONE NUMBERS/NAMES OF INDIVIDUALS/ADDRESSES AS APPLICABLE:

Ambulance: 911

Hospital Emergency Room: 882-3333
(map with route to hospital is attached)

Poison Control Center: 1-800-441-0040

Police (local, county, state): 911 (emergency) 335-4222 (non-emergency)

Fire Department: 911 (emergency) 332-2131 (non-emergency)

Airport: Meacham Airport 624-1127

Regulatory Agency Contact (EPA, TNRCC, etc.): EPA 214-655-6444 TNRCC (district) 214-298-6171

QA/QC Laboratory: US Army Corps of Engineers Southwestern Division Laboratory, 4815 Cass St., Dallas, TX 75235-8011 CONTACT: Steven Brooks at 214-905-9130

Client Contact: Randy Niebuhr (817) 334-3223

SITE RESOURCES
PHONE NUMBERS/NAMES OF INDIVIDUALS/ADDRESSES AS APPLICABLE

Site Contact: (817) 782-5000 (Carswell switchboard), Law Enforcement 782-5200

Site Emergency Contact: Bobby Hernandez (Base Conversion Agency) 731-8973,

Water Supply Source: available on site

Local Telephone Number (Base Utilites, etc.)/Location: Alan Flolo/Air Force Base Conversion Agency (817) 731-8973, ext. 18

GEO-MARINE INC.
HAZARDOUS COMMUNICATION PROGRAM

PROJECT NAME: Phase II - Groundwater Sampling, Carswell Air Force Base

PROJECT LOCATION: Carswell Air Force Base, Fort Worth, Texas

PROJECT NUMBER: 1161-052

DATE(S): February 2, 1994

This written hazardous communication program follows the requirements specified in 29 CFR 1910.1200 (OSHA) and includes the following components:

I. proper labelling of all containers of hazardous chemicals which includes accurate identification of contents, appropriate hazard warnings, and complete name and address of manufacturer

II. complete and readily available list of all chemicals present on site

III. readily available material safety data sheets (MSDS) for all chemicals either used or produced at the site

IV. employee training which includes:

detection methods for hazardous chemicals

monitoring methods for hazardous chemicals

emergency procedures in the event of a release

safe work habits

types of personal protective equipment (PPE) and the appropriate usage of PPE

I. Are all containers of hazardous chemicals on site properly labelled?
yes no not applicable/reason

II. Is there a complete list of all hazardous chemicals on site readily available?
yes no not applicable/reason

III. Are there MSDS sheets readily available for all hazardous chemicals used or produced on site?
(yes) no not applicable/reason

IV. Employee Training:

OSHA 40 Hour Training?
(yes) no not applicable/reason

Other training? (specify)

What hazardous chemical detection method(s) are used on site?
Mobile lab will analyze all samples for halogenated hydrocarbons and for petroleum hydrocarbons using method 8021

What hazardous chemical monitoring method(s) are used on site?
HNu will be used for monitoring air space at each sample location
Explosimeter will be used to check for explosive atmosphere at each drilling site

What emergency procedures are in place in the event of a release?
Emergency Phone Numbers:

fire: 911 police: 911 ambulance: 911

Route to nearest hospital (map is attached):
Roaring Spring Rd. southeast from base to I-30. East on I-30 to Summit exit. South on Summit to Pennsylvania. East one block to Harris Methodist Hospital at 1301 Pennsylvania Ave.

What level of PPE is used at the site? (include specifics of clothing and equipment):

Level D with hardhats, steel-toes boots, safety goggles, and latex gloves.
Rubber boots, rain suits, and impervious coveralls will be available.
APR with organic vapor cartridges will be available in case action level exceeded.

Printed name of person completing form: Tony C. Mills Title: Geologist

Signature: Tony C. Mills

ATTACHMENTS

Site Safety Review Form
GMI Employee OSHA Certifications
Hazard Evaluation Forms
Site Maps
Air Monitoring Forms
Route Map to Hospital
Equipment List

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Trichloroethene** DOT Name/UN Number: **UN1710** CAS Number: **79-01-6**

References Consulted: (circle):

NIOSH/OSHA Pocket Guide Verschueren **Merck** Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other_____

Chemical Properties:

Chemical Formula: **$CHCl=CCl_2$** Odor Characteristic: **chloroform-like** LEL: **8%** UEL: **10.5%**

Molecular Weight: **131.4** Physical State: **liquid** Solubility (Water): **non-soluble (0.1% @ 77°F.)** Boiling Point: **189°F.**

Flash Point: **90°F.** Freezing Point: **-99°F.** Specific Gravity: **1.46** Vapor Pressure/Density: **58 mm.**

Incompatibilities: **strong caustics, chemically active metals, e.g. Na, Be, Li, Mg, Ti, & Ba**

Biological Properties

TLV-TWA: **25 ppm (NIOSH)** PEL: **50 ppm** STEL: **200 ppm** Odor/Odor Threshold:

IDLH: Human: **1000 ppm** Aquatic: Rat/Mouse: **LD_{50} = 4.92 ml/kg**
LC = 8000 ppm

Route(s) of Exposure: **inhalation, ingestion, skin/eye contact**

Carcinogen: **suspected** Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
use goggles and impervious clothing if possibility of splashing
use respirators if strong fumes identified

Monitoring Recommendations: **area air monitoring with OVA, HNu: IP = 9.45 eV**

Disposal/Waste Treatment:
Allow area of spill or leak to ventilate and remove ignition sources. Follow EPA, DOT, State and Local disposal regulations.

Health Hazard & First Aid: **irrigate eyes immediately if splashed; seek immediate medical attention if ingested; wash skin with sap if splashed; remove to fresh air and administer resuscitation if necessary if overcome with fumes.**

Symptoms: Acute: **vertigo, nausea, eye/skin irritation, cardiac arrhythmia**
Chronic: **target organs include respiratory system, heart, liver, kidneys, skin**

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Vinyl Chloride** DOT Name/UN Number: **Vinyl Chloride/UN1086** CAS Number: **75-01-4**

References Consulted: (circle):

(NIOSH/OSHA Pocket Guide) Verschueren (Merck) Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other **29 CFR 1910.1017**

Chemical Properties:

Chemical Formula: $CH_2=CHCl$ Odor Characteristic: **pleasant at high conc.** Flammable Limits:

Molecular Weight: **62.5** Physical State: **Gas/Liquid** Solubility (Water): **0.01%** Boiling Point: **7° F**

Flash Point: **-112°F** Freezing Point: **-256°F** Specific Gravity: **0.9** Vapor Pressure/Density: **> 1 atm.**

Incompatibilities: **Copper, oxidizers, aluminum, peroxides, iron, steel** LEL: **3.6%** UEL: **33%**

Biological Properties:

TLV-TWA: **0.5 ppm** PEL: **1 ppm** STEL: **5 ppm** Odor/Odor Threshold:

IDLH: Human: **Carcinogen** Aquatic: Rat/Mouse:

Route(s) of Exposure: **Inhalation.**

Carcinogen: **confirmed in humans** Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
At 2 ppm above background use APR with OV cartridges; above 10 ppm use gas mask APR or full face powered APR; above 25 ppm use supplied air respirator; above 100 ppm use SCBA. Remove or control ignition sources. Keep fire extinguisher available. Keep containers in a well ventilated area.

Monitoring Recommendations: **HNu, GC/FID, OVA, Drager tube for Vinyl Chloride** IP = **9.99 eV**

Disposal/Waste Treatment:
Allow ventilation in area of leak and remove ignition sources. Follow EPA, DOT, State and Local disposal regulations.

Health Hazard & First Aid:
Flammable Gas. If inhaled, give respiratory support. Skin contact can result in frostbite. Get medical attention immediately. Narcotic in high concentrations.

Symptoms: Acute: **Weakness; abdominal pain**
Chronic: **GI bleeding; heptomegaly; pallor or cyan of extremities**

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Benzene** DOT Name/UN Number: **Benzene/UN1114** CAS Number: **71-43-2**

References Consulted: (circle):

NIOSH/OSHA Pocket Guide Verschueren Merck Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other **29 CFR 1910.1028**

Chemical Properties:

Chemical Formula: C_6H_6 Odor Characteristic: **pleasant, sweet, aromatic** LEL: **1.3%** UEL: **7.9%**

Molecular Weight: **78** Physical State: **Liquid** Solubility (Water): **0.07%** Boiling Point: **176°F**

Flash Point: **12°F** Freezing Point: **42°F** Specific Gravity: **0.879** Vapor Pressure/Density: **75 mm Hg/2.7**

Incompatibilities: **Strong oxidizers, many fluorides & perchlorates, nitric acid**

Biological Properties:

TLV-TWA: **0.5 ppm** PEL: **1 ppm** STEL: **5 ppm** Odor/Odor Threshold:

IDLH: Human: **2000 ppm** Aquatic: Rat/Mouse: **LD_{50} orally = 3.8 ml/kg**

Route(s) of Exposure: **Inhalation, ingestion, dermal contact, eye contact.**

Carcinogen: **suspected in humans** Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
At 2 ppm above background to 10 ppm, use half mask with OV cartridges; above 10 ppm use full-face APR. Above 50 ppm use PAPR (powered APR); above 100 ppm use supplied air positive pressure air respirator; above 1000 ppm use SCBA. Remove or control ignition sources. Keep fire extinguisher available. Keep containers in a well ventilated area.

Monitoring Recommendations: **HNu, GC/FID, OVA, Drager tube for Benzene** IP = **9.24 eV**

Disposal/Waste Treatment: **Keep area ventilated near spill or leak, and remove ignition sources. Follow EPA, DOT, State and Local disposal regulations.**

Health Hazard & First Aid:
Highly Flammable Liquid. Immediately wash with water if eye contact. Use soap and water when skin contact has occurred. If inhaled, move person to fresh air. Use mouth to mouth resuscitation if person has stopped breathing. Get medical attention immediately if swallowed; do not induce vomiting.

Symptoms: Acute: **Due to ingestion and inhalation: dizziness, staggering gait, nausea, headaches, restlessness, convulsions, euphoria, pulmonary edema.**
Chronic: **Fatigue, nervousness, red skin, leukemia, bone marrow depression.**

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Toluene** DOT Name/UN Number: **Toluene/UN1294** CAS Number: **108-88-3**

References Consulted: (circle):

NIOSH/OSHA Pocket Guide Verschueren Merck Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other _____

Chemical Properties:

Chemical Formula: $C_6H_5CH_3$ Odor Characteristic: **pungent, sweet, aromatic** Flammable Limits:

Molecular Weight: **92.1** Physical State: **Liquid** Solubility (Water): **0.05%** Boiling Point: **232°F**

Flash Point: **40°F** Freezing Point: **-139°F** Specific Gravity: **0.87** Vapor Pressure/Density: **20 mm Hg**

Incompatibilities: **Strong oxidizers** LEL: **1.2%** UEL: **7.1%**

Biological Properties:

TLV-TWA: **100 ppm** PEL: **100 ppm** Ceiling: **150 ppm (REL)** Odor/Odor Threshold:

IDLH: Human: **2000 ppm** Aquatic: Rat/Mouse: **LD_{50} orally = 7.53 g/kg**

Route(s) of Exposure: **Inhalation, ingestion, dermal contact, eye contact.**

Carcinogen: Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
Use APR with chemical cartridges above 1000 ppm (Level C). Above 2000 ppm use SCBA or evacuate site.

Monitoring Recommendations:
HNu, GC/FID, OVA, Drager tube for Toluene
IP: 8.82 eV

Disposal/Waste Treatment:
Ventilate spill or leak and remove ignition sources. Follow EPA, DOT, State and Local disposal regulations.

Health Hazard & First Aid:
Flammable Liquid. Immediately wash with water if eye contact. Use soap and water when skin contact has occurred. If inhaled, move person to fresh air. Use mouth to mouth resuscitation if person has stopped breathing. Get medical attention immediately if swallowed; do not induce vomiting.

Symptoms:		
	Acute:	**Fatigue, weakness, confusion, euphoria, dizziness, headaches, dilated pupils, insomnia, nervousness**
	Chronic:	**Paresthesia, dermatitis, kidney or liver damage, anemia, bone marrow depression.**

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Ethylbenzene** DOT Name/UN Number: **Ethylbenzene/UN1175** CAS Number: **100-41-4**

References Consulted: (circle):

(NIOSH/OSHA Pocket Guide) Verschueren (Merck) Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other **Firefighter's Hazardous Materials Reference Book**

Chemical Properties:

Chemical Formula: $C_2H_5C_6H_5$ Odor Characteristic: **aromatic** Flammable Limits:

Molecular Weight: **106.2** Physical State: **Liquid** Solubility (Water): **0.01%** Boiling Point: **277°F**

Flash Point: **55° - 64°F** Freezing Point: **-139°F** Specific Gravity: **0.87** Vapor Pressure/Density: **10 mm @ 79°F**

Incompatibilities: **Strong oxidizers** LEL: **1.0%** UEL: **6.7%**

Biological Properties:

TLV-TWA: **100 ppm** PEL: **100 ppm** STEL: **125 ppm** Odor/Odor Threshold:

IDLH: Human: **2000 ppm** Aquatic: Rat/Mouse: **LD_{50} orally = 5.46 g/kg**

Route(s) of Exposure: **Inhalation, ingestion, dermal contact, eye contact.**

Carcinogen: Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
Use APR with chemical cartridges above 1000 ppm (Level C). Above 2000 ppm use SCBA or evacuate site. Remove or control ignition sources. Keep fire extinguisher available. Keep containers in a well ventilated area.

Monitoring Recommendations: **HNu, GC/FID, OVA, Drager tube for Ethylbenzene**
IP = 8.76 eV

Disposal/Waste Treatment:
Ventilate spill or leak and remove ignition sources. Follow EPA, DOT, State and Local disposal regulations.

Health Hazard & First Aid:
Flammable Liquid. Immediately wash with water if eye contact. Use soap and water when skin contact has occurred. If inhaled, move victim to fresh air. Use CPR if person has stopped breathing. If breathing is difficult administer oxygen. Get medical attention immediately if swallowed; do not induce vomiting.

Symptoms: Acute: **Irritation of skin, eyes, nose, mucous membranes, and in high concentraions, narcotic.**
Chronic: **Skin contact may cause erythema and skin inflammation.**

GEO-MARINE INC.

HAZARD EVALUATION OF CHEMICALS

Project Number/Name: **1161-052/Groundwater Survey at USAF Plant #4, Fort Worth, Texas**

Chemical Name: **Xylene** DOT Name/UN Number: **Xylene/UN1307** CAS Number: **1330-20-7**

References Consulted: (circle):

(NIOSH/OSHA Pocket Guide) Verschueren (Merck) Hazardline Chris ACGIH

Toxic & Hazardous Safety Manual Other **Firefighter's Hazardous Materials Reference Book**

Chemical Properties:

Chemical Formula: $C_6H_4(CH_3)_2$ Odor Characteristic: **sweet, aromatic** Flammable Limits:

Molecular Weight: **106.2** Physical State: **Liquid** Solubility (Water): **insoluble** Boiling Point: **269° - 292°F**

Flash Point: **63° to 90°F** Freezing Point: **-54° to 56°F** Specific Gravity: **0.87** Vapor Pressure/Density: **9 mm**

Incompatibilities: **Strong oxidizers, hypochlorite bleaches** LEL: **1.1%** UEL: **7.0%**

Biological Properties:

TLV-TWA: **100 ppm** PEL: **100 ppm** STEL: **150 ppm** Odor/Odor Threshold:

IDLH: Human: **1000 ppm** Aquatic: Rat/Mouse: **LD_{50} orally = 7.71 ml/kg**

Route(s) of Exposure: **Inhalation, ingestion, dermal contact, eye contact, skin absorption.**

Carcinogen: Teratogen: Mutagen:

Handling Recommendations (including personal protective clothing, equipment, & measures):
Use APR with chemical cartridges above 1000 ppm (Level C). Above 2000 ppm use SCBA or evacuate site. Remove or control ignition sources. Keep fire extinguisher available. Keep containers in a well ventilated area.

Monitoring Recommendations: **HNu, GC/FID, OVA, Drager tube for Xylene** IP = **8.44 to 8.56 eV**

Disposal/Waste Treatment:
Ventilate spill or leak and remove ignition sources. Incinerate in an absorbed sand. Follow EPA, DOT, State and Local disposal regulations.

Health Hazard & First Aid:
Flammable Liquid. Immediately wash with water if eye contact. Use soap and water when skin contact has occurred. If inhaled, move victim to fresh air. Use CPR if person has stopped breathing. If breathing is difficult administer oxygen. Get medical attention immediately if swallowed; do not induce vomiting.

Symptoms: Acute: **Irritation of skin, eyes, nose, mucous membranes, and in high concentraions, narcotic; nausea, vomiting, loss of conciousness**
Chronic: **Skin rash, possible liver/kidney damage**

Economic Environmental Services, Inc.

Certificate of Completion

This is to certify that

Lyle C. Winnette

461-94-3130

has successfully completed an

8 Hr. Training Course in

29 CFR Part 1910.120(e)(8) and DOT HM-126F

Hazardous Operations and Emergency Response

on this 1st day of February, 1994.

Thomas D. Bentley-Smith

Trainer

No. 941171

Economic Environmental Services, Inc.

Certificate of Completion

This is to certify that

L. Louise Delano

006-48-1402

has successfully completed an

8 Hr. Training Course in

29 CFR Part 1910.120(e)(8) and DOT HM-126F

Hazardous Operations and Emergency Response

on this 1st day of February, 1994.

Trainer

No. 941167

Economic Environmental Services, Inc.

Certificate of Completion

This is to certify that

Louise L. Delano

006-48-1402

has successfully completed an

8 Hr. Managers/Supervisors Training Course in

29 CFR Part 1910.120 and DOT HM-126F

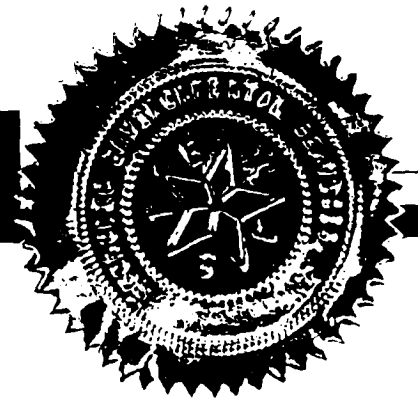
Hazardous Waste Operations and Emergency Response

on this 26th day of March, 1993.

Thomas H. Bentley-Smith

Trainer

No. 930952



212103

2828 W. Parker Rd., Suite 103 - B
Plano, Texas 75075
Telephone (214) 612-0220

RUSSELL R. SMITH, M.D.

Diplomate, American Board of Family Practice

September 3, 1993

Mr. Lyle Winnette
HAZMAT Department
Geo-Marine
550 E. 15th Street
Plano, TX 75074

RE: Louise Delano

Dear Lyle:

I saw your employee, Louise Delano in my office on August 20, 1993. She presented for a complete physical examination including chest x-ray, pulmonary function tests and audiometric testing to meet the OSHA requirements for her position.

My impression, based on her history and physical exam, is that Louise is qualified to wear a respirator and work in the field per the requirements of her job.

Please don't hesitate to call me if you have questions.

Sincerely,

Russell R. Smith, M.D.

RRS/ac

Mayhew Environmental Training Associates

Certificate Number
7ME070293002HM
Soc. Sec. #530-48-1550

Accreditation Expires
07/02/94

This is to certify that

Hubert S. Thompson Jr.

has successfully completed
8 hours of annual recertification training in

Hazardous Waste Operations & Emergency Response

in accordance with OSHA 29 CFR 1910.120
July 2, 1993 in Dallas, Texas
and passed the associated examination.

Conducted By:

META

P.O. Box 786 Lawrence, Kansas 66044
1-800-444-6382
For further information contact: Patsy Kemp, Registrar

T. Bradford Mayhew, President

RUSSELL R. SMITH, M.D.
Diplomate, American Board of Family Practice

2828 W. Parker Rd., Suite 103 - B
Plano, Texas 75075
Telephone (214) 612-0220

June 24, 1993

COPY

Mr. Lyle Winnette
HAZMAT Department
Geo-Marine
550 E. 15th Street
Plano, TX 75074

RE: HUBERT THOMPSON

Dear Lyle:

I saw your employee, Hubert Thompson in my office on June 7, 1993. He presented for a complete physical examination including chest x-ray, pulmonary function tests and audiometric testing to meet the OSHA requirements for his position.

My impression, based on his history and physical exam, is that Hubert is qualified to wear a respirator and work in the field per the requirements of his job.

Please don't hesitate to call me if you have questions.

Sincerely,

Russell R. Smith, M.D.

RRS/ac

TEXAS NATURAL RESOURCE
CONSERVATION COMMISSION

P.O. BOX 13087 AUSTIN, TEXAS 78711-3087
512-371-6296

THIS CERTIFIES THAT

HUBERT SHARP JR THOMPSON

whose signature appears below and was found to be acceptable by the Texas Natural Resource Conservation Commission is entitled to practice in Texas as indicated.

Certificate Number	Expiration Date
2413W	AUG 31, 1994

Signature of Licensee

Chairman

GEO MARINE
HUBERT SHARP JR THOMPSON
550 E 15TH
PLANO, TX 75074

01/11

PLEASE KEEP THE TEXAS NATURAL RESOURCE CONSERVATION COMMISSION ADVISED OF ADDRESS CHANGES: HOME AND BUSINESS

LPS Form W-20 (Rev. 05/2/93)

75074-5766 96

21[illegible]1[illegible]6

Economic Environmental Services, Inc.

Certificate of Completion

This is to certify that

Lambert Lewis

455-70-4020

has successfully completed an

8 Hr. Training Course in

29 CFR Part 1910.120(e)(8) and DOT HM-126F

Hazardous Operations and Emergency Response

on this 1st day of February, 1994.

Thomas H Bentley-Smith

Trainer

No. 941168

2828 W. Parker Rd., Suite 103 - B
Plano, Texas 75075
Telephone (214) 612-0220

RUSSELL R. SMITH, M.D.

Diplomate, American Board of Family Practice

April 19, 1993

Mr. Lyle Winnette
HAZMAT Department
Geo-Marine
550 E. 15th Street
Plano, TX 75074

RE: LAMBERT LEWIS

Dear Lyle:

I saw your employee, Lambert Lewis in my office on April 2, 1993. He presented for a complete physical examination including chest x-ray, pulmonary function tests and audiometric testing to meet the OSHA requirements for his position.

My impression, based on his history and physical exam, is that Lambert is qualified to wear a respirator and work in the field per the requirements of his job.

Please don't hesitate to call me if you have questions.

Sincerely,

Russell R. Smith, M.D.

RRS/ac

Economic Environmental Services, Inc.

Certificate of Completion

This is to certify that

Tony C. Mills

446-62-1135

has successfully completed an

8 Hr. Training Course in

29 CFR Part 1910.120(e)(8) and DOT HM-126F

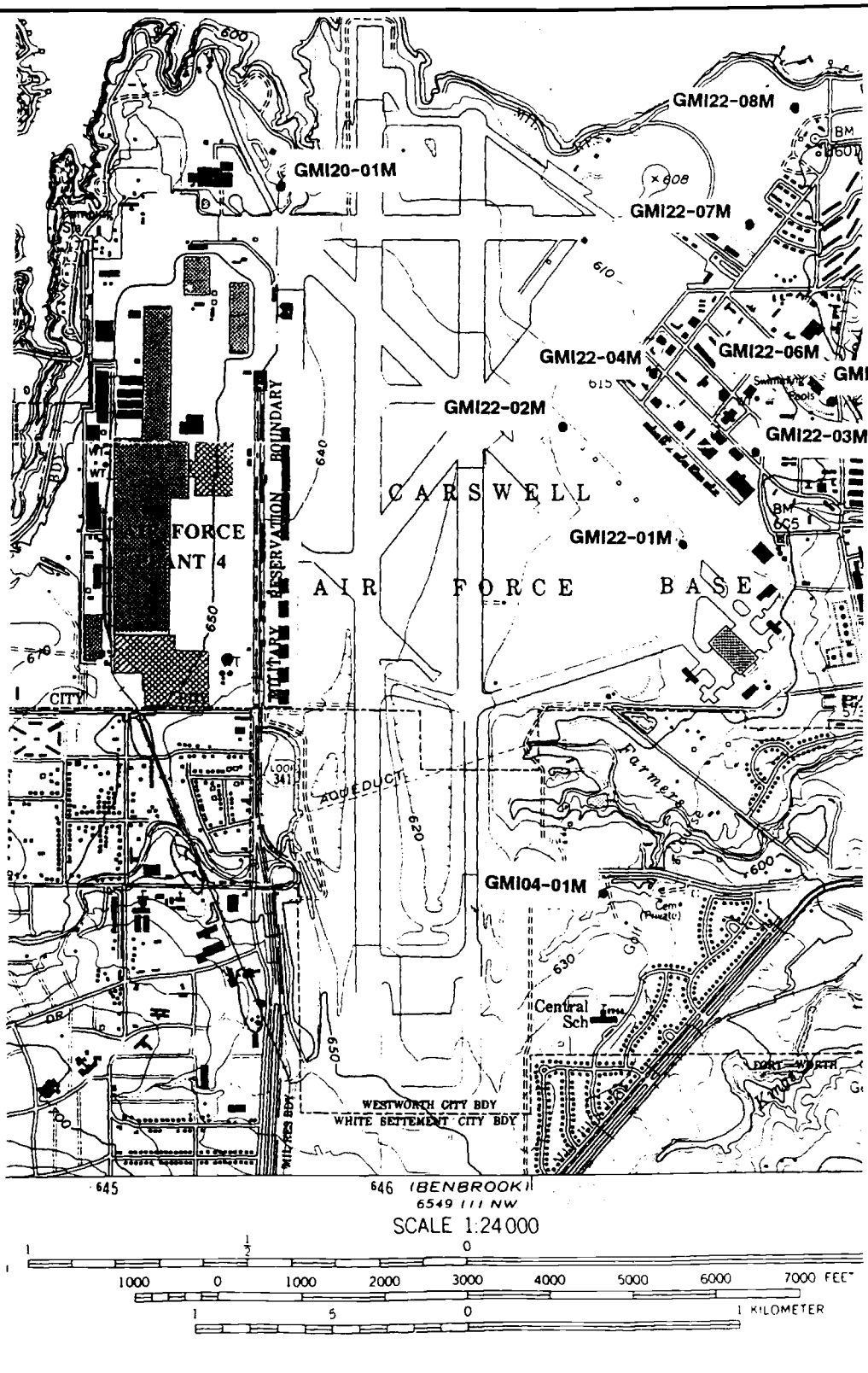
Hazardous Operations and Emergency Response

on this 1st day of February, 1994.

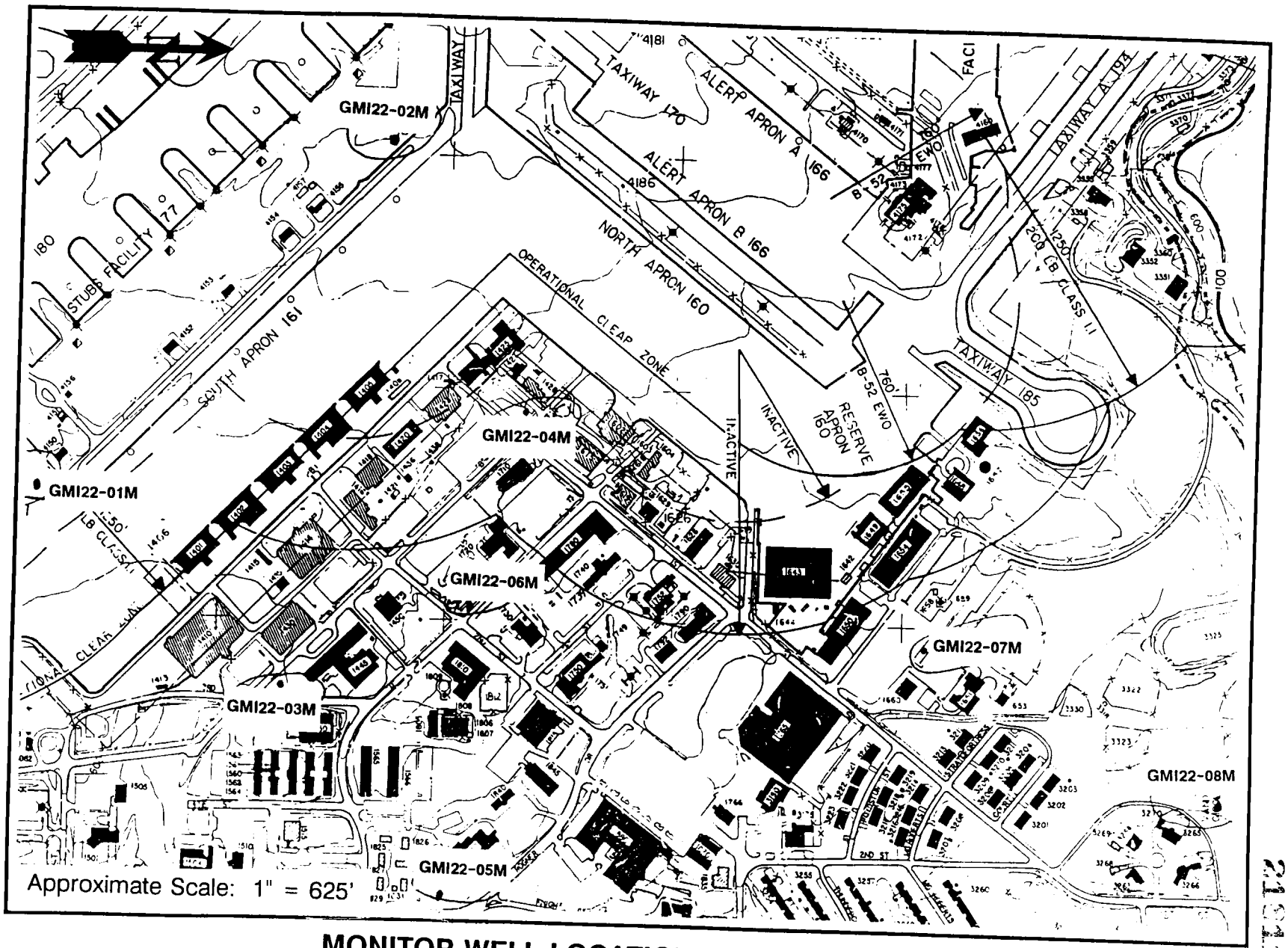
Trainer

No. 941172

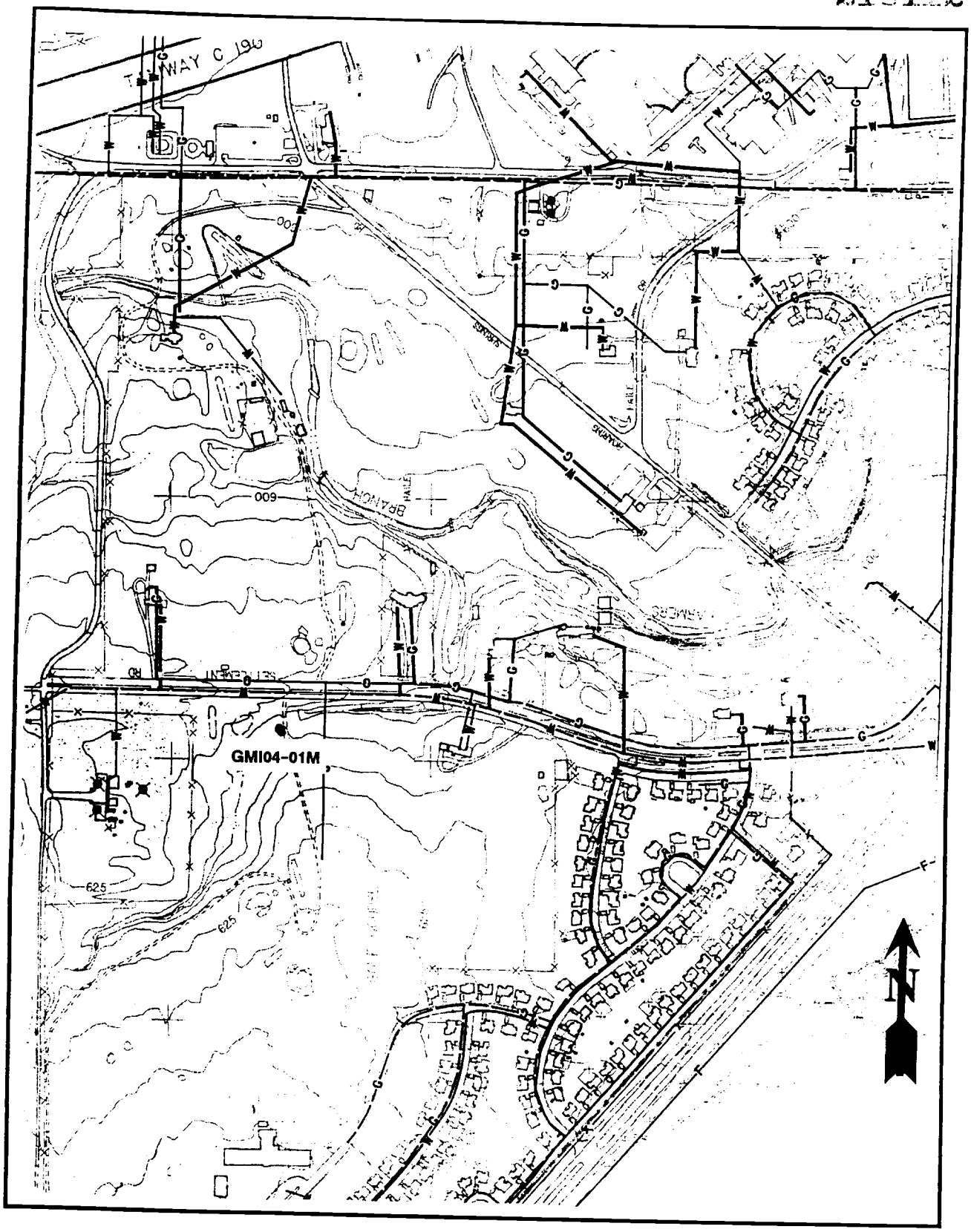
213109



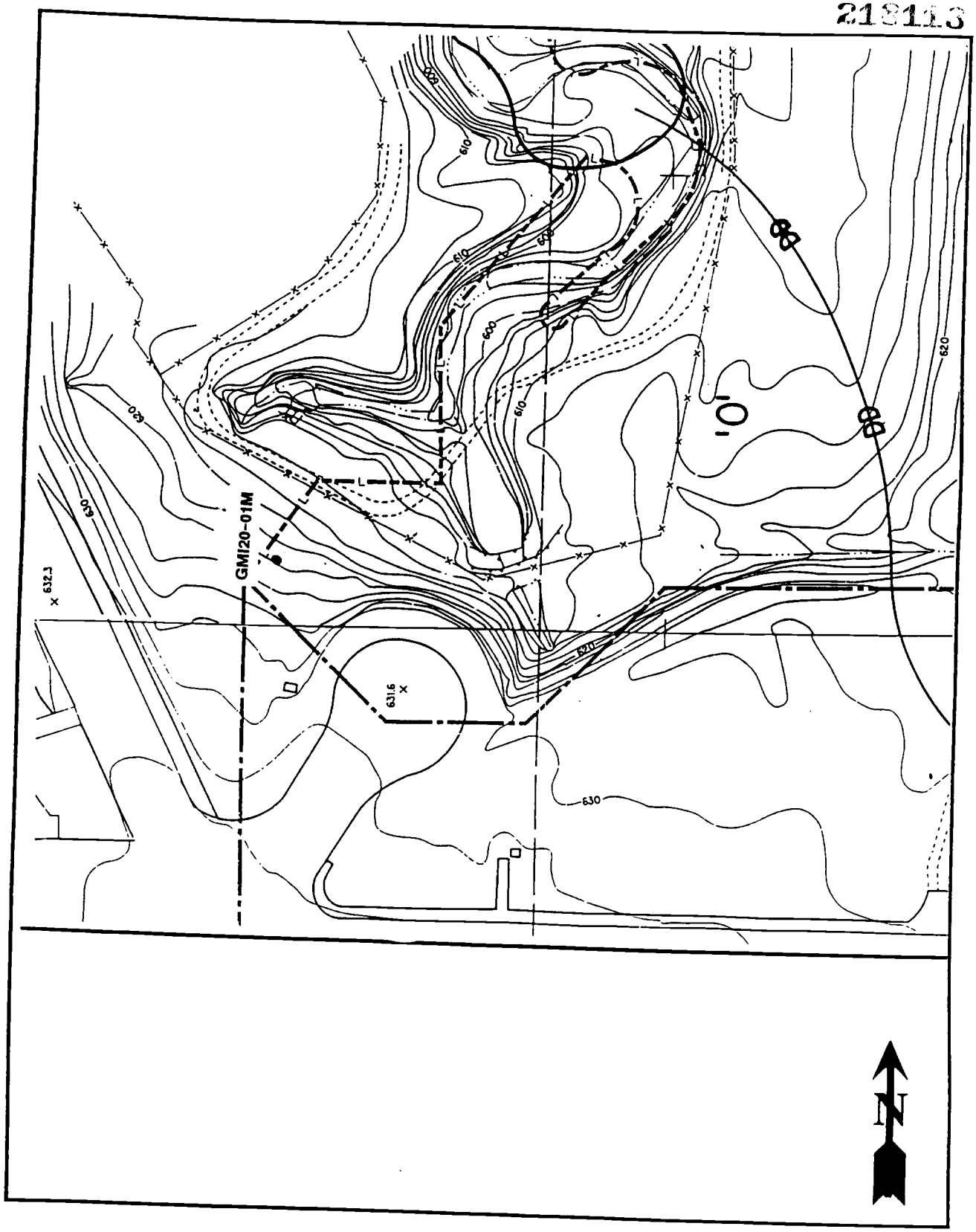
PROPOSED USGS MONITOR WELL LOCATIONS



MONITOR WELL LOCATIONS AT NORTH SITE



MONITOR WELL LOCATION
AT SITE LF04



**MONITOR WELL LOCATION
AT NORTHWEST SITE**

GEO-MARINE, INC.

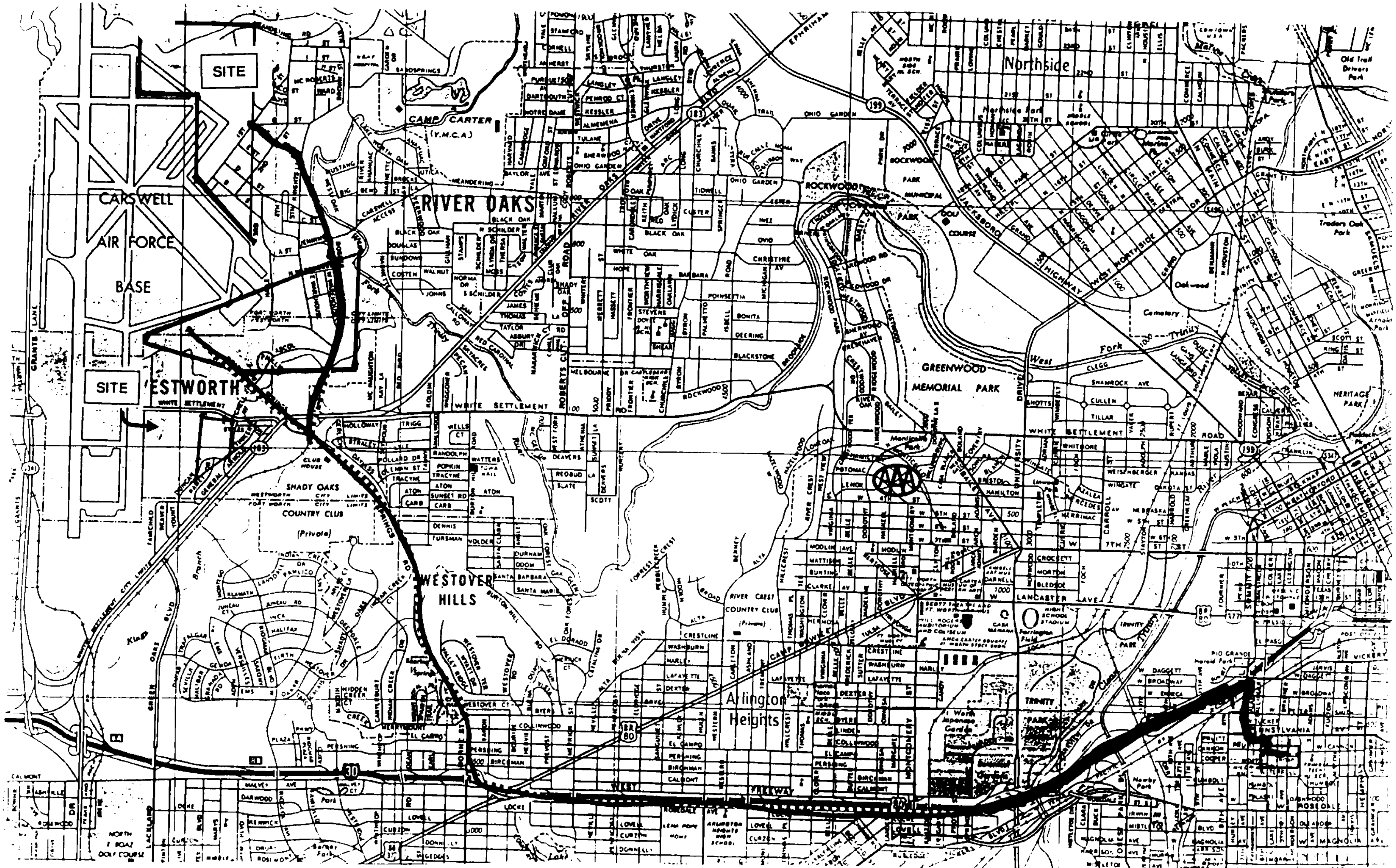
AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS



ROUTE TO HARRIS HOSPITAL

GEO-MARINE, INC.
SITE SAFETY PLAN
EQUIPMENT LIST

PPE

Level A

Item	No(s).
SCBA	
spare air tanks	
encapsulating suit (type _____)	
surgical gloves	
gloves (type _____)	
outer work gloves	
neoprene safety boots	
steel-toed boots	
booties	
hard hat	
5-minute escape cooling vest	

Level C

Item	No(s).
respirator (type _____)	
cartridge (type _____)	
5-minute escape mask	
protective coveralls (type _____)	
rain suit available	
butyl apron	
surgical gloves	
gloves (type _____)	
outer work gloves	
neoprene safety boots	
steel-toed boots	
booties	
hard hat with face shield	

Level B

Item	No(s).
SCBA	
spare air tanks	
protective coverall (type _____)	
rain suit	
butyl apron	
surgical gloves	
gloves (type _____)	
outer work gloves	
neoprene safety boots	
steel-toed boots	
booties	
hard hat with face shield	

Level D

Item	No(s).
respirator available (type half n full face)	✓
cartridges available (type _____)	✓
5-minute escape mask available	
protective coverall (type _____)	
splash apron	
rain suit available	✓
neoprene safety boots	
steel-toed boots	✓
booties	
work gloves	✓
surgical gloves	✓
hardhat	✓
safety glasses or goggles	✓

EQUIPMENT LIST (cont.)

GENERAL INSTRUMENTS	No(s).
OVA (model no. _____)	
HNu (model no. _____)	✓
O^2 explosimeter with calibration kit	
magnetometer (model no. _____)	
pipe locator	
Draeger tubes (type _____)	
heat stress monitor	
noise equipment (type ear plugs)	✓
monitox cyanide	
personal sampling pumps	
conductivity meter	
pH meter	
metal detector	

RADIATION	No(s).
Geiger counter	
ion chamber	
alert dosimeter	
pocket dosimeter	
portable ratemeter	
scaler/ratemeter (type _____)	
micro meter	

FIRST AID	No(s).
first aid kit	✓
oxygen administrator	
stretcher	
portable eye wash	
blood pressure monitor	
thermometer	
blanket	

EQUIPMENT LIST (cont.)

VEHICLE No(s).

vehicle (description & license number_____)
gas ( )
oil ( )
antifreeze ( )
battery water level ( )
windshield washing fluid ( )
tire pressure ( )
tire pressure - spare(s) ( )
other _____ ( )
vehicle insurance proof ( )
vehicle registration current ( )
vehicle inspection current ( )
tool kit ✓
hydraulic jack ✓
spare tire(s) ✓
lug wrench ✓
tow chain ✓
fire extinguisher (date tested/filled _____) ✓
generator ✓
steam cleaner ✓

DECON No(s).

wash tubs ✓
buckets ✓
scrub brushes ✓
pressurized sprayer ✓
detergent (type Alconox) ✓
solvent (type _____)
plastic sheeting ✓
containment dams ✓
tarps and poles ✓
trash bags ✓
trash containers ✓
masking tape ✓
duct tape ✓
paper towels ✓
face mask sanitizer ✓
respirator cleaners
goggle cleaners
chairs
step ladder
distilled water ✓

EQUIPMENT LIST (cont.)

SAMPLING AND SHORT-TERM SAMPLE STORAGE No(s).

clear glass bottles
8 oz
16 oz.
32 oz.
64 oz.
amber glass bottles (1 liter)
VOA vials
acid for preservation (type: _____)
funnel
string
hand bailer
1.66 inch
2 inch
4 inch
bottle labels
water proof pen
chain-of-custody forms
sample description forms
custody seals
QA/QC seals
baggies
spoons
knives
measuring tape
filter paper
coolers
ice
personal pump sampling supplies
thieving rods with bulbs

SAMPLE SHIPMENT No(s).

heavy duty plastic coolers with labels
paint cans with lids, 7 clips each
shipping labels
DOT labels
labels **UP**
FRAGILE
HAZARDOUS
other _____
strapping tape
clear packing tape
express shipping forms
vermiculite
"bubble" wrap

EQUIPMENT LIST (cont.)

MISCELLANEOUS	No(s).
surveyor's tape	
100-foot metal tape	
flagging	✓
stakes	
surveying flags	
surveying meter stick	
compass (type _____)	✓
measuring ("wonder") wheel	✓
300 foot nylon rope	
nylon string	
camera	✓
film	✓
banner tape	
binoculars	
megaphone	
walkie-talkies	
chaining pin and ring	
bailing pump	
55-gallon storage drums	✓
drum dolly	✓
bung wrench	✓
wheel barrow	
pick	
shovel	
soil auger	
weather radio	

GEO-MARINE INC.
HAZARDOUS & TOXIC MATERIALS PLAN
SITE SAFETY REVIEW

219121

PROJECT NAME: Phase II - Groundwater Survey, Carswell AFB **PROJECT NUMBER:** 1161-052

Site Location: Carswell Air Force Base, Fort Worth, Texas

Date: 2/03/94 Time: 1430 PM Location of review: GMI22-034

GMI Representative(s): L. Deland, L. Lewis, H. Thompson, B. Moring

Client Representative(s): —

Meeting Conducted by: L. Deland

Meeting Objective(s): To answer questions & address concerns

Chemicals Anticipated: TCE and BTEX

Other Hazardous Substance(s) and/or Condition(s) Anticipated: H.S.T. raised concern that 3 unspecified SITES not cleared for communication cable, L.L.D. mentioned that work after dark should be avoided if at all possible

TOPICS DISCUSSED:

Physical Hazards ✓

Chemical Hazards _____

Radiation Hazards _____

Personal Protective Clothing/Equipment _____

Emergency Procedures _____

Specific Individual Responsibilities ✓

Decontamination Procedures _____

Special Site Considerations ✓

Checklist

Emergency information reviewed by ALL team members? ___

Route to nearest hospital known by ALL team members? ___

Site safety plan on site and readily available to ALL team members? ___

Copy(ies) of appropriate licensing/certification available? ___

Signatures of those present:

212122

GEO-MARINE INC.
HAZARDOUS & TOXIC MATERIALS PLAN
SITE SAFETY REVIEW

PROJECT NAME: Phase II - Groundwater Survey, Carswell AFB **PROJECT NUMBER:** 1161-052
Site Location: Carswell Air Force Base, Fort Worth, Texas
Date: 2-22-94 Time: 1515 Location of review: DECON AREA

GMI Representative(s): LOUISE DELAND

Client Representative(s): NONE

Meeting Conducted by: TONY MILLS

Meeting Objective(s): SITE OVERVIEW, REVIEW OF SAFETY PLAN, QUESTIONS REGARDING PPE.

Chemicals Anticipated: TCE and BTEX
Other Hazardous Substance(s) and/or Condition(s) Anticipated: LIGHTNING/THUNDERSTORMS

TOPICS DISCUSSED: ✓
Physical Hazards ✓
Chemical Hazards ✓
Radiation Hazards ✓
Personal Protective Clothing/Equipment ✓
Emergency Procedures ✓
Specific Individual Responsibilities ✓
Decontamination Procedures ✓
Special Site Considerations ✓

Checklist
Emergency information reviewed by ALL team members? ✓
Route to nearest hospital known by ALL team members? ✓
Site safety plan on site and readily available to ALL team members? ✓
Copy(ies) of appropriate licensing/certification available? ✓

Signatures of those present:

Tony C. Mills

212123

GEO-MARINE INC.
HAZARDOUS & TOXIC MATERIALS PLAN
SITE SAFETY REVIEW

PROJECT NAME: Phase II - Groundwater Survey, Carswell AFB **PROJECT NUMBER:** 1161-052
Site Location: Carswell Air Force Base, Fort Worth, Texas
Date: 2-23-94 Time: 1255 Location of review: LUNCH - OFFSITE

GMI Representative(s): LOUISE DELANO

Client Representative(s): NONE

Meeting Conducted by: TONY MILLS

Meeting Objective(s): DISCUSS POTENTIAL HAZARDS FOR THE DAY. GIVE OPPORTUNITY FOR COMMENTS ON YESTERDAY'S WORK & SAFETY RELATED ACTIVITIES.

Chemicals Anticipated: TCE and BTEX
Other Hazardous Substance(s) and/or Condition(s) Anticipated: _____

TOPICS DISCUSSED:
Physical Hazards ✓
Chemical Hazards ✓
Radiation Hazards _____
Personal Protective Clothing/Equipment _____
Emergency Procedures _____
Specific Individual Responsibilities ✓
Decontamination Procedures _____
Special Site Considerations ✓

Checklist
Emergency information ~~reviewed~~ UNDERSTOOD by ALL team members? ✓
Route to nearest hospital known by ALL team members? ✓
Site safety plan on site and readily available to ALL team members? ✓
Copy(ies) of appropriate licensing/certification available? ✓

Signatures of those present:

219124

GEO-MARINE INC.
HAZARDOUS & TOXIC MATERIALS PLAN
SITE SAFETY REVIEW

PROJECT NAME: Phase II - Groundwater Survey, Carswell AFB **PROJECT NUMBER:** 1161-052

Site Location: Carswell Air Force Base, Fort Worth, Texas

Date: 3-17-94 Time: 9:50 Location of review: CARSWELL well # GMW22-05M

GMI Representative(s): Tony C. Mills

Client Representative(s): NA

Meeting Conducted by: Tony C. Mills

Meeting Objective(s): Review Safety Plans, Emergency Procedures

Chemicals Anticipated: TCE and BTEX

Other Hazardous Substance(s) and/or Condition(s) Anticipated: _____

TOPICS DISCUSSED:

Physical Hazards ✓

Chemical Hazards ✓

Radiation Hazards _____

Personal Protective Clothing/Equipment ✓

Emergency Procedures ✓

Specific Individual Responsibilities _____

Decontamination Procedures ✓

Special Site Considerations ✓

Checklist

Emergency information reviewed by ALL team members? ___

Route to nearest Hospital known by ALL team members? ___

Site safety plan on site and readily available to ALL team members? ___

Copy(ies) of appropriate licensing/certification available? ___

Signatures of those present:

Tony C. Mills

GEO-MARINE INC.
HAZARDOUS & TOXIC MATERIALS PLAN
SITE SAFETY REVIEW

PROJECT NAME: Phase II - Groundwater Survey, Carswell AFB **PROJECT NUMBER:** 1161-052
Site Location: Carswell Air Force Base, Fort Worth, Texas
Date: _____ Time: _____ Location of review: _____

GMI Representative(s): _____

Client Representative(s): _____

Meeting Conducted by: _____

Meeting Objective(s): _____
_____
_____

Chemicals Anticipated: TCE and BTEX
Other Hazardous Substance(s) and/or Condition(s) Anticipated: _____
_____

TOPICS DISCUSSED:
Physical Hazards _____
Chemical Hazards _____
Radiation Hazards _____
Personal Protective Clothing/Equipment _____
Emergency Procedures _____
Specific Individual Responsibilities _____
Decontamination Procedures _____
Special Site Considerations _____

Checklist
Emergency information reviewed by ALL team members? ___
Route to nearest hospital known by ALL team members? ___
Site safety plan on site and readily available to ALL team members? ___
Copy(ies) of appropriate licensing/certification available? ___

Signatures of those present:

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: ENMET Corp. model CGS-80R (explosimeter)

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE	TIME	INSTRUMENT READING	SAMPLER INITIALS

GEO-MARINE, INC.

AIR MONITORING FORMS (daily calibration unless noted)

Contaminant(s) of Interest: TCE (trichloroethylene) & break-down products
BTEX (benzene, toluene, ethyl-benzene, & xylenes)

Type of Sample (area, personal): area

Equipment Make & Model: HNu Systems, Inc. model PI-101

DATE TIME INSTRUMENT READING SAMPLER INITIALS

_____

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APPENDIX G

State of Texas Well Reports

218136

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

1) OWNER CARSWELL AFB (Name) ADDRESS AFBCA/... CARSWELL TX 761.. (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: GMI 22-01M
County TARRANT ______ miles in ______ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 03/08 19 94
Completed 03/08 19 94

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	28.5

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 11 ft. to 28.5 ft.

From (ft.)	To (ft.)	Description and color of formation material
GL	1	TOP SOIL CLAY BROWN
	3	BLACK CLAY
	7	MOTTLED CLAY GRAY & TAN
	20	SAND
	28	SAND & GRAVEL STIFF
	28.5	LIMESTONE
		TD

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2"	N	PVC RISER	GL	13	SCH 40
2"	N	PVC SCREEN	13	28.5	.010

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from TOTAL ft. to 9 ft. No. of Sacks Used 3
______ ft. to ______ ft. No. of Sacks Used ______
Method used 8 GALS WATER TO 100# SK
Cemented by E.C. MAGENT ENV

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME ~~HUBERT S THOMPSON JR~~ E.C. MAGENT ENV. (Type or print) WELL DRILLER'S LICENSE NO. 02413W

ADDRESS 550 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) Hubert S Thompson (Licensed Well Driller) (Signed) Tony C. Miller (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

TWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

218135

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

1) OWNER CARSWELL AFB (Name) ADDRESS AFB DR/OLH (Street or RFD) CARSWELL (City) TX (State) 76127 (Zip)

2) LOCATION OF WELL: GMI 22-02M
County TARRANT , ______ miles in ______ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 03-03 1994
Completed 03-08 1994

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 5/8	Surface	30.0

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 3 ft. to 30.5 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	TOP SOIL SANDY
	7	SAND TAN
	30.5	SAND & SOME GRAVEL
	TD	BED ROCK

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	GL	5	SCH 40
2	N	PVC SCREEN	5	30.5	.010

9) CEMENTING DATA [Rule 287.44(1)] NA
Cemented from ______ ft. to ______ ft. No. of Sacks Used ______
______ ft. to ______ ft. No. of Sacks Used ______
Method used ______
Cemented by ______

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GD-MARINE ENV (Type or print) WELL DRILLER'S LICENSE NO. 02413-W

ADDRESS 55 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) Tony C. Mills (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

WWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

212136

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentially*
Privilege Notice on Reverse Side

State of Texas
WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

1) OWNER _____ (Name) ADDRESS _____ (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: GMI 22-03M
County _____ miles in _____ (NE, SW, etc.) direction from _____ (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:

Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____

Distance and direction from two intersecting section or survey lines _____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check):
☒ New Well ☐ Deepening
☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check):
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply
☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check):
☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☐ Bored
☐ Air Rotary ☐ Cable Tool ☐ Other _____

6) WELL LOG:
Date Drilling:
Started 6/1/94 19 94
Completed 6/1/94 19 94

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 3/8	Surface	32

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If Gravel Packed give interval . . . from 32 ft. to _____ ft.

From (ft.)	To (ft.)	Description and color of formation material

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 15 ft. to 0 ft. No. of Sacks Used _____
_____ ft. to _____ ft. No. of Sacks Used _____
Method used _____
Cemented by _____

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL:
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

12) PACKERS: Type Depth

13) TYPE PUMP:
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) WELL TESTS:
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME _____ (Type or print) WELL DRILLER'S LICENSE NO. _____

ADDRESS _____ (Street or RFD) (City) (State) (Zip)

Signed _____ (Licensed Well Driller) (Signed) Lambert Levin (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. _____ Located on map _____

WWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas
WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER CARSWELL AFB (Name) ADDRESS REBAR/DEH CARSWELL TX 76127 (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: UMC 22-04M
County TARRANT ________ miles in ________ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:

Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______

Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:

Date Drilling:
Started 02/22 1994
Completed 02/22 1994

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 5/8	Surface	~~23.5~~
		23.5

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval ... from 11 ft. to 23.5 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	SANDY LOAM
	4.5	CLAY GRAY & BROWN
	8.5	SAND REDDISH BROWN
	10	CLAY GRAY
	21	SAND & SOME GRAVEL
	22.5	SHALE
	23.5	LIMESTONE

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	3 AGL	13	SCH 40
2	N	PVC ~~RISER~~ SCREEN	13	23.5	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 1 BGL ft. to 9.5 ft. No. of Sacks Used 3
______ ft. to ______ ft. No. of Sacks Used ______
Method used 8 GALS WATER TO 1OC# SK
Cemented by G.E. MARINE ENG

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME G.E. MARINE ENG (Type or print) WELL DRILLER'S LICENSE NO. 02413 W

ADDRESS 550 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) Tony C. Mills (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

WD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

212136

Send 1 original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER Carswell AFB (Name) ADDRESS AFB D M / ULX Carswell (Street or RFD) (City) TX (State) 76127 (Zip)

2) LOCATION OF WELL: LMF 22-05M
County Tarrant , ______ miles in ______ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:

Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______

Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 02/23 1994
Completed 02/23 1994

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 5/8	Surface	11

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 3 ft. to 11 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	TOP SOIL SANDY LOAM
	3	GRAY BROWN
	7	SANDY GRAY BROWN
		SAND, GRAVEL SAND
	10	GRAY
	11	GRAY CLAY
	TD	BED ROCK

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	3 ALL	5.5	SCH 40
2	N	PVC SCREEN	5.5	11	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 1BLS ft. to 3 ft. No. of Sacks Used 1
______ ft. to ______ ft. No. of Sacks Used ______
Method used 8 GALS WATER TO 100# SA
Cemented by GEO MARINE

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

12) PACKERS: NA Type Depth

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GEO MARINE INC (Type or print) WELL DRILLER'S LICENSE NO. 2413 W

ADDRESS 550 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) Tony C. Mills (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

TWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

212139

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

Please use black ink.

ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER CARSWELL AFB (Name) ADDRESS AFB DOA/ DEH (Street or RFD) CARSWELL (City) TX (State) 761.. (Zip)

2) LOCATION OF WELL: WMC 22-01M
County TARRANT , ______ miles in ______ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 02/23 19 94
Completed 02/23 19 94

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 5/8	Surface	24
7		

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval . . . from 11.5 ft. to 24 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	TOP SOIL
	2	SAND BROWN
	6	CLAY ABUNDANT BROWN
	8	SANDY CLAY
	21	SAND YELLOWISH BROWN
	23	SAND & GRAVEL
	24	SHALE
	TD	

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	3 AGL	13.5	SCH 40
2	N	PVC SCREEN	13.5	24	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 1 BGL ft. to 9.5 ft. No. of Sacks Used 3
______ ft. to ______ ft. No. of Sacks Used ______
Method used ______
Cemented by WEST MARINE INC

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME WEST MARINE INC (Type or print) WELL DRILLER'S LICENSE NO. 2413 W

ADDRESS 5510 ... (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) Tony C. Miller (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

WWD-012 (Rev. 05-18-90)

TEXAS WATER COMMISSION COPY

21 [illegible]

Send original copy by certified mail to: Texas Water Commission, P.O. Box 13087, Austin, Texas 78711

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ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER CARSWELL AFB (Name) ADDRESS AFB [illegible] CARSWELL TX 76127 (Street or RFD) (City) (State) (Zip)

2) LOCATION OF WELL: UMF 22-07M
County TARRANT, ____ miles in ____ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:

Section No. ____ Block No. ____ Township ____ Abstract No. ____ Survey Name ____

Distance and direction from two intersecting section or survey lines ____

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ____

6) WELL LOG:
Date Drilling:
Started 2/23 1994
Completed 2/23 1994

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 5/8	Surface	20.5

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ____
If Gravel Packed give interval . . . from 8.5 ft. to 20.5 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	TOP SOIL
	3	SAND
	5	SAND & GRAVEL TAN
	9	SAND & GRAVEL BROWN
	15	SAND & GRAVEL GRAY
	19	SAND
	20.5	SHALE
	TD	LIMESTONE

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	3 [illegible]	10	SCH 40
2	N	PVC SCREEN	10	20.5	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 1 ft. to 6.5 ft. No. of Sacks Used 2
____ ft. to ____ ft. No. of Sacks Used ____
Method used [illegible] WATER [illegible]
Cemented by [illegible]

13) TYPE PUMP: N/A
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ____
Depth to pump bowls, cylinder, jet, etc., ____ ft.

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

14) WELL TESTS: N/A
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ____ gpm with ____ ft. drawdown after ____ hrs.

11) WATER LEVEL: N/A
Static level ____ ft. below land surface Date ____
Artesian flow ____ gpm. Date ____

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ____ Depth of strata ____
Was a chemical analysis made? ☐ Yes ☒ No

12) PACKERS: N/A Type Depth

ereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand it failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

MPANY NAME [illegible] (Type or print) WELL DRILLER'S LICENSE NO. 24,3[illegible]

Dr 550 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

ned) [signature] (Licensed Well Driller) (Signed) Tony C. Mills (Registered Driller Trainee)

ise attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ____ Located on map ____

D-012 (Rev. 05-18-90)

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ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER CARSWELL AFB (Name) ADDRESS AFB DA / CLH (Street or RFD) CARSWELL (City) TX (State) 76127 (Zip)

2) LOCATION OF WELL: VMI 22-02M
County TARRANT, ______ miles in ______ (NE, SW, etc.) direction from ON BASE (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ LEGAL DESCRIPTION:
Section No. ______ Block No. ______ Township ______ Abstract No. ______ Survey Name ______
Distance and direction from two intersecting section or survey lines ______

☒ SEE ATTACHED MAP

3) TYPE OF WORK (Check): ☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) PROPOSED USE (Check): ☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) DRILLING METHOD (Check): ☐ Driven ☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other ______

6) WELL LOG:
Date Drilling:
Started 02/24 1994
Completed 02/24 1994

DIAMETER OF HOLE

Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	22.5

7) BOREHOLE COMPLETION:
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other ______
If Gravel Packed give interval ... from 7 ft. to 22.5 ft.

From (ft.)	To (ft.)	Description and color of formation material
0	5	SAND & SANDY CLAY BROWN
	15	SAND & SILTY CLAY
	18	GRAVEL
	19	CLAY
	22.5	CLAY & SHALE
		TD

(Use reverse side if necessary)

8) CASING, BLANK PIPE, AND WELL SCREEN DATA:

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	PVC RISER	3 AGL	10	SCH 40
2	N	PVC SCREEN	10	22.5	.01

9) CEMENTING DATA [Rule 287.44(1)]
Cemented from 1 BGL ft. to 5 ft. No. of Sacks Used 2
______ ft. to ______ ft. No. of Sacks Used ______
Method used SLURRY OF WATER TO 100# SK
Cemented by GRU MARINE INC

10) SURFACE COMPLETION
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) WATER LEVEL: NA
Static level ______ ft. below land surface Date ______
Artesian flow ______ gpm. Date ______

12) PACKERS: NA Type Depth

13) TYPE PUMP: NA
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other ______
Depth to pump bowls, cylinder, jet, etc., ______ ft.

14) WELL TESTS: NA
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: ______ gpm with ______ ft. drawdown after ______ hrs.

15) WATER QUALITY:
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? ______ Depth of strata ______
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME GRU MARINE INC (Type or print) WELL DRILLER'S LICENSE NO. 2413 W

ADDRESS 550 E 15 (Street or RFD) PLANO (City) TX (State) 75074 (Zip)

(Signed) [signature] (Licensed Well Driller) (Signed) Tony C. Mills (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. ______ Located on map ______

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ATTENTION OWNER: *Confidentiality Privilege Notice on Reverse Side*

State of Texas WELL REPORT

Texas Water Well Drillers Board
P.O. Box 13087
Austin, Texas 78711

OWNER _____ (Name) **ADDRESS** _____ (Street or RFD) (City) (State) (Zip)

2) **LOCATION OF WELL:** #6 MI Off - 01 M
County _____ _____ miles in _____ (NE, SW, etc.) direction from _____ (Town)

Driller must complete the legal description below with distance and direction from two intersecting section or survey lines, or he must locate and identify the well on an official Quarter- or Half-Scale Texas County General Highway Map and attach the map to this form.

☐ **LEGAL DESCRIPTION:**

Section No. _____ Block No. _____ Township _____ Abstract No. _____ Survey Name _____

Distance and direction from two intersecting section or survey lines _____

☒ **SEE ATTACHED MAP**

3) **TYPE OF WORK (Check):**
☒ New Well ☐ Deepening ☐ Reconditioning ☐ Plugging

4) **PROPOSED USE (Check):**
☐ Domestic ☐ Industrial ☒ Monitor ☐ Public Supply ☐ Irrigation ☐ Test Well ☐ Injection ☐ De-Watering

5) **DRILLING METHOD (Check):** ☐ Driven
☐ Mud Rotary ☐ Air Hammer ☐ Jetted ☒ Bored ☐ Air Rotary ☐ Cable Tool ☐ Other _____

6) **WELL LOG:**
Date Drilling:
Started 03/24 19 91
Completed 04-2 19 91

DIAMETER OF HOLE		
Dia. (in.)	From (ft.)	To (ft.)
7 7/8	Surface	31.5

7) **BOREHOLE COMPLETION:**
☐ Open Hole ☐ Straight Wall ☐ Underreamed
☒ Gravel Packed ☐ Other _____
If Gravel Packed give interval . . . from _____ ft. to _____ ft.

From (ft.)	To (ft.)	Description and color of formation material
0	1	[illegible]
1	2.5	[illegible]
2.5	6	[illegible]
6	20	[illegible]
20	30.5	[illegible]
30.5	32	[illegible]

(Use reverse side if necessary)

8) **CASING, BLANK PIPE, AND WELL SCREEN DATA:**

Dia. (in.)	New or Used	Steel, Plastic, etc. Perf., Slotted, etc. Screen Mfg., if commercial	Setting (ft.) From	Setting (ft.) To	Gage Casting Screen
2	N	[illegible]	[illegible]	16.5	
2	N	[illegible]	16.5	32	

9) **CEMENTING DATA** [Rule 287.44(1)]
Cemented from _____ ft. to _____ ft. No. of Sacks Used _____
_____ ft. to _____ ft. No. of Sacks Used _____
Method used _____
Cemented by _____

10) **SURFACE COMPLETION**
☒ Specified Surface Slab Installed [Rule 287.44(2)(A)]
☐ Specified Steel Sleeve Installed [Rule 287.44(3)(A)]
☐ Pitless Adapter Used [Rule 287.44(3)(B)]
☐ Approved Alternative Procedure Used [Rule 287.71]

11) **WATER LEVEL:** N/A
Static level _____ ft. below land surface Date _____
Artesian flow _____ gpm. Date _____

12) **PACKERS:** N/A Type Depth

13) **TYPE PUMP:** N/A
☐ Turbine ☐ Jet ☐ Submersible ☐ Cylinder
☐ Other _____
Depth to pump bowls, cylinder, jet, etc., _____ ft.

14) **WELL TESTS:** N/A
Type Test: ☐ Pump ☐ Bailer ☐ Jetted ☐ Estimated
Yield: _____ gpm with _____ ft. drawdown after _____ hrs.

15) **WATER QUALITY:**
Did you knowingly penetrate any strata which contained undesirable constituents?
☐ Yes ☒ No If yes, submit "REPORT OF UNDESIRABLE WATER"
Type of water? _____ Depth of strata _____
Was a chemical analysis made? ☐ Yes ☒ No

I hereby certify that this well was drilled by me (or under my supervision) and that each and all of the statements herein are true to the best of my knowledge and belief. I understand that failure to complete items 1 thru 15 will result in the log(s) being returned for completion and resubmittal.

COMPANY NAME _____ (Type or print) WELL DRILLER'S LICENSE NO. _____

ADDRESS _____ (Street or RFD) _____ (City) _____ (State) _____ (Zip)

(Signed) _____ (Licensed Well Driller)

(Signed) Lambert Levi (Registered Driller Trainee)

Please attach electric log, chemical analysis, and other pertinent information, if available.

For TWC use only: Well No. _____ Located on map _____

WD-012 (Rev. 05-18-90)

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FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE

FINAL PAGE

ADMINISTRATIVE RECORD

FINAL PAGE