FINAL

Site-Specific Work Plan for the Passive Diffusion Bag Sampler Demonstration at Carswell AFB, Texas

Prepared For

U.S. Department of the Army Corps of Engineers,
Omaha District
Omaha, Nebraska

Contract 44650-99-D-0005
Delivery Order DK01

U.S. AIR FORCE

April **2002**

FINAL

SITE-SPECIFIC WORK PLAN FOR THE PASSIVE DIFFUSION BAG SAMPLER DEMONSTRATION AT CARSWELL AFB, TEXAS

April 2002

Prepared for:

U.S. Army Corps of Engineers, Omaha District

and

Air Force Center for Environmental Excellence
Technology Transfer Division
and
Air Force Base Conversion Agency

CONTRACT NO. F44650-99-D-0005

Delivery Order DK01

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AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFCEE/ERT	Air Force Center for Environmental Excellence, Technology Transfer Division
BGMP	Basewide Groundwater Monitoring Program
BRAC	Base Realignment and Closure
COC	contaminant of concern
DCE	dichloroethene
DERA	Defense Environmental Restoration Account
DoD	Department of Defense
Ellis	Ellis Environmental Group. LC
gpd/ft^2	gallons per day per square foot
HASP	Health and Safety Plan
JRB	Joint Reserve Base
µg/L	micrograms per liter
NAS	Naval Air Station
Parsons	Parsons Engineering Science, Inc.
PDBS	passive diffusion bag sampler
QAPP	Quality Assurance Project Plan
RAB	Restoration Advisory Board
RL	reporting limit
RPD	relative percent difference
RPO	remedial process optimization
SAP	Sampling and Analysis Plan
STL	Severn Trent Laboratories
SWMU	solid waste management unit
TCE	trichloroethene
USACE	US Department of the Army, Corps of Engineers
USAF	US Air Force
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WAA	waste accumulation area

1.0 INTRODUCTION

1.1 Project Description and Location

On 22 January 2002, Parsons Engineering Science, Inc. (Parsons) was awarded delivery order DK01 under US Department of the Army, Corps of Engineers (USACE) Contract Number F44650-99-D-0005 to provide services, technical man-hours, and materials to support Remedial Process Optimization (RPO) evaluations and demonstrate the effectiveness of Passive Diffusion Bag Samplers (PDBSs) for sampling volatile organic compounds (VOCs) in existing groundwater monitoring programs at selected Base Realignment and Closure (BRAC) sites administered by the Air Force Base Conversion Agency (AFBCA). The Technology Transfer Division of AFCEE (AFCEE/ERT) has initiated the PDBS demonstration to introduce this technology to multiple Department of Defense (DoD) installations and to improve the cost effectiveness of groundwater monitoring programs for VOCs.

This site-specific work plan is for the demonstration of the PDBS technology at the former Carswell Air Force Base (AFB), Texas. The specific project location is the AFBCA property located on the south side of the former Carswell AFB. The majority of the former Carswell AFB property has been transferred to the US Navy and is named Naval Air Station (NAS) Fort Worth Joint Reserve Base (JRB). NAS Fort Worth JRB borders the AFBCA property to the west and north.

Diffusion sampling is a relatively new technology designed to utilize passive sampling techniques that eliminate the need for well purging. Specifically, a diffusive-membrane capsule is filled with deionized/distilled water, sealed, suspended in a well-installation device, and lowered to a specified depth below the water level in a monitoring well. Over time (no less than 72 hours), the VOCs in the groundwater diffuse across the membrane, and the water inside the sampler reaches equilibrium with groundwater in the surrounding formation. The sampler is subsequently removed from the well, and the water in the diffusion sampler is transferred to a sample container and submitted for laboratory analysis of VOCs. Benefits of diffusion sampling include reduced sampling costs and reduced generation of investigation-derived waste.

1.2 Objectives

The PDBS demonstration at the former Carswell AFB has three primary objectives:

- Develop vertical profiles of VOC concentrations across the screened intervals of the sampled monitoring wells;

- Assess the effectiveness of PDBS by statistically comparing groundwater analytical results for VOCs obtained using the current (conventional) sampling method (i.e., micropurge sampling method) with results obtained using the PDB sampling method. VOC results from the scheduled April 2002 Basewide Groundwater Monitoring Program (BGMP) event will be compared to the results obtained using the PDBS method; and

- Compare the costs of PDB and conventional sampling.

Vertical contaminant profiles will be developed by placing PDBSs at discrete depths within the saturated screened interval of each monitoring well included in the demonstration, and analyzing the resulting samples for VOCs. The resulting information will aid the Base in evaluating contaminant migration and fate in the saturated zone, and will allow optimization of the Basewide Groundwater Sampling and Analysis Program. The statistical comparison of the conventional and diffusion sampling results will allow assessment of the appropriateness of implementing diffusion sampling for VOCs at each sampled well.

1.3 Scope

The sampling demonstration at the former Carswell AFB will require two mobilizations to the site - one to place the diffusion samplers in the selected monitoring wells, and a second to retrieve the samplers from the wells. The PDBSs will be installed in late March 2002 to provide adequate equilibration time before the current sampling contractor for NAS Fort Worth JRB, Ellis Environmental Group, LC (Ellis) begins the scheduled BGMP sampling event on 8 April 2002. Dedicated pumps in several of the monitoring wells selected for the PDBS demonstration will be removed by Ellis during the week of 25 March 2002. To the extent feasible, the PDBSs will be retrieved immediately prior to the conventional BGMP sampling at the selected locations to ensure temporal comparability of the analytical results obtained using the two methods. The PDBSs will be in place for a minimum of 14 days, which fulfills the 14-day minimum equilibration time period specified in the Draft BRAC PDBS Project Work Plan (Parsons, 2002).

1.4 Document Organization

This work plan is organized into seven sections, including this introduction, and three appendices. The site description summarized from HydroGeoLogic (2001) is presented in Section 2. Section 3 presents the scope of the PDBS investigation at the Former Carswell AFB. Project organization, schedule, and an overview of the PDBS site-specific results report are summarized in Sections 4, 5, and 6, respectively. References used in the preparation of this work plan are presented in Section 7. Appendix A provides a site-specific addendum to the Program Health and Safety Plan (HASP) (Parsons, 2002). Historic site-specific groundwater quality data for the former Carswell AFB is provided in Appendix B. Appendix C presents selected groundwater sampling procedures from the *Final 2001 Groundwater Sampling and Analysis Plan – NAS Fort Worth, Texas* (HydroGeoLogic, 2001).

2.0 SITE DESCRIPTION

2.1 Location and Description of the Former Carswell AFB

The former Carswell AFB is located approximately 8 miles west of downtown Fort Worth (Figure 2.1). The former Base is bordered by Lake Worth to the north; the West Fork Trinity River, River Oaks, and Westworth Village to the east; other urban areas of Fort Worth to the northeast and southeast; White Settlement to the west and southwest;

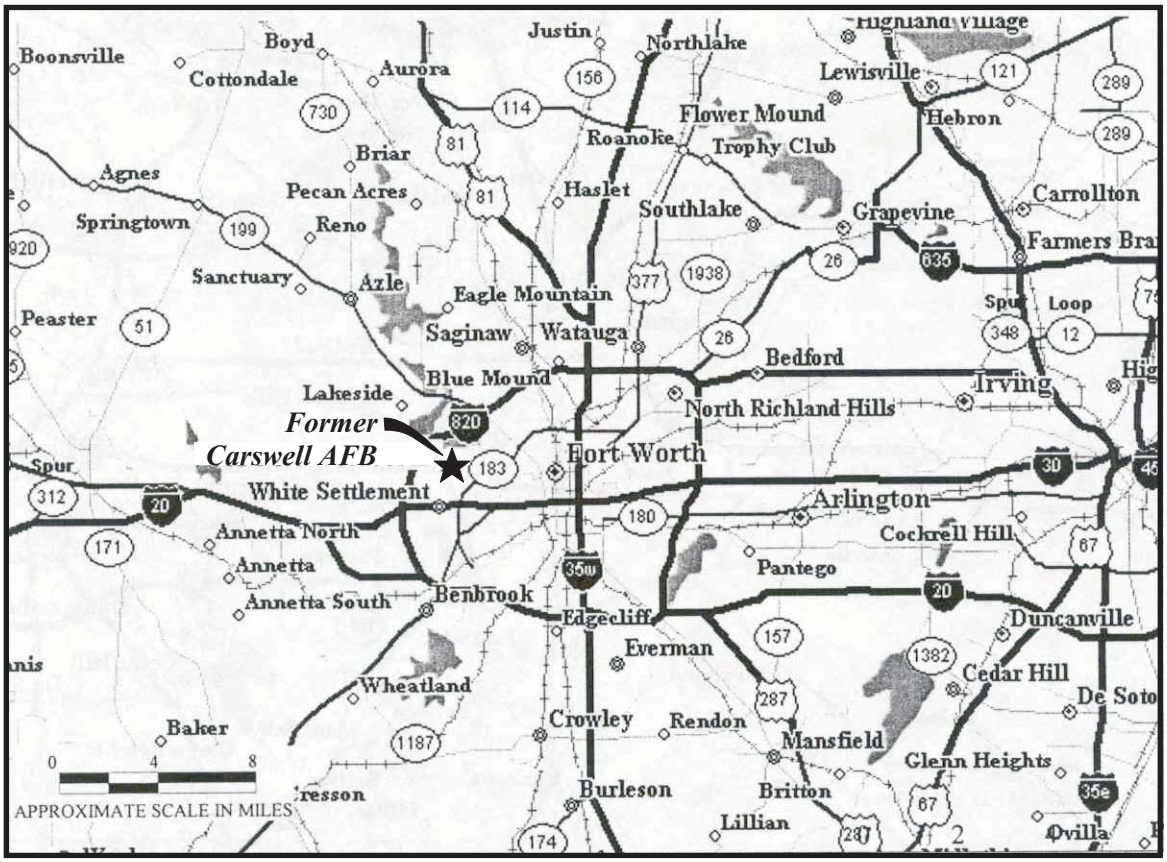


FIGURE 2.1

SITE LOCATION MAP
FORMER CARSWELL AFB

Passive Diffusion Bag Sampler Demonstration
Carswell AFB, Texas

PARSONS

Denver, Colorado

Map Source: ProCD

draw\741436carswell.cdr nap 31102

and US Air Force Plant (AFP) 4 to the west. The area surrounding the former Base is mostly suburban with the immediate vicinity having industrial, commercial, residential, and recreational land uses.

Carswell AFB was originally known as Tarrant Field Airdrome and was established as a military installation in 1942 for flight training and heavy bomber operations. The Base was renamed Carswell AFB in 1948. Carswell AFB was selected for closure under the Defense Base Closure and Realignment Act of 1990 during Round II Base Closure Commission deliberations. The Base ceased operations on 30 September 1993, and was transferred to the AFBCA for property distribution and reuse (Carswell AFB Restoration Advisory Board, 2002). On 1 October 1994, the Air Force transferred the majority of the property that constituted Carswell AFB to the US Navy to become NAS Fort Worth JRB. The site layout is shown on Figure 2.2.

Since 1942, most hazardous waste generated through operations and activities at the Base has been disposed of in landfills, reused on Base, or processed through the Defense Property Disposal Office for off-Base recycling or disposal. Since 1984, many of these sites (which include landfills, fire training areas, oil/water separators, and waste accumulation areas [WAAs]) have been investigated.

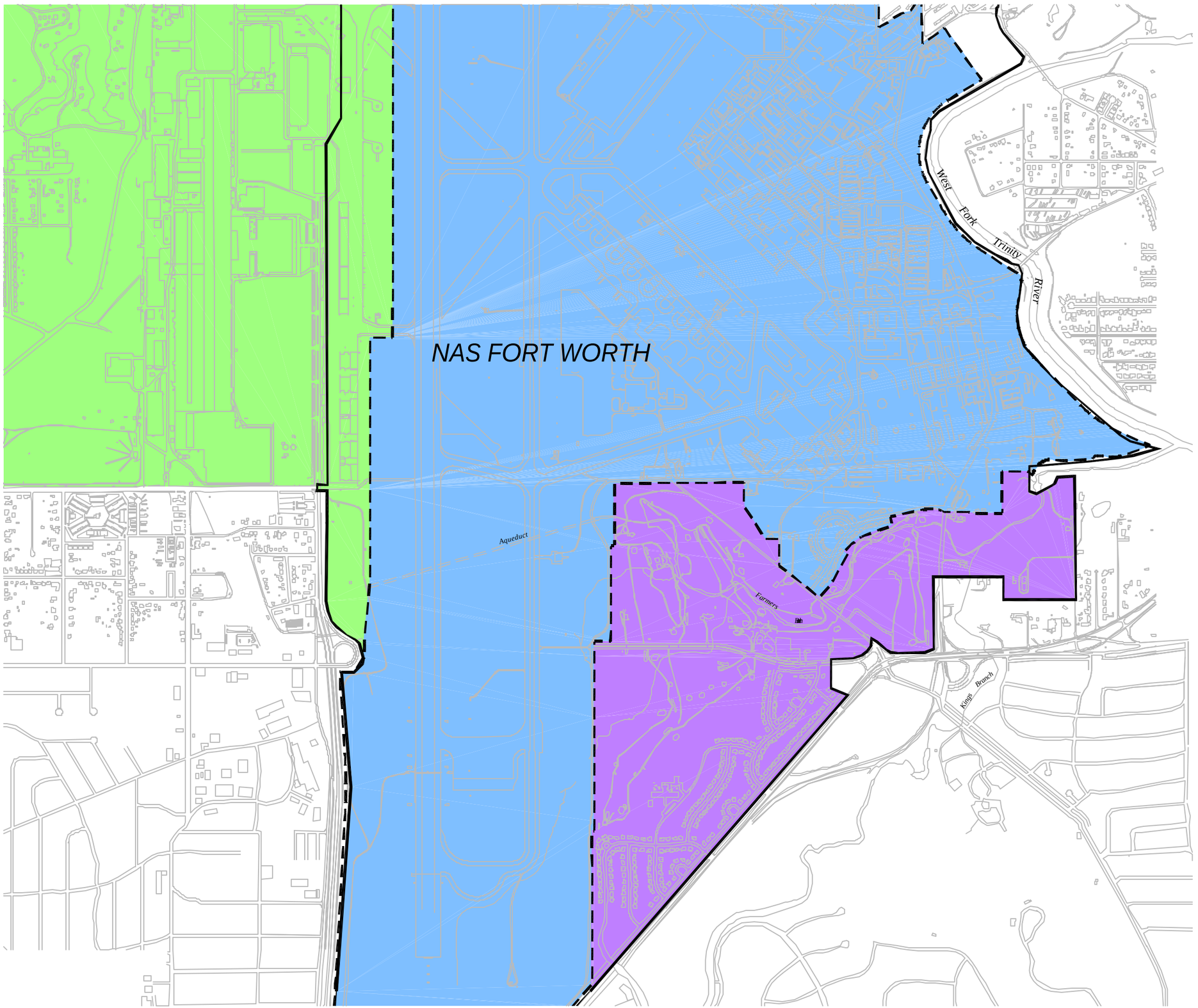
2.2 Geology and Hydrogeology

Five hydrogeologic units are present beneath NAS Fort Worth JRB. From shallowest to deepest these units are: an upper perched-water zone occurring in the alluvial terrace deposits associated with the Trinity River (Terrace Alluvium), an aquitard of predominantly dry limestone with interbedded fine-grained clay and shale layers of the Goodland and Walnut Formations, an aquifer in the sandstone of the Paluxy Formation, an aquitard of relatively impermeable limestone in the Glen Rose Formation, and a major aquifer in the sandstone of the Twin Mountains Formation.

The wells selected for use in this PDBS demonstration at the former Carswell AFB are primarily screened in the alluvial deposits of the surficial aquifer. This aquifer is composed of silt, clay, sand, and gravel deposited by the Trinity River. Recharge to the water-bearing deposits occurs through infiltration from precipitation and from surface water bodies. The inflow of water to the shallow aquifer locally affects the groundwater flow patterns and contaminant transport. The estimated hydraulic conductivity of the Terrace alluvium aquifer is 4.6 gallons per day per square foot (gpd/ft^2) (0.6 foot per day). A contour map of the surficial aquifer water table is provided in Appendix B.

2.3 Nature and Extent of Contamination

The contaminants of concern (COCs) in groundwater beneath the AFBCA property at the former Carswell AFB are primarily trichloroethene (TCE), TCE biodegradation daughter products, and metals. The TCE contamination in groundwater at the former Carswell AFB is generally described as one plume with northern and southern lobes. The northern lobe is migrating west to east in the flightline area, or northern portion of the former Carswell AFB. The wells selected for this PDBS demonstration are within the southern lobe of the TCE plume on and to the west and east of the AFBCA property.



Legend

AIR FORCE PLANT 4

NAS FORT WORTH JRB
(FORMER CARSWELL AFB)

AIR FORCE BASE CONVERSION
AGENCY PROPERTY
(FORMER CARSWELL AFB)

N

0 600 1200 2400
FEET

FIGURE 2.2

SITE MAP

PASSIVE DIFFUSION BAG SAMPLER
DEMONSTRATION
CARSWELL AFB, TEXAS

p a r s o n s

Denver, Colorado

The TCE plume at NAS Fort Worth JRB and the AFBCA property appears to have originated at AFP 4 (HydroGeoLogic, 2000a). The southern lobe of the TCE plume migrates in a southeasterly direction and appears to follow a paleochannel of the West Fork Trinity River. The higher hydraulic conductivities of the paleochannel deposits, paired with the surrounding bedrock highs make the paleochannel a preferred pathway for groundwater movement (HydroGeoLogic, 2000a).

Quarterly sampling results for TCE and TCE daughter products, obtained in 1999, are presented in Appendix B. For the seven wells sampled in 1999 that also are included in this PDBS demonstration, the maximum TCE concentration was 4,800 µg/L at monitoring well HM-123. The highest *cis*-1,2-dichloroethene (DCE) concentration was 780 µg/L, also detected at HM-123. In 1999, vinyl chloride was detected at a maximum concentration of 18 µg/L at monitoring well LF05-5G, located on the AFBCA property. An isopleth map showing the October 2001 TCE concentrations in groundwater at NAS Fort Worth JRB is provided in Appendix B.

3.0 SCOPE OF PDBS DEMONSTRATION

An estimated total of 76 samples will be collected from 24 monitoring wells located on and immediately adjacent to the AFBCA property as part of this project. The 24 monitoring wells have been chosen because they 1) are located on or adjacent to the AFBCA property, 2) are sampled for VOCs, and 3) are included in the BGMP sampling event scheduled for April 2002. The monitoring wells that will be sampled during this PDBS demonstration are summarized in Table 3.1, and their locations are shown on Figure 3.1.

3.1 Field Activities

Monitoring wells selected for VOC sampling using the PDBS technique (Table 3.1) were chosen from the list of monitoring wells targeted for sampling by Ellis beginning on 08 April 2001. Monitoring wells were selected based primarily on VOC concentrations detected during previous sampling events. Eleven of the wells selected for sampling contain dedicated sampling pumps. Ellis will remove these 11 pumps during the week of 25 March 2002 to allow deployment of the PDBSs.

PDBSs deployed during this investigation will be installed and retrieved in general accordance with the diffusion sampler installation and recovery standard operating procedures presented in Appendix B of the AFBCA PDBS Project Work Plan (Parsons, 2002). PDBSs will be installed throughout the screened interval of each well (i.e., 1 PDBS per 3 feet of saturated screen) to obtain a vertical profile of contaminant concentrations. The PDBSs will be collected prior to the April 2002 conventional sampling event completed by Ellis.

Sample aliquots from PDBSs installed in the 24 wells targeted for sampling will be shipped to Severn Trent Laboratories, Inc., (STL) in Chicago for VOC analysis using US Environmental Protection Agency (USEPA) Method 8260B. This is the same laboratory and analytical method that will be used by Ellis for their conventional sampling of the same wells. The analyses will be performed in accordance with the Final 2000 Basewide

TABLE 3.1
SAMPLING LOCATION SUMMARY
PASSIVE DIFFUSION BAG SAMPLER DEMONSTRATION
CARSWELL AFB, TEXAS

Well ID	Total Depth (ft btoc)[a/]	Well Diameter (inches)	Screened Interval (ft btoc)	Screen Length (feet)	Top of Casing Elevation (ft amsl)[b/]	Depth to Water April 2001 (ft btoc)	Groundwater Elevation April 2001(ft amsl)	Estimated Number of PDBSs	October 2001 TCE Concentrations (exceptions noted) (µg/L)[c/]	Notes
FT09-12B	41.95	2	29.53 - 39.43	10	627.36	30.85	596.51	2	42	may be silted in or total depth measurement is incorrect
FT09-12C	40.55	2	30.13 - 40.13	10	627.86	31.72	596.14	2	20 µg/L cis-1,2-DCE, Oct. 1999	well has dedicated pump - no recent total depth measurement.
HM-123	40.09	4	20.09 - 40.09	20	624.85	25.80	599.05	4	2,100	
ITMW-01T	21.57	4	NA[d/]	NA	NA	10.87	NA	3	2	screened interval not known - assume 10 feet.
LF04-02	40.33	2	25.78 - 40.13	14	623.44	28.44	595.00	4	1,500	well has dedicated pump - no recent total depth measurement.
LF04-10	49.14	2	38.86 - 48.59	10	626.47	33.19[e/]	593.28[e/]	3	0.5	Jacobs Lock, not gauged in 4/2001. Well had dedicated pump
LF05-02	29.39	2	19.34 - 29.09	10	622.61	19.20	603.41	3	7	
LF05-19	20.53	3	10.03 - 19.78	10	606.05	13.77	592.28	2	10	Well has dedicated pump - no recent total depth measurement.
LF05-5G	30.39	2	17.64 - 29.39	12	615.28	21.43[e/]	593.85[e/]	2	1,600	Well has dedicated pump - no recent total depth measurement.
USGS07T	15.16	2	10.16 - 15.16	5	632.43	8.10	624.33	1	Trace PCE and TCE, Oct. 1999	Well has dedicated pump - no recent total depth measurement.
WHGLPU001	90.43	2	74.20 - 89.20	15	620.44	75.72	544.72	3		May be silted in. Screened in Paluxy Formation
WHGLRW016	22.50	4	12.50 - 22.50	10	602.47	10.96	591.51	3	120 µg/L cis-1,2-DCE, Oct. 1999	
WHGLRW017	24.60	4	13.90 - 23.90	10	604.66	12.90	591.76	3	Trace cis-1,2-DCE, Oct. 1999	
WHGLTA004	23.30	2	13.30 - 23.30	10	614.35	16.68	597.67	2	710	Well has dedicated pump - no recent total depth measurement.
WHGLTA025	20.66	2	10.50 - 20.50	10	601.37	14.63	586.74	2	5	
WHGLTA043	13.70	2	8.50 - 14.00	5.5	602.17	9.59	592.58	1	410	
WHGLTA044	8.94	2	3.50 - 8.50	5	582.93	3.03	579.90	1	ND[f/]	"clean" well included to verify absence of VOCs throughout saturated screen interval
WHGLTA045	16.00	2	5.60 - 15.60	10	598.52	7.88	590.64	2	23	
WHGLTA049	26.78	2	16.70 - 26.70	10	604.89	NA	NA	3	2	MW was damaged and repaired in July 2001.
WHGLTA051	6.93	2	2.00 - 7.00	5	598.30	4.01	594.29	1	390	
WHGLTA053	30.20	2	15.20 - 30.20	15	636.02	14.28	621.74	5	ND	"clean" well included to verify absence of VOCs throughout saturated screen interval
WHGLTA054	40.02	2	30.02 - 40.02	10	631.26	33.82	597.44	2	19	
WHGLTA055	41.21	2	31.21 - 41.21	10	628.49	31.56	596.93	3	0.3	
WHGLTA056	41.55	2	25.55 - 40.55	15	627.48	31.00	596.48	3	43	

[a/] ft btoc = feet below top of casing.

[b/] ft amsl = feet above mean sea level.

[c/] µg/L = micrograms per liter.

[d/] NA = not available.

[e/] January 1999 water elevation is presented because April 2001 water level was not available.

[f/] ND = not detected.

Legend

WHGLTA049 — WELLS SELECTED FOR PDBS DEMONSTRATION

WHGLTA049 — SITE MONITORING WELLS

FORMER CARSWELL AFB BOUNDARY

NAS FORT WORTH JRB BOUNDARY

0 200 400 800

FEET

FIGURE 3.1

PDBS WELL LOCATIONS

PASSIVE DIFFUSION BAG SAMPLER DEMONSTRATION
CARSWELL AFB, TEXAS

parsons

Denver, Colorado

Quality Assurance Project Plan (QAPP) (HydroGeoLogic, 2000b). Field quality control samples will be collected at the following frequencies:

- 10 percent field duplicates,
- 5 percent matrix spikes and matrix spike duplicates,
- 1 pre-installation equipment rinseate,
- 1 pre-installation source water blank, and
- Approximately 4 trip blanks (1 per cooler of samples).

The *Final 2001 Basewide Groundwater Sampling and Analysis Plan (SAP), NAS Fort Worth JRB, Texas* (HydroGeoLogic, 2001) will be adopted as the site-specific SAP for the PDBS demonstration where appropriate. Appendix C from this site-specific SAP, which presents instructions for well gauging and inspection, groundwater level measurements, equipment decontamination, and waste handling proceedures, is presented in Appendix C of this work plan. The PDBS-specific methods and procedures outlined in the AFBCA Program SAP (Parsons, 2002) will be adhered to during all PDBS-related activities at the former Carswell AFB.

3.2 Analytical Results Comparison/Evaluation

Analytical results for groundwater samples collected using the PDBS and conventional techniques will be compared, and the results will be evaluated. Typically, if maximum concentrations from the PDBSs are higher than concentrations in samples collected using the conventional method, it is probable that the PDBS concentrations are more representative of ambient groundwater chemistry conditions than are the conventional-sampling data (Vroblesky, 2001). Considering this guidance, if the maximum analytical result obtained using PDB sampling is greater than or equal to the conventional sampling result, it will indicate that the PDBS method is appropriate for use in that particular well. If, however, the conventional method produces VOC results that are higher by a predetermined amount than the concentrations reported for the PDBSs, then the PDBS method may not adequately represent local ambient groundwater conditions. In this case, the difference may be due to a variety of factors, including hydraulic and chemical heterogeneity within the saturated screened interval of the well, vertical flow of groundwater within the well, and/or the relative permeability of the well screen with respect to the surrounding aquifer matrix (Vroblesky, 2001).

Analytical results for all samples collected using the diffusion samplers will be compared to results from the conventional sampling using relative-percent-difference (RPD), as defined by the following equation:

$$RPD = 100 \cdot [abs(D-C)]/[(D+C)/2]$$

Where:

abs = absolute value

D = diffusion sampler result

C = conventional sample result.

Therefore, multiple RPD values will be computed for each well, despite the fact that there is only one conventional sampling result. Each RPD value will be compared to the acceptance criteria to determine whether it is within the acceptable range.

For this investigation, an RPD of less than 30 will be considered to demonstrate good correlation between sample results. In summary, the PDBS acceptance criteria that will be used are:

- If at least one PDBS result for a given well is equal to or greater than the conventional sampling result, PDBS will be deemed appropriate for use in that well.
- If either the PDBS or the conventional sample result is greater than three times the laboratory reporting limit (RL), and the PDBS result is less than the conventional result, an RPD of 30 will be used as the acceptance criterion.
- If both the PDBS and conventional sample results are less than three times the laboratory RL, a value of ± the lowest RL will be used as the range of acceptance between the two values.

4.0 PROJECT ORGANIZATION

Addresses and telephone numbers of the Carswell PDBS project team are as follows:

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5.0 SCHEDULE

Work performed as part of this demonstration at the former Carswell AFB will be completed according to the schedule summarized below.

- Submittal of the Draft Site-Specific PDBS Work Plan: 13 March 2002
- Receipt of Draft Site-Specific PDBS Work Plan Comments: 22 March 2002.
- Submittal of the Final Site-Specific PDBS Work Plan: 29 March 2002
- Install PDB samplers at the Former Carswell AFB: 27 March 2002
- Retrieve PDBS samplers at the former Carswell AFB: 09 April 2002.
- Submittal of the Preliminary Internal Draft Site-Specific PDBS Report: September 2002.

6.0 REPORTING

The site-specific results report will provide a table identifying the location and depth for each PDBS collected. The analytical results collected by Parsons as part of this study will be compared to conventional-sampling analytical results collected by Ellis using the procedures described in Section 3.2. The results of the statistical comparisons will be clearly and logically presented in the site-specific results report. Comparison methods will include calculation of RPDs between PDBS and conventional sampling results. In addition, the relative costs of PDB and conventional groundwater sampling will be compared.

The report will include a qualitative review of data sets when the correlation criteria for a well or compound are met in less than 70 percent of the comparisons. The purpose of this review will be to attempt to determine the most likely reason(s) for the lack of correlation. The arbitrary threshold value of 70 percent is not intended to indicate success or failure of PDBS, but rather to focus further review on those wells or analytes where a lower correlation was observed. If there are wells or compounds for which the correlation criteria were not as consistently met, and it's not clear that the poor correlation was due to a one-time, explainable occurrence (e.g., air bubbles in the sample vials for a particular sample), then the report will likely state that further evaluation of those wells/compounds should be performed before the PDBS method is used for those wells/compounds. The draft version of this report will be distributed according to the schedule shown in Section 5.0.

7.0 REFERENCES

Carswell AFB Restoration Advisory Board (RAB). 2002. History Report. http://www.afcee.brooks.af.mil/er/carswell/nasfw/documents/factsheet.htm

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APPENDIX A

HEALTH AND SAFETY PLAN ADDENDUM

ADDENDUM TO THE PROGRAM HEALTH AND SAFETY PLAN FOR REMEDIAL PROCESS OPTIMIZATION SUPPORT AND DEMONSTRATION OF PASSIVE DIFFUSION BAG SAMPLING TECHNOLOGY AT SEVERAL DEPARTMENT OF DEFENSE INSTALLATIONS

AT

THE FORMER CARSWELL AIR FORCE BASE
TEXAS

March 2002

Prepared for

U.S. Department of the Army, Corps of Engineers,
Omaha District
Omaha, Nebraska

And

Air Force Base Conversion Agency,
Roslyn, Virginia

Reviewed and Approved By:

	Name	Date
Project Manager	Linda B Murray	3/12/02
Office Health and Safety Representative	James Hughes Mustard CIH	3/11/02

1.0 INTRODUCTION

This addendum modifies the existing Program Health and Safety Plan (HASP) entitled *Program Health and Safety Plan for Remedial Process Optimization Support and Demonstration of Passive Diffusion Bag Sampling Technology at Several Department of Defense Installations* (Parsons Engineering Science, Inc., [Parsons] 2002) for the evaluation of the use of passive diffusion bag samplers (PDBSs) in existing groundwater monitoring programs at selected U.S. Air Force (USAF) and other Department of Defense installations across the United States. This work is being performed under contract number F44650-99-D-005 Delivery Order DK01, for the U.S. Department of the Army, Corps of Engineers, Omaha District, and Air Force Base Conversion Agency (AFBCA), Roslyn, Virginia.

This addendum to the Program HASP was prepared to address the upcoming tasks at the former Carswell Air Force Base (AFB) in Texas. Included or referenced in this addendum are the scope of services, site specific description and history, project team organization, hazard evaluation of physical hazards and of known or suspected chemicals, and emergency response information. All other applicable portions of the Program HASP remain in effect.

2.0 SCOPE OF SERVICES

Site activities will involve the placement of a water-filled diffusive membrane capsule in a well installation device at a specific depth in an existing groundwater monitoring well. The wells are located in various areas throughout the base. After a specified period of time, the water in the sampler is transferred to a sample container and submitted for laboratory analysis. No drilling or ground-intrusive activities are anticipated under the current scope of work.

3.0 SITE SPECIFIC DESCRIPTION HISTORY

The descriptions, history, and maps for the various sites are contained in the work plan entitled *Site-Specific Work Plan for the Passive Diffusion Bag Sampler Demonstration at the Former Carswell AFB, Texas (*Parsons, 2002).

4.0 PROJECT TEAM ORGANIZATION

The project team assigned to the PDBS demonstration activities at the former Carswell AFB is identified in the Program HASP. The following personnel also will be involved in this project.

Mr. Peter Guest	Project Manager
Mr. John Hicks	Task Manager
Mr. John Tunks	Site Manager
Mr. Jason Bidgood	Site Health and Safety Officer
Mr. John Tunks, Ms. Lynette Lamenskie	Alternate Site Health and Safety Officers
Mr. Mike Dodyk	Carswell AFB Site Contact

5.0 HAZARD EVALUATION

5.1 Chemical Hazards

The primary contaminants of concern at the various sites are chlorinated compounds including trichloroethene (TCE), 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), 1,2-DCE, 1,1,2,2-tetrachloroethane, tetrachloroethane (PCE), and vinyl chloride; chromium; the volatile hydrocarbon constituents benzene, toluene, ethylbenzene, and xylenes (BTEX); and benzene compounds. Health hazard qualities for these and other compounds are presented in Table 5.1 at the end of this addendum. If other contaminants are found to exist at the site, this addendum will be modified to include the necessary information that will then be communicated to the onsite personnel.

5.2 Physical Hazards

Potential physical hazards at the former Carswell AFB include hazards associated with motor vehicles; slip, trip, and fall hazards; noise; and heat exposure. These hazards are discussed in the Program HASP.

6.0 EMERGENCY RESPONSE PLAN

6.1 Emergency Contacts

In the event of any emergency situation or unplanned occurrence requiring assistance, the appropriate contacts should be made from the list below. A list of emergency contacts must be posted at the site.

Contingency Contacts	**Telephone Number**
Site/Medical Emergency	911
Carswell AFB Fire Department	911 or (817) 246-1741
On-base mobile for Fire Department or Ambulance	(817) 782-6330
Poison Control Center	911 or (800) 441-0040
Site Contact: Mr. Mike Dodyk	(817) 782-7167

Medical Emergency

Hospital Name	Harris Methodist Hospital
Address	1301 Pennsylvania Avenue, Fort Worth, TX
Telephone Number	911 or (817) 882-2000
Ambulance	911 or (817) 922-3150

Directions to the Hospital:

Exit the former Carswell AFB to the south toward the East-West Freeway (Interstate 30). Follow signs for I-30 East. Follow I-30 for approximately 7 miles to the exit for Henderson Street. At Henderson Street, turn left (south). Follow to Pennsylvania Avenue and turn right (west). Continue one block and turn left (south) onto Fifth Avenue. The emergency entrance is located on the right.

Parsons Contacts	Telephone Number
Peter Guest Project Manager	(303) 831-8100 or 764-1919 (Work)
John Hicks Task Manager	(303) 831-8100 or 764-1941 (Work) (303) 279-3698 (Home)
Tim Mustard, CIH Program Health and Safety Manager	(303) 831-8100 or 764-8810 (Work) (303) 450-9778 (Home)
Ed Grunwald, CIH Corporate Health and Safety Manager	(678) 969-2394 (Work) (404) 299-9970 (Home)
Judy Blakemore Assistant Program Health and Safety Manager	(303) 831-8100 or 764-8861 (Work) (303) 828-4028 (Home) (303) 817-9743 (Mobile)
Parsons 24-Hour Emergency Contact Service	(866) 727-1411 (toll free)

7.0 LEVELS OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT REQUIRED FOR SITE ACTIVITIES

The personal protection level prescribed for field activities at the former Carswell AFB is Occupational Safety and Health Administration (OSHA) Level D with a contingency for the use of OSHA Level C or B, as site conditions require. This addendum and the flow chart presented in Figure 7.1 of the Program HASP will be used to select respiratory protection with the following comments and additions.

If sustained air-monitoring readings in the worker-breathing zone indicate vapor concentrations greater than background for 30 seconds or longer, the field crew will be forced to evacuate and ventilate the area until readings are less than 1 part per million (ppm) in the worker-breathing zone. If ventilation is inadequate, air samples will be taken to confirm or deny the existence of the contaminants of concern and/or the crew will upgrade to Level B respiratory protection. These air samples will be sent to a lab to be analyzed by US Environmental Protection Agency (USEPA) Compendium Method TO-14 or the equivalent. Decisions for further actions and for levels of respiratory protection will be made after consulting with the project manager and program health and safety manager.

Due to the nature of the field activities and the concentrations of the arsenic and chromium, these metals are not expected to pose a health hazard to field personnel.

Section 7 of the Program HASP contains guidelines for selection of personal protective equipment (PPE). PPE will be required when handling contaminated samples and when working with potentially contaminated materials. See page 7-4 of the Program HASP for PPE to be used.

8.0 FREQUENCY AND TYPES OF AIR MONITORING

A photoionization detector (PID) with an 11.7 electron volts (eV) (HNU®) or equivalent lamp will be used for air monitoring during this project since the ionization potentials of the contaminants of concern are below 11.7 eV.

TABLE 5.1 HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a] (ppm)	TLV [b] (ppm)	IDLH [c] (ppm)	Odor Threshold [d] (ppm)	Ionization Potential [e] (eV)	Physical Description/Health Effects/Symptoms
Arsenic (Inorganic, as As)	0.01 mg/m^3 [f] (29 CFR 1910.1018) [h]	0.01 mg/m^3	5 mg/m^3	NA [g]	NA	Silver-gray or tin-white, brittle, odorless solid. Causes ulceration of the nasal septum, dermatitis, gastrointestinal disturbances, nervous system degeneration, respiratory irritation, skin spots, and lung and lymphatic cancer. Mutagen, experimental teratogen, and carcinogen.
Benzene	1 (29 CFR 1910.1028) [h]	0.5 (skin) [i]	500	4.7	9.24	Colorless to light-yellow liquid (solid<42^{o}F) with an aromatic odor. Eye, nose, skin, and respiratory system irritant. Causes giddiness, headaches, nausea, staggered gait, fatigue, anorexia, exhaustion, dermatitis, bone marrow depression, and leukemia. Mutagen, experimental teratogen, and carcinogen.
Bromodichloromethane	NA	NA	NA	1,680 mg/m^3	10.88	Nonflammable liquid. Carcinogen.
n-Butyl Benzene	NA	NA	NA	NA	NA	Colorless liquid. Mildly toxic by ingestion. In rats, causes fibrosis, lung irritation, pulmonary edema, and hemorrhaging.
sec-Butyl Benzene	NA	NA	NA	NA	NA	Colorless liquid.
tert-Butyl Benzene	NA	NA	NA	NA	NA	Colorless liquid.
Chlorobenzene	75	10	1,000	0.21-60	9.07	Colorless, liquid narcotic with an almond-like odor. Irritates eyes, nose, and skin. Causes drowsiness, incoordination, and CNS depression. In animals, causes lung and kidney injury. Mutagen and experimental teratogen.
Chloroform (Trichloromethane)	2	10	500	205 [j]	11.42	Colorless, heavy liquid with pleasant odor. Irritates eyes and skin. Anaesthetic. Causes dizziness, mental dullness, nausea, confusion, headache, fatigue, anesthesia, and enlarged liver. Also attacks kidneys and heart. In animals, causes liver and kidney cancer. Mutagen, experimental teratogen, and carcinogen.
Chromium metal	1 mg/m^3	0.5 mg/m^3	250 mg/m^3	NA	NA	Blue-white to steel gray, lustrous, brittle, hard, odorless, metallic solid. Irritates eyes, skin, and respiratory system. Causes lung fibrosis. Explosive.
Chromium (II) and (III) Compounds (as Cr)	0.5 mg/m^3	0.5 mg/m^3	250 mg/m^3(II) 25 mg/m^3 (III)	NA	NA	Properties vary with compound. Irritates eyes and causes sensitization dermatitis.
1,2-Dichlorobenzene (o-DCB)	50 (ceiling) [k]	25	200	2-50	9.06	Colorless, to pale-yellow, liquid herbicide with a pleasant, aromatic odor. Irritates eyes, skin, nose, and mucous membranes. Causes liver and kidney damage and skin blisters. Mutagen, experimental teratogen, and questionable carcinogen.
1,4-Dichlorobenzene (p-DCB)	75	10	150	15-30	8.98	Colorless or white, crystalline, solid insecticide with mothball-like odor. Irritates eyes, skin, and respiratory tract. Causes eye swelling, profuse runny nose, headaches, anorexia, nausea, vomiting, low-weight, jaundice, and cirrhosis. In animals, causes liver and kidney cancer. Mutagen, experimental teratogen, and carcinogen.

TABLE 5.1 HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold [d/] (ppm)	Ionization Potential [e/] (eV)	Physical Description/Health Effects/Symptoms
1,1-Dichloroethane (DCA)	100	100	3,000	120	11.06	Colorless, oily liquid with chloroform-like odor and hot saccharine taste. Irritates skin. Causes CNS depression and kidney, lung, and liver damage. Experimental teratogen and questionable carcinogen.
1,1-Dichloroethene (DCE) (Vinylidene Chloride)	1	5	NA	NA	10.00	Colorless liquid or gas (>89°F) with a mild, sweet, chloroform-like odor. Irritates eyes, skin, and throat. Causes dizziness, headaches, nausea, shortness of breath, liver and kidney dysfunctions, and lung inflammation. Mutagen and carcinogen.
1,2-Dichloroethene (DCE) (cis- and trans-isomers)	200	200	1,000	0.085-500	9.65	Colorless liquid (usually a mixture of cis- and trans- isomers), with a slightly acrid, chloroform-like odor. Irritates eyes and respiratory system. CNS depressant. Cis- isomer is a mutagen.
1,2-Dichloropropane (Propylene Dichloride)	75	75	400	50	10.87	Colorless, liquid pesticide with chloroform-like odor. Irritates skin, eyes, and respiratory system. Causes drowsiness, lightheadedness, and liver and kidney damage. In animals, causes CNS depression and liver and mammary gland tumors. Mutagen and carcinogen.
Ethylbenzene	100	100	800 (10% LEL) [l/]	0.25-200	8.76	Colorless liquid with an aromatic odor. Irritates eyes, skin, and mucous membranes. Causes dermatitis, headaches, narcosis, and coma. Mutagen and experimental teratogen.
Bis(2-Ethylhexyl)Phthalate (Di-sec Octyl Phthalate)	5 mg/m^3	5 mg/m^3	5,000 mg/m^3	NA	NA	Colorless to light-colored, oily liquid with slight odor. Irritates eyes and mucous membranes. Also affects respiratory system, CNS, and gastrointestinal tract. In animals, causes liver damage, liver tumors, and teratogenic effects. Carcinogen.

TABLE 5.1 HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold[d/] (ppm)	Ionization Potential[e/] (eV)	Physical Description/Health Effects/Symptoms
Gasoline	300	300	NA	0.005-10	NA	Clear/amber flammable, volatile liquid with a characteristic odor. Irritates eyes, skin, and mucous membranes. Causes dermatitis, headaches, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, chemical pneumonia, and possible liver and kidney damage. In animals, causes liver and kidney cancer. Monitor for BTEX constituents. Carcinogen.
Isopropyl Benzene (Cumene)	50 (skin)	50	900 (10% of LEL)	0.088-0.132	8.75	Colorless liquide with a sharp, penetrating, aromatic, and gasoline-like Irritates eyes, skin, nose, mouth, throat, and mucous membranes. Causes dermatitis, headaches, CNS depression, narcosis, dizziness, light-headedness, vertigo, incoordination, ringing in ears, confusion, tremors, substernal pain, cough, hoarseness, nausea, vomiting, coma, and liver and
p-Isopropyltoluene (p-Cymene)	NA	NA	NA	NA	NA	Colorless to pale-yellow liquid with a mild, sweet aromatic, solvent-like odor. Irritates eyes, skin, mouth, and stomach. Causes chemical pneumonia, skin redness, dryness, defatting, headaches, nausea, vomiting, and incoordination. Mutagen.
MTBE	NA	40	NA	NA	NA	Colorless liquid. Irritates eyes, skin, nose, throat, and lungs. Causes difficulty concentrating and thinking, headaches, dizziness, weakness, nausea, lightheadedness, and fainting. Affects kidneys and reproductive system. Carcinogen.
Naphthalene	10	10	250	0.3	8.12	Colorless to brown solid (shipped as a molten liquid) with a mothball-like odor. Irritates eyes, skin, and bladder. Causes headaches, confusion, excitement, convulsions, coma, vague discomfort, nausea, vomiting, abdominal pain, profuse sweating, jaundice, hematoma, hemoglobin in the urine, renal shutdown, dermatitis, optic nerve disorders, and corneal and liver damage. Experimental teratogen and questionable carcinogen.
Propyl Benzene (Isocumene)	NA	NA	NA	NA	NA	Colorless to light-yellow liquid. Irritates eyes, nose, throat, and skin. Causes CNS depression, headaches, anorexia, dizziness, muscular weakness, incoordination, nausea, breathing difficulties, vertigo, mental confusion, and unconsciousness.
1,1,2,2-Tetrachloroethane	1 (skin)	1 (skin)	100	3-5	11.10	Heavy, colorless to pale-yellow liquid with pungent, chloroform-like odor. Powerful narcotic and liver poison. Strong irritant to eyes and mucous membranes. Causes nausea, vomiting, abdominal pain, finger tremors, jaundice, hepatitis, liver tenderness, dermatitis, blood disorders, sleepiness, hallucinations, distorted perceptions, tearing, salivation, restlessness, dizziness, convulsions, coma, death, and kidney damage. In animals, causes liver tumors. Mutagen and carcinogen.
Tetrachloroethene (PCE) (Perchlorethylene)	25 [m/]	25	150	5-50	9.32	Colorless liquid with a mild chloroform odor. Eye, nose, skin and throat irritant. Causes nausea, flushed face and neck, vertigo, dizziness, headaches, hallucinations, incoordination, drowsiness, coma, pulmonary changes, and skin redness. Cumulative liver, kidney, and CNS damage. In animals, causes liver tumors. Mutagen, experimental teratogen, and carcinogen.
Toluene	100	50 (skin)	500	0.2-40 [j/]	8.82	Colorless liquid with sweet, pungent, benzene-like odor. Irritates eyes and nose. Causes fatigue, weakness, dizziness, headaches,

TABLE 5.1 HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold [d/] (ppm)	Ionization Potential [e/] (eV)	Physical Description/Health Effects/Symptoms
						hallucinations or distorted perceptions, confusion, euphoria, dilated pupils, nervousness, tearing, muscle fatigue, insomnia, skin tingling, dermatitis, bone marrow changes, and liver and kidney damage. Mutagen and experimental teratogen.
1,1,1-Trichloroethane (TCA) (Methyl Chloroform)	350	350	700	20-500	11.00	Colorless liquid with a mild chloroform-like odor. Irritates eyes and skin. Causes headaches, exhaustion, CNS depression, poor equilibrium, dermatitis, liver damage, cardiac arrhythmia, hallucinations or distorted perceptions, motor activity changes, aggression, diarrhea, and nausea or vomiting. Mutagen, experimental teratogen, and questionable carcinogen.
1,1,2-Trichloroethane (TCA)	10 (skin)	10 (skin)	100	NA	11.00	Colorless liquid with a sweet, chloroform-like odor. Irritates eyes, skin, lungs, and nose. Causes dermatitis, liver and kidney damage, and CNS depression. In animals, causes liver cancer. Mutagen and carcinogen.
Trichloroethene (TCE)	50	50	1,000	21.4-400	9.45	Clear, colorless or blue liquid with chloroform-like odor. Irritates skin and eyes. Causes fatigue, giddiness, headaches, vertigo, visual disturbances, tremors, nausea, vomiting, drowsiness, dermatitis, skin tingling, cardiac arrhythmia, and liver injury. In animals, causes liver and kidney cancer. Mutagen, experimental teratogen, and carcinogen.
Trichlorofluoromethane (Fluorotrichloromethane, Freonâ 11)	1,000 (ceiling)	1,000 (ceiling)	2,000	135-209	11.77	Colorless to water-white, nearly odorless liquid (gas>75°F). Causes incoordination, tremors, dermatitis, cardiac arrhythmia, cardiac arrest, asphyxia, and frostbite (liquid).
1,2,4-Trimethylbenzene (Pseudocumene)	25	25	NA	0.027	8.27	Colorless liquid with a distinctive, aromatic odor. Irritates eyes, skin, nose, throat, and respiratory system. Causes bronchitis, hypochromic anemia, headaches, drowsiness, fatigue, dizziness, nausea, incoordination, vomiting, confusion, CNS depression, and chemical pneumonia.
1,3,5-Trimethylbenzene (Mesitylene)	25 [n/]	25 [n/]	NA	0.027 [n/]	8.39	Colorless liquid with a distinctive, aromatic odor. Irritates eyes, skin, nose, throat, and respiratory system. Causes bronchitis, hypochromic anemia, headaches, drowsiness, fatigue, dizziness, nausea, incoordination, vomiting, confusion, and chemical pneumonia. Mutagen.
Vinyl Acetate	10	10	NA	0.12-0.55	9.19	Colorless liquid with a sweet, fruity odor. Polymerizes to solid upon exposure to light. Irritates eyes, nose, skin, and throat. Causes hoarseness, coughing, loss of sense of smell, eye burns, and skin blisters. Mutagen and questionable carcinogen.
Vinyl Chloride	1 (29 CFR 1910.1017) [g/]	1	NA	260	9.99	Colorless gas (liquid<7°F) with a pleasant odor at high concentrations. Severe irritant to skin, eyes, and mucous membranes. Causes weakness, abdominal pain, gastrointestinal bleeding, enlarged liver, pallor or blue skin on the extremities, liver cancer, and frostbite (liquid). Also attacks lymphatic system. Mutagen, experimental teratogen, and carcinogen.
Xylene (o-, m-, and p-isomers)	100	100	900	0.05-200 [j/]	8.56 8.44 (p)	Colorless liquid with aromatic odor. P-isomer is a solid <56°F. Irritates eyes, skin, nose, and throat. Causes dizziness, drowsiness, staggered

TABLE 5.1 HEALTH HAZARD QUALITIES OF HAZARDOUS SUBSTANCES OF CONCERN

Compound	PEL [a/] (ppm)	TLV [b/] (ppm)	IDLH [c/] (ppm)	Odor Threshold[d/] (ppm)	Ionization Potential[e/] (eV)	Physical Description/Health Effects/Symptoms
						gait, incoordination, irritability, excitement, corneal irregularities, conjunctivitis, dermatitis, anorexia, nausea, vomiting, abdominal pain, and olfactory and pulmonary changes. Also targets blood, liver, and kidneys. Mutagen and experimental teratogen.

a/ PEL = Permissible Exposure Limit. OSHA-enforced average air concentration to which a worker may be exposed for an 8-hour workday without harm. Expressed as parts per million (ppm) unless noted otherwise. PELs are published in the *NIOSH Pocket Guide to Chemical Hazards* , 1997. Some states (such as California) may have more restrictive PELs. Check state regulations.

b/ TLV = Threshold Limit Value - Time-Weighted Average. Average air concentration (same definition as PEL, above) recommended by the American Conference of Governmental Industrial Hygienists (ACGIH), 2001 *TVLs® and BEIs®*.

c/ IDLH = Immediately Dangerous to Life or Health. Air concentration at which an unprotected worker can escape without debilitating injury or health effects. Expressed as ppm unless noted otherwise. IDLH values are published in the *NIOSH Pocket Guide to Chemical Hazards* , 1997.

d/ When a range is given, use the highest concentration.

e/ Ionization Potential, measured in electron volts (eV), used to determine if field air monitoring equipment can detect substance. Values are published in the *NIOSH Pocket Guide to Chemical Hazards* , June 1997.

f/ mg/m^3 = milligrams per cubic meter.

g/ Refer to expanded rules for this compound.

h/ NA = Not available.

i/ (skin) = Refers to the potential contribution to the overall exposure by the cutaneous route.

j/ Olfactory fatigue has been reported for the compound and odor may not serve as an adequate warning property.

k/ (ceiling) = Ceiling concentration which should not be exceeded at any time.

l/ Indicates that the IDLH value was based on 10% of the lower explosive limit for safety considerations, even though relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations *(NIOSH Pocket Guide to Chemical Hazards, 1997).*

m/ NIOSH recommends reducing exposure to the lowest feasible concentration, and limiting the number of workers exposed.

n/ Based on 1,2,4-Trimethylbenzene.

APPENDIX B

HISTORIC SITE DATA

Table 5.9
1999 Quarterly Groundwater Investigations Detections of TCE and Daughter Products above Method Quantitation Limits in Monitoring Wells Located in the Area of the Southern Lobe TCE Plume

Monitoring Well	Analyte	Result (µg/L)			
		January	April	July	October
FT09-12C	cis-1,2-Dichloroethene	33	26	27	20
	trans-1,2-Dichloroethene	ND	ND	ND	0.6
	Trichloroethene	1	1 J	0.8 F	1
	Vinyl Chloride	4	3	6	4
HM-123	1,1-Dichloroethene	4	3	ND	4 J
	cis-1,2-Dichloroethene	740	680 J	780	680 J
	Tetrachloroethene	0.7	0.7 J	ND	0.8
	trans-1,2-Dichloroethene	24	18	16 F	22
	Trichloroethene	3500	3300 J	4800	3500 J
	Vinyl Chloride	ND	6	ND	7
LF04-02	1,1-Dichloroethene	2	2	2	2
	cis-1,2-Dichloroethene	510	300 J	410	270
	Tetrachloroethene	9	11 J	6	9
	trans-1,2-Dichloroethene	22	24	24	23
	Trichloroethene	3300	2400 J	2800 J	2800
	Vinyl Chloride	3	2	4	4
LF04-4C	cis-1,2-Dichloroethene	7	6	5	6
	trans-1,2-Dichloroethene	2	2	1	1
	Trichloroethene	10	7 J	8 J	10
	Vinyl Chloride	3	2	4	1
LF05-19	cis-1,2-Dichloroethene	13	34	44 J	57
	trans-1,2-Dichloroethene	ND	0.7	1	1
	Trichloroethene	27	68 J	96	140
LF05-5G	1,1-Dichloroethene	3	3	4	3
	cis-1,2-Dichloroethene	290	140	190	250
	trans-1,2-Dichloroethene	20	12	20	32
	Trichloroethene	1000	560 J	920 J	1200
	Vinyl Chloride	8	6	11	18
ITMW-01T	cis-1,2-Dichloroethene	5	NA	3	3
	trans-1,2-Dichloroethene	0.7	NA	ND	ND
	Trichloroethene	12	NA	6	8
USGS07T	cis-1,2-Dichloroethene	0.8	NA	0.7 F	0.5
	Tetrachloroethene	1	NA	1 J	1
	Trichloroethene	0.7	NA	0.7 F	0.6
WHGLTA003	cis-1,2-Dichloroethene	8	7	5	
	Trichloroethene	28	27	18 J	24
WHGLTA004	1,1-Dichloroethene	2	2	2	2
	cis-1,2-Dichloroethene	180	120	140	100
	trans-1,2-Dichloroethene	6	5	5	7
	Trichloroethene	1300	1300 J	1100	870

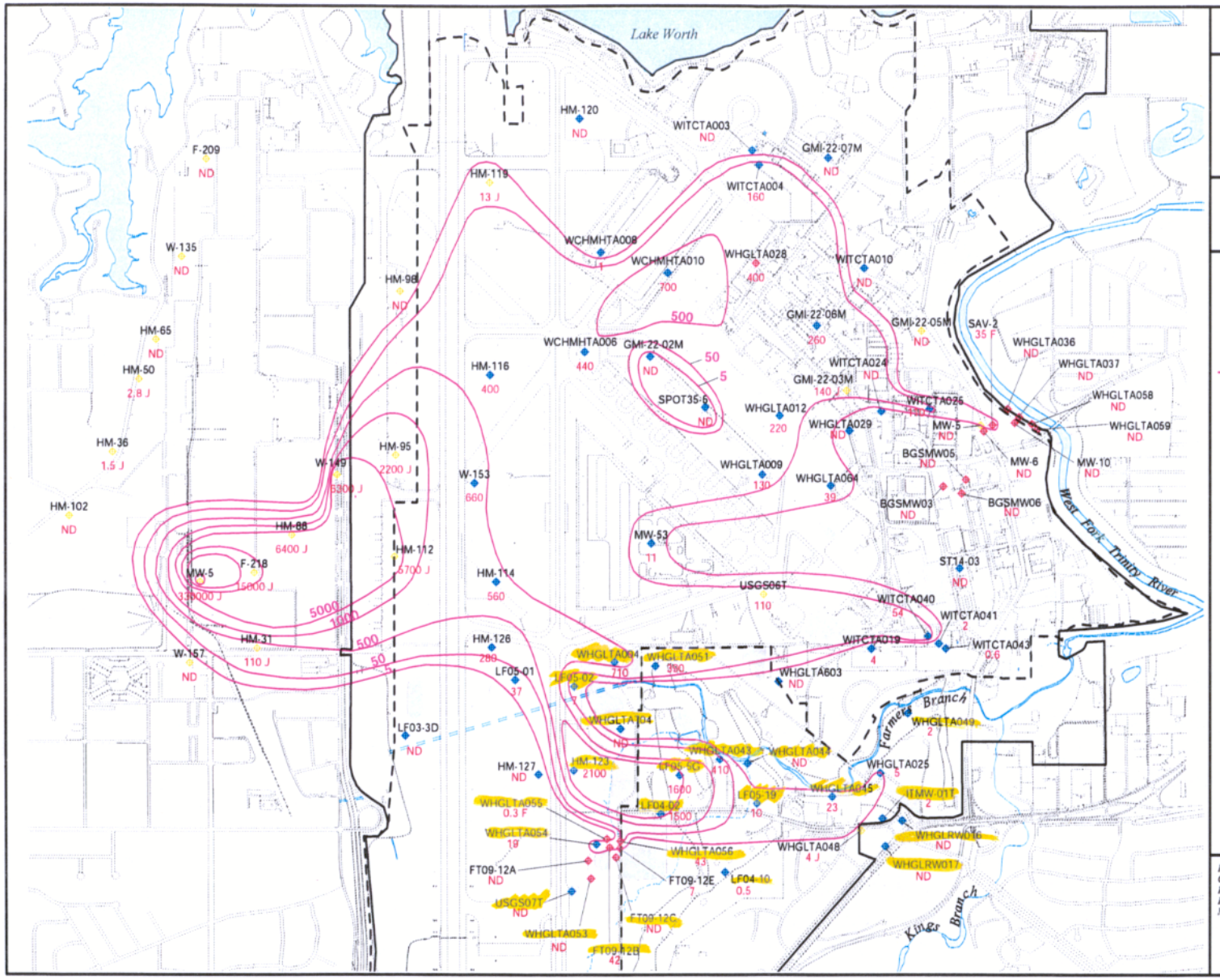
Table 5.9 (continued)
1999 Quarterly Groundwater Investigations Detections of TCE and Daughter Products above Method Quantitation Limits in Monitoring Wells Located in the Area of the Southern Lobe TCE Plume

Monitoring Well	Analyte	Result (µg/L)			
		January	April	July	October
WHGLTA601	cis-1,2-Dichloroethene	21	27 J	24	39
	trans-1,2-Dichloroethene	2	2	2	4
	Trichloroethene	110	150 J	120	180
WHGLTA701	1,1-Dichloroethene	NA	NA	5	3
	cis-1,2-Dichloroethene	NA	NA	88	450
	Tetrachloroethene	NA	NA	ND	0.6
	trans-1,2-Dichloroethene	NA	NA	70 J	56 J
	Trichloroethene	NA	NA	400	2700
	Vinyl Chloride	NA	NA	25 J	19
WHGLTA704	cis-1,2-Dichloroethene	NA	NA	NA	7
	trans-1,2-Dichloroethene	NA	NA	NA	2
	Trichloroethene	NA	NA	NA	1
	Vinyl Chloride	NA	NA	NA	2
WP07-10B	cis-1,2-Dichloroethene	500	430 J	480	450
	Tetrachloroethene	15	8 J	3	5
	trans-1,2-Dichloroethene	39	34	38	50
	Trichloroethene	3100	3100 J	2900 J	2700
	Vinyl Chloride	9	ND	15	14
WP07-10C	cis-1,2-Dichloroethene	300	320 J	350	250
	trans-1,2-Dichloroethene	26	35	65	
	Trichloroethene	1300	1500 J	910 J	1100
	Vinyl Chloride	25	24	83	17

Notes:
F - analyte was detected between the PQL and the reporting limit
J - analyte was positively identified, the quantitation is an estimation
NA - not analyzed
ND - not detected

Figure 5.4
TCE Concentrations
Terrace Alluvium
October 2001

U.S. Air Force Center For Environmental Excellence



Legend

- NAS Fort Worth JRB (Carswell Field)
- Former Carswell Air Force Base
- 50 — TCE Concentration Contour (µg/L)
- LF05-01 — NAS Fort Worth JRB Basewide Sampling Well
- 34 — TCE Concentration (µg/L)
- WHGLTA801 — Monitoring well data collected as part of other investigations during October 2001.
- 210 — TCE Concentration (µg/L)
- HM-119 — AFP 4 Semi-Annual Monitoring Well
- ND — TCE Concentration (µg/L)

ND = Not Detected at Laboratory Method Detection Limit of 0.5µg/L

F = The analyte was positively identified, but the associated value is below the PQL.

J = The analyte was positively identified, but the quantitation is an estimation.

Filename: \EEG001\01E130\Report\tce_oct2001.apr
Created: 08/03/01 jbelcher
Revised: 01/30/02 jb
Project: EEG001-001-05-13
Map Source: HydroGeoLogic, Inc. GIS Database, Jacobs Engineering

HYDRO GeoLogic INC.

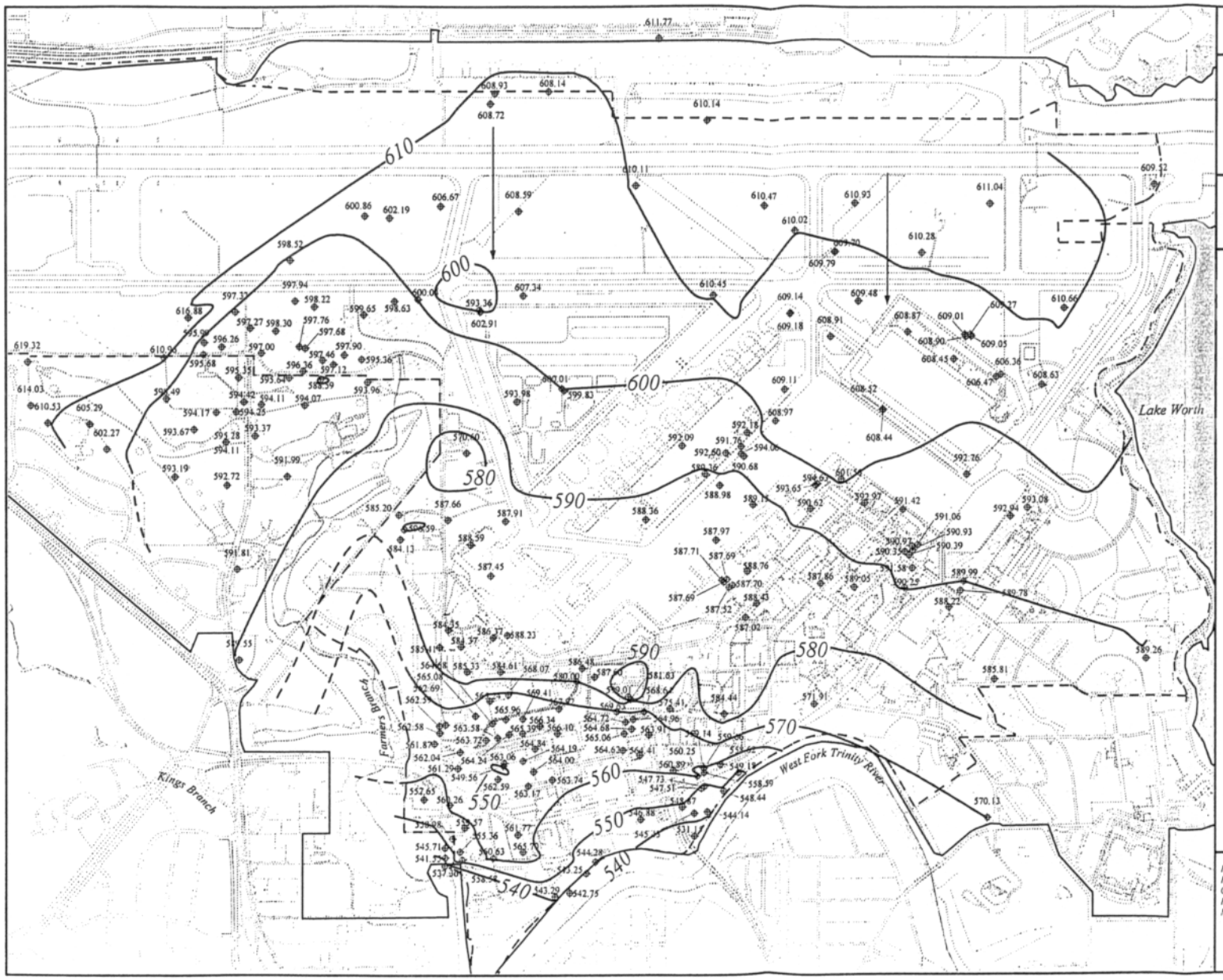


Figure 5.2

Water Level Elevations Terrace Alluvium July 1999

U.S. Air Force Center For Environmental Excellence
Brooks AFB, Texas

Legend

- NAS Fort Worth JRB (Carswell Field)
- Former Carswell Air Force Base
- -600- Groundwater Elevation Contour (Feet Above Mean Sea Level)
- Generalized Groundwater Flow
- Monitoring Well

N

0 500 1000 2000

SCALE IN FEET

Filename: X:\AFC001 26hbbc Report Water_lvl_elev_0799\5-2).apr
Project: AFC001-26HBBC
Created: 01 22 00 jbelcher
Revised: 03 16 00 jb
Map Source: HydroGeoLogic, Inc. GIS Database

HYDRO GeoLogic INC.

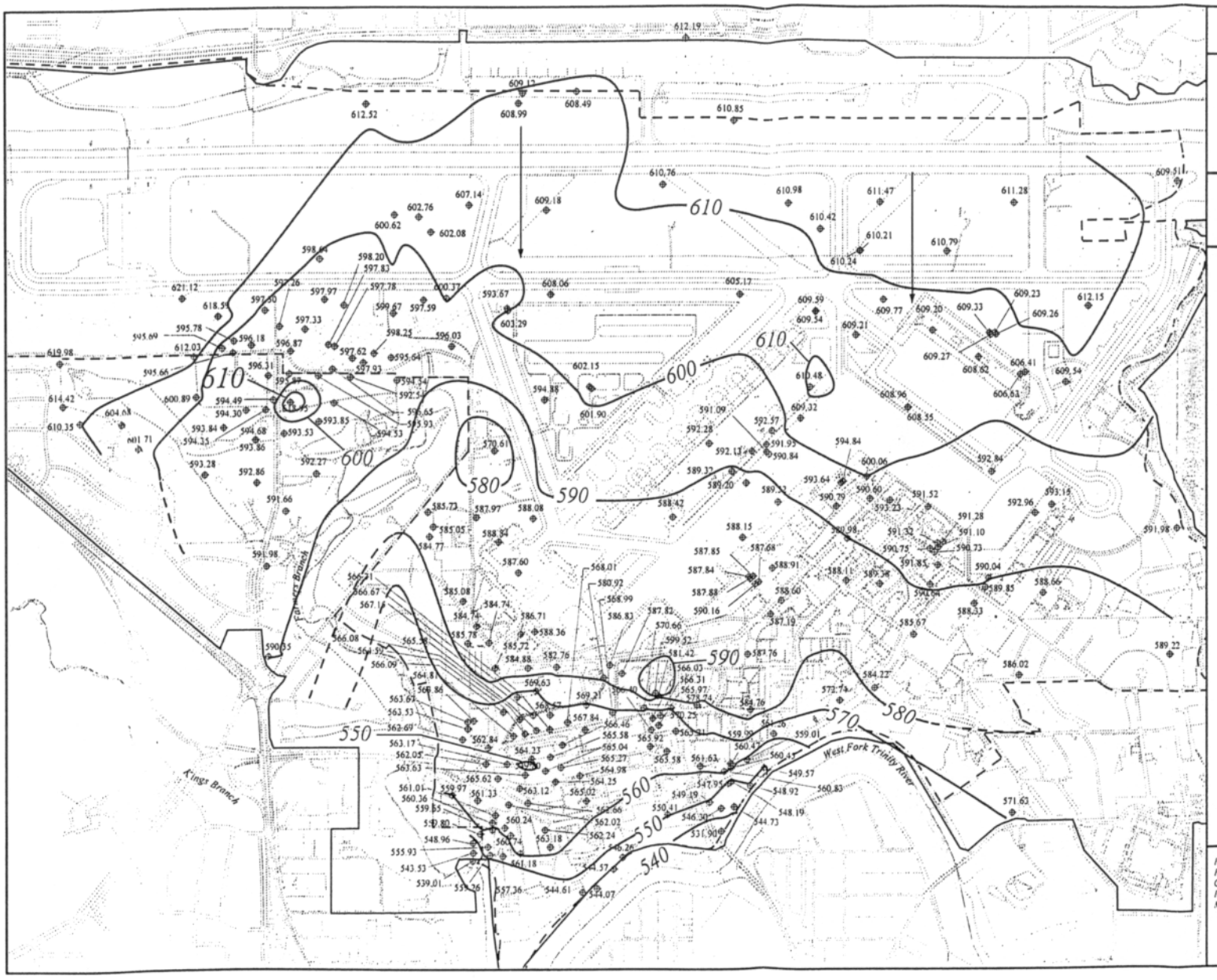


Figure 5.1

Water Level Elevations
Terrace Alluvium
January 1999

U.S. Air Force Center For Environmental Excellence
Brooks AFB, Texas

Legend

- NAS Fort Worth JRB (Carswell Field)
- Former Carswell Air Force Base
- -600- Groundwater Elevation Contour (Feet Above Mean Sea Level)
- Generalized Groundwater Flow
- Monitoring Well

N

0 500 1000 2000

SCALE IN FEET

Filename: X: AFC001 26hbbc Report Water_level_01-99.apr
Project: AFC001-26HBBC
Created: 01 12 99 cf
Revised: 03 20 00 up
Map Source: HydroGeoLogic, Inc. GIS Database

HYDRO GeoLogic INC

April 2001
Well Gauging and Inspection Information

WELL ID	Previous Seal	Current Seal	DEPTH TO WATER (FTOC)	TOTAL DEPTH (FTOC)	DATE	TIME	MP HEIGHT ABOVE/ BELOW GROUND ELEVATION (Feet)	CASING DIAMETER (Inches)	PID READINGS (ppm)		WELL CONDITION											COMMENTS
									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX	ID PLATE	PAD CONDITION	BOLTS	MANHOLE COVER	MANHOLE GASKET	LOCKS	WELL CAP	SAMPLER ID	Ded. Pump	
SD13-02	0439765	0026917	below TP	dedicated p.	3/28/01	1109	2.64	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	none	KD, AK	✓	*PID not working, top pump is @ 11.84'; dedicated pump
SD13-03	0438830	0026915	9.89	16.50	3/28/01	1119	2.94	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	none	KD, AK	none	*PID not working, firm bottom
SD13-04	0438982	0026916	below TP	dedicated p.	3/28/01	1116	2.76	2	*	*	✓	✓	✓	covered	NA	NA	NA	✓	none	KD, AK	✓	*PID not working, top pump is @ 7.52'; dedicated pump
SD13-05	0438862	0026911	7.65	13.50	3/28/01	0951	-0.19	4	*	*	none	✓	✓	cracked	✓	✓	none	✓	✓	KD, AK	none	*PID not working, firm bottom
SD13-06	none	0026867	8.16	dedicated p.	3/30/01	1220	2.06	4	0	0	✓	✓	✓	covered	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
SD13-07	0435983	0026863	16.18	21.57	3/30/01	1224	1.78	4	0	183	✓	✓	✓	covered	NA	NA	NA	✓	✓	KD, AK	none	odor, firm bottom
SPOT35-1	0438892	0026810	22.89	26.60	3/29/01	1312	-0.92	2	0	68	NA	NA	none	none	✓	✓	✓	✓	✓	KD, AK	none	firm bottom
SPOT35-3	0438985	0026801	20.32	23.75	3/29/01	1255	-0.66	2	0	189	NA	NA	✓	cracked	2 stripped	✓	✓	✓	✓	KD, AK	none	box filled w/ water, soft bottom, odor
SPOT35-4	0438895	0026802	20.92	24.22	3/29/01	1259	-0.96	2	0	96	NA	NA	✓	cracked	2 stripped	✓	✓	✓	✓	KD, AK	none	dedicated tubing, bolts stripped-threads blocked by broken bolt
SPOT35-5	0433050	0026934	22.22	dedicated p.	3/29/01	1244	-0.15	4	0	144	NA	NA	none	none	2 stripped	✓	none	✓	✓	KD, AK	✓	dedicated pump, no ID at well, bolts stripped
SPOT35-6	0438754	0026936	23.08	28.00	3/29/01	1227	-0.35	4	0	240	NA	NA	none	none	2 stripped	✓	none	✓	✓	KD, AK	none	bolts stripped, bailed water, firm bottom
SPOT35-7	0438714	0026803	8.15	20.35	3/29/01	1306	-0.04	4	0	0	NA	NA	none	none	1 stripped	✓	✓	✓	✓	KD, AK	none	bolt stripped, bailed water, firm bottom
SPOT35-8	0438735	0026808	23.10	26.60	3/29/01	1337	-0.16	4	0	28	NA	NA	✓	none	✓	✓	✓	✓	✓	KD, AK	none	firm bottom, dedicated tubing
SPOT35-9	0438720	0026806	22.67	28.50	3/29/01	1343	-0.40	4	0	6	NA	NA	✓	none	✓	✓	✓	✓	✓	KD, AK	none	firm bottom
ST14-01	0402316	0026946	12.73	18.29	3/28/01	1700	2.69	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	none	*PID not working, possible tubing
ST14-02	0402318	0026943	10.83	dedicated p.	3/28/01	1702	2.94	2	*	*	✓	✓	✓	gone	NA	NA	NA	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-03	0438911	0026983	7.50	dedicated p.	3/28/01	1737	1.85	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-04	0438840	0026942	11.13	dedicated p.	3/28/01	1650	2.71	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	✓	*PID not working, dedicated pump, id plate loose
ST14-24	0438870	0026855	10.18	dedicated p.	3/30/01	1051	-0.30	2	0	317	NA	NA	✓	✓	1 stripped	✓	✓	none	✓	KD, AK	✓	1 bolt stripped, dedicated pump
ST14-25	0438741	0433008	5.38	16.65	3/29/01	0914	-0.65	2	0	0	NA	NA	✓	✓	1 short	✓	✓	✓	✓	KD, AK	none	firm bottom, dedicated tubing, 1 bolt short
ST14-27	0438932	0026949	7.34	15.80	3/28/01	1613	-1.19	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, dedicated tubing, firm bottom
ST14-28	0438917	0026947	10.73	dedicated p.	3/28/01	1635	-0.44	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-29	0438818	0026921	8.25	dedicated p.	3/28/01	1130	-0.30	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-30	0402320	0433024	5.28	13.89	3/28/01	1218	-0.44	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom
ST14-W05	0438691	0026856	7.82	16.00	3/30/01	1044	-0.14	2	0	2.2	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	firm bottom
ST14-W06	0438855	0026861	7.53	22.55	3/30/01	1057	-0.26	2	0	1.1	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	soft bottom
ST14-W07	0438854	0026987	10.26	24.64	3/29/01	0903	-0.07	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	firm bottom
ST14-W08	0438868	0026997	8.49	24.96	3/29/01	0914	-0.30	2	0	36	NA	NA	none	none	stripped	✓	✓	✓	✓	KD, AK	none	soft bottom, bolts stripped
ST14-W09	0438853	0026968	6.95	20.18	3/29/01	0900	-0.27	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	firm bottom
ST14-W10	0438842	0026967	4.65	19.58	3/28/01	1804	-0.04	2	*	*	NA	NA	✓	corner cracked	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom
ST14-W11	0438931	0026985	5.03	dedicated p.	3/28/01	1815	-0.09	2	*	*	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-W12	0438843	0026969	3.87	17.67	3/28/01	1750	-0.17	2	*	*	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	none	*PID not working, water in curb box, firm bottom
ST14-W13	0438681	0026966	7.19	17.08	3/28/01	1800	-0.16	2	*	*	NA	NA	none	✓	✓	✓	none	✓	✓	KD, AK	none	*PID not working, firm bottom
ST14-W15	0438847	0026731	9.87	18.55	4/2/01	0842	-0.36	2	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not working, soft bottom
ST14-W16	0438936	0026981	6.68	dedicated p.	3/28/01	1717	-0.37	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-W18	0402319	0026990	7.62	dedicated p.	3/28/01	1719	-0.26	2	*	*	NA	NA	✓	none	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-W19	0438834	0026982	8.12	16.68	3/28/01	1721	-0.77	2	*	*	NA	NA	none	none	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom, odor
ST14-W20	0438833	0026984	7.97	15.92	3/28/01	1740	-0.03	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom
ST14-W21	0433044	0026941	9.08	dedicated p.	3/28/01	1640	-0.15	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump
ST14-W22	0438823	0026919	8.57	10.85	3/28/01	1059	-0.25	2	*	*	NA	NA	✓	cracked	✓	✓	none	✓	✓	KD, AK	none	*PID not working, firm bottom, no tubing
ST14-W23	0438838	0026922	3.69	9.87	3/28/01	1206	-0.14	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom, no tubing
ST14-W31	0438821	0026918	below TP	dedicated p.	3/28/01	1106	-0.28	2	*	*	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, dedicated pump top @ 9.30'
ST14-W32	0438827	0026868	3.59	12.14	3/30/01	1217	2.74	2	0	38	✓	✓	✓	covered	NA	NA	NA	✓	✓	KD, AK	none	firm bottom
USGS03T	none	0026816	2.22	8.68	3/30/01	0805	-0.77	2	0	0	NA	NA	none	none	2 of 3	✓	✓	✓	✓	KD, AK	none	cover loose, 2 bolts missing, firm bottom
USGS04T	0194121	0026841	17.98	19.01	3/30/01	0828	-0.24	2	0	0.2	NA	NA	none	none	✓	✓	✓	none	✓	KD, AK	none	soft bottom
USGS06T	none	0026845	17.28	dedicated p.	3/30/01	0936	-0.40	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	KD, AK	✓	dedicated pump
USGS07T	0438624	0026783	8.10	dedicated p.	3/29/01	1504	-1.34	2	0.1	0.6	NA	NA	none	cracked	✓	✓	none	none	✓	JW/CD	✓	dedicated pump
W-153	0438952	0026754	20.79	dedicated p.	3/30/01	1702	-0.13	2	0	25.1	NA	NA	✓	✓	1 stripped	✓	none	none	✓	JW/CD	✓	dedicated pump
WCHMHTA001	0438678	0026753	28.15	45.83	3/30/01	1650	-0.49	2	0	0	NA	NA	✓	✓	1 stripped	✓	✓	✓	✓	JW/CD	none	
WCHMHTA002	0438044	0026888	21.31	42.15	3/30/01	1513	-0.51	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, soft bottom
WCHMHTA003	0438046	0026875	21.53	28.63	3/30/01	1534	-0.69	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, firm bottom, silt on probe
WCHMHTA004	0438045	0026886	21.77	37.65	3/30/01	1525	-0.43	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working
WCHMHTA005	none	0026890	18.43	26.78	3/30/01	1443	-0.44	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, full of water, firm bottom

April 2001

Well Gauging and Inspection Information

WELL ID	Previous Seal	Current Seal	DEPTH TO WATER (FTOC)	TOTAL DEPTH (FTOC)	DATE	TIME	MP HEIGHT ABOVE/ BELOW GROUND ELEVATION (Feet)	CASING DIAMETER (Inches)	PID READINGS (ppm)		WELL CONDITION											COMMENTS
									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX	ID PLATE	PAD CONDITION	BOLTS	MANHOLE COVER	MANHOLE GASKET	LOCKS	WELL CAP	SAMPLER ID	Ded. Pump	
LF04-04	none	0026706	18.17	26.72	3/28/01	1553	2.72	2	0	0	✓	✓	none	NA	NA	NA	NA	✓	✓	JW, CD	none	
LF04-10	*	*	*	*	3/28/01	1543	-0.36	2	*	*	✓	NA	none	✓	1 stripped	✓	✓	✓	✓	JW, CD	none	*unable to gauge - Jacobs lock
LF04-4A	0433041	0026709	9.38	24.48	3/28/01	1441	1.19	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	
LF04-4B	0180786	0026708	18.43	25.28	3/28/01	1448	1.33	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	seal broken/tubing slipped 1'
LF04-4C	0180785	0026703	18.21	dedicated p.	3/28/01	1511	2.30	2	0	0	✓	✓	none	NA	NA	NA	NA	✓	✓	JW, CD	✓	seal broken, dedicated pump
LF04-4D	none	0026702	20.13	27.93	3/28/01	1505	2.25	2	0	0	✓	✓	none	NA	NA	NA	NA	✓	✓	JW, CD	none	
LF04-4E	none	0026701	23.55	40.43	3/28/01	1501	1.10	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	bailer inside well
LF04-4F	no lock or seal	0026710	29.26	36.97	3/28/01	1429	2.56	2	0	24.3	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	no lock/seal & lid not closed
LF04-4G	none	0433065	25.68	32.99	3/28/01	1308	0.92	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	well cap doesn't seal tightly
LF05-01	0433027	0026779	13.83	dedicated p.	3/29/01	1758	2.66	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	✓	dedicated pump
LF05-02	0438991	0026788	19.20	28.85	3/29/01	1533	2.39	2	0	0.1	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	
LF05-18	0180797	0433080	18.78	23.77	3/28/01	1228	-0.26	2	0	0	NA	NA	none	✓	1 stripped	✓	✓	✓	✓	JW, CD	none	dolphin lock on cap
LF05-19	0433046	0433086	13.77	dedicated p.	3/28/01	1027	-0.22	2	0	0.7	NA	NA	none	✓	✓	✓	✓	✓	✓	JW, CD	✓	dedicated pump
LF05-5A	0438784	0026791	24.65	30.35	3/29/01	1015	3.80	2	0	0	✓	✓	none	none	NA	NA	NA	✓	✓	JW, CD	none	rusty security post
LF05-5B	none	0433059	3.58	12.11	3/28/01	1352	3.30	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	no lock or seal
LF05-5C	0438631	0438973	11.30	21.14	3/29/01	0946	2.10	2	0	0	✓	✓	none	none	NA	NA	NA	✓	✓	JW, CD	none	
LF05-5E	none	0026793	28.49	35.50	3/29/01	1019	2.99	2	0	0	✓	✓	none	none	NA	NA	NA	✓	✓	JW, CD	none	unlocked/no seal- PVC cracked 4"
LF05-5G	none	0433070	below TP	dedicated p.	3/28/01	1325	3.39	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	✓	DTW below top of dedicated pump
LF05-5H	none	0433060	16.35	16.69	3/28/01	1340	2.03	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW, CD	none	
LSA1628-1	0438753	0026836	10.73	16.95	3/29/01	16.34	-0.76	4	0	409	NA	NA	none	cracked	✓	✓	✓	none	✓	KD, AK	none	strong odor
LSA1628-14	0402357	0026811	10.18	15.90	3/29/01	1641	-0.25	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	firm bottom, dedicated tubing
LSA1628-15	0402356	0026835	9.94	16.95	3/29/01	1638	-0.25	4	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	
LSA1628-2	0438947	0026842	10.28	19.05	3/30/01	0836	-0.33	4	0	330	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	firm bottom
LSA1628-3	0438740	0026812	10.06	dedicated p.	3/29/01	1646	-0.92	4	0	0	NA	NA	✓	✓	need 1	✓	✓	none	✓	KD, AK	✓	bail box, need to drill hole for bolt, dedicated pump
MW-10	0194415	0026927	9.77	32.77	3/28/01	1240	-0.68	4	*	*	NA	NA	✓	✓	none	none	none	✓	✓	KD, AK	none	*PID not functioning,curb box damaged, odor
MW-11	0194403	0433026	23.62	32.17	3/28/01	1235	-0.73	4	*	*	NA	NA	none	✓	none	broken	none	✓	✓	KD, AK	none	*PID not working, curb box damaged, manhole cover off
MW-11A	0438899	0026809	22.86	26.10	3/29/01	1324	-0.15	4	0	136	NA	NA	none	none	✓	✓	✓	✓	✓	KD, AK	none	strong odor, firm bottom
MW-12	0180729	0026929	3.92	27.31	3/28/01	1248	-0.76	4	*	*	NA	NA	✓	✓	none	none	none	✓	✓	KD, AK	none	*PID not working, box/manhole damaged, cap off, soft bm
MW-19	0438655	0026653	17.42	19.64	4/26/01	0952	-0.60	4	*	*	NA	NA	none	✓	✓	✓	✓	none	✓	KD	none	*no PID, no odor, firm bottom
MW-2	0180726	0026750	6.58	47.64	4/2/01	0856	-0.49	4	*	*	NA	NA	none	none	none	none	none	✓	✓	CD, KD	none	*PID not working
MW-3	0180724	0026958	9.76	19.64	3/28/01	1535	-0.20	4	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	firm bottom, dedicated tubing
MW-36	0438802	0026999	4.07	19.71	3/29/01	0956	-0.29	4	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	water in box, firm bottom
MW-37	0438804	0027000	8.84	19.73	3/29/01	0959	-0.33	4	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	
MW-38	0438885	0026931	15.74	18.41	3/29/01	1100	-0.30	4	0	602	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	none	dedicated tubing
MW-39	0438886	0026940	15.71	19.04	3/29/01	1102	-0.35	4	0	972	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	none	strong odor
MW-40	0438889	0026939	15.94	19.53	3/29/01	1104	-0.20	4	0	3.7	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	none	firm bottom, dedicated tubing
MW-42	0438871	0026993	16.06	19.47	3/29/01	1055	-0.30	4	0	590	NA	NA	✓	✓	✓	✓	none	✓	✓	KD, AK	none	strong odor
MW-5	0194350	0026960	2.98	7.98	3/28/01	1435	1.58	4	*	*	none	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	none	*PID not working, firm bottom, odor, dedicated tubing
MW-50	0438795	0026824	10.17	14.35	3/29/01	1414	-0.30	4	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	KD, AK	none	soft bottom
MW-51	0438796	0026823	10.29	15.00	3/29/01	1412	-0.35	4	0	0	NA	broken	none	cracked	none	none	none	none	✓	XD, AK	none	poor well condition, firm bottom
MW-52	0194080	0026843	11.61	19.13	3/30/01	0900	-0.35	4	0	0	NA	lifted	none	none	✓	✓	✓	none	✓	KD, AK	none	no box - mowers destroyed, soft bottom
MW-53	0433047	0026850	12.27	dedicated p.	3/30/01	0854	-0.50	4	0	0	NA	NA	none	cracked	✓	✓	✓	none	✓	KD, AK	✓	dedicated pump
MW-56	0438679	0026830	7.55	19.25	3/29/01	1425	-0.24	4	0	0	NA	NA	none	none	none	none	none	none	none	KD, AK	none	soft bottom, no pad, silt on probe
MW-57	0438778	0026814	11.56	14.22	3/29/01	1735	-0.45	4	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	KD, AK	none	firm bottom, dedicated tubing
MW-6	0402354	0026952	1.31	9.85	3/28/01	1445	-0.42	4	*	*	NA	NA	✓	cracked	1 bolt	✓	✓	✓	✓	KD, AK	none	*PID not working, curb box had water, firm bottom, odor
MW-7	0194492	0026951	6.79	16.54	3/28/01	1440	-0.41	4	*	*	NA	NA	none	✓	none	none	none	✓	✓	KD, AK	none	*PID not working, firm bottom, curb box destroyed
MW-8	0180728	0026902	3.13	26.72	3/28/01	1227	-0.79	4	*	*	NA	NA	✓	✓	none	none	none	✓	✓	KD, AK	none	*PID not working, silty bottom, pump/tubing, missing cover
MW-9	0194496	0026928	4.79	27.68	3/28/01	1245	-0.14	4	*	*	NA	NA	✓	✓	none	none	none	✓	✓	KD, AK	none	*PID not working, bailer, manhole damaged, soft bottom
MWMTAC-001	*	*	*	*	*	*	-0.11	*	*	*	NA	NA	*	*	*	*	*	*	*	JW/CD	none	unable to locate using metal detector
OT-15C	0438814/0438815	0026869/0026870	7.53	15.41	3/30/01	1109	3.70	2	0	9.8	✓	✓	✓	none	NA	NA	NA	none	none	KD, AK	none	firm bottom
SAV-1	0194444	0026924	5.94	18.78	3/28/01	1250	-1.11	4	*	*	NA	NA	none	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, soft bottom, cap doesn't fit, dedicated tubing
SAV-2	0180742	0026923	6.42	18.85	3/28/01	1252	-1.15	4	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, odor, cap doesn't fit casing well
SD13-01	0438912	0026930	10.93	17.35	3/28/01	1123	2.94	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	none	KD, AK	none	*PID not working, firm bottom

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WELL ID	Previous Seal	Current Seal	DEPTH TO WATER (FTOC)	TOTAL DEPTH (FTOC)	DATE	TIME	MP HEIGHT ABOVE/ BELOW GROUND ELEVATION (Feet)	CASING DIAMETER (inches)	PID READINGS (ppm)		WELL CONDITION												COMMENTS
									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX	ID PLATE	PAD CONDITION	BOLTS	MANHOLE COVER	MANHOLE GASKET	LOCKS	WELL CAP	SAMPLER ID	Ded. Pump	
15B	0438816	0026862	7.57	12.42	3/30/01	1114	3.95	2	0	9.7	✓	✓	none	none	NA	NA	NA	✓	✓	KD, AK	none	firm bottom
17I	0438850	0026988	9.89	19.77	3/29/01	0845	2.99	2	0	10.3	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	firm bottom
17J	0438849	0026989	10.10	21.04	3/28/01	1825	2.79	2	*	*	none	✓	none	none	NA	NA	NA	✓	✓	KD, AK	none	*PID not functioning, firm bottom
17K	0438841	0026986	8.55	18.58	3/29/01	0848	1.54	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	firm bottom
17L	0438681	0026965	9.24	21.04	3/28/01	1755	2.87	2	*	*	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	soft btm, *PID not functioning
17M	0438986	0026944	8.28	17.71	3/28/01	1705	1.68	2	*	*	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	*PID not functioning
BGSMW01	0438810	0026991	5.01	22.26	3/29/01	0945	-0.29	4	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	
BGSMW02	0180739	0026963	9.84	20.63	3/28/01	1539	-0.48	4	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; odor, firm btm
BGSMW03	0194331	0026954	9.23	20.43	3/28/01	1525	-0.44	4	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; soft btm, dedicated tubing
BGSMW04	0194485	0026910	10.42	22.53	3/28/01	1550	-0.62	4	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; odor
BGSMW05	0194347	0026955	4.57	12.57	3/28/01	1505	-0.32	4	*	*	NA	NA	✓	cracked	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; firm btm, dedicated tubing
BGSMW06	0194332	0026956	9.06	17.30	3/28/01	1510	-0.48	4	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; firm btm, dedicated tubing
BGSMW07	0194486	0026957	6.35	17.55	3/28/01	1515	-0.26	4	*	*	NA	NA	✓	✓	✓	✓	✓	none	✓	KD, AK	none	*PID not functioning; firm btm
BLDG1040-1	0438860	0026858	17.86	19.68	3/30/01	1014	-0.50	4	0	0	NA	NA	none	cracked	✓	✓	✓	none	✓	KD, AK	none	firm bottom
BSS-A	0402355	0026953	4.25	10.13	3/28/01	1455	-0.38	2	*	*	NA	NA	none	none	✓	✓	✓	none	broken	KD, AK	none	*PID not functioning; firm btm, cap broken-won't lock
FT08-11A	0433004	0026716	10.15	17.54	3/29/01	0911	3.50	2	0	0	✓	✓	none	cracked	NA	NA	NA	✓	✓	JW, CD	none	security post very rusty
FT08-11B	0438726/0438725	0438958/0438962	8.56	17.00	3/29/01	0924	4.55	2	0	0	✓	no hinge	none	cracked	NA	NA	NA	none	✓	JW, CD	none	no hinge for lock, 2 seals used
FT09-12A	0433013	0026800	13.78	27.77	3/29/01	1040	3.90	2	0	0	✓	✓	none	none	NA	NA	NA	✓	✓	JW, CD	none	
FT09-12B	0433012/0433015	0026799/0026796	30.85	37.67	3/29/01	1054	2.03	2	0	0	✓	no hinge	none	none	NA	NA	NA	none	✓	JW, CD	none	no hinge for lock, 2 seals used
FT09-12C	0433045	0026797	31.72	dedicated p.	3/29/01	1050	2.63	2	0	0	✓	✓	none	cracked	NA	NA	NA	✓	✓	JW, CD	✓	dedicated pump
FT09-12D	none	0026786	30.36	36.99	3/29/01	1411	2.65	2	0	215	✓	✓	none	slightly cracked	NA	NA	NA	✓	✓	JW, CD	none	no seal
FT09-12E	0438781	0026790	31.07	38.56	3/29/01	1433	2.98	2	0.2	3.1	✓	✓	none	cracked/broken	NA	NA	NA	✓	✓	JW, CD	none	cap wasn't attached, on ground
GMI-04-01M	0433057	0026747	19.30	20.03	4/2/01	1054	2.62	2	*	*	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	*PID not functioning; bailer inside
GMI-22-02M	0438898	0026933	10.75	dedicated p.	3/29/01	1236	2.70	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	KD, AK	✓	dedicated pump, box full of water
GMI-22-03M	none	0026992	20.32	dedicated p.	3/29/01	1034	2.37	2	0	0	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
GMI-22-04M	0438766	0026813	below TP	dedicated p.	3/29/01	1714	2.28	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump, top @ 19.61'
GMI-22-05M	none	0026977	11.19	dedicated p.	3/28/01	1406	2.78	2	*	*	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	✓	*PID not functioning, dedicated pump
GMI-22-06M	0433025	0026938	18.07	dedicated p.	3/29/01	1115	2.55	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
GMI-22-07M	0433048	0026839	15.75	dedicated p.	3/29/01	1547	2.75	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
GMI-22-08M	0402351	0433051	15.08	22.20	3/30/01	1340	2.67	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	KD, AK	none	soft bottom
HM-110	none	none	66.38	dedicated p.	3/30/01	1529	-0.57	4	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW, CD	✓	no seal due to type of well cap; dedicated pump
HM-111	none	none	*	*	*	*	-0.40	*	*	*	NA	NA	none	✓	✓	✓	*	none	✓	JW, CD	none	*not gauged/twist off cap broken
HM-112	none	none	27.03	48.86	3/30/01	1641	-0.44	4	0	181	NA	NA	✓	none	none	✓	none	✓	✓	JW, CD	none	no seal, well no bolts
HM-114	0194477	0026755	17.94	36.13	3/30/01	1734	-0.23	4	0	6.3	NA	NA	✓	none	NA	✓	✓	✓	✓	JW, CD	none	no tubing
HM-116	0438908	0026882	23.40	dedicated p.	3/30/01	1508	-0.43	4	*	*	NA	NA	✓	✓	none	✓	✓	✓	✓	KD, AK	✓	*PID not functioning, dedicated pump, no bolts
HM-117	none	0026874	22.02	38.52	3/30/01	1540	-0.40	4	*	*	NA	NA	✓	none	✓	✓	✓	✓	✓	KD, AK	none	*PID not functioning
HM-118	none	0026743	15.88	26.24	4/2/01	1010	-0.30	4	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not functioning/manual pump, soft botm
HM-119	none	0433053	14.02	dedicated p.	3/30/01	1604	-0.24	4	*	*	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD, AK	✓	*PID not functioning/dedicated pump
HM-120	0438792	0026871	1.95	dedicated p.	3/30/01	1355	-0.54	4	0	0	NA	NA	none	none	1 stripped	✓	✓	✓	✓	KD, AK	✓	*PID not functioning/dedicated pump, bolts stripped
HM-121	none	0026880	18.92	30.35	3/30/01	1407	-0.33	4	*	*	NA	NA	✓	none	2 stripped	✓	✓	✓	✓	KD, AK	none	*PID not functioning/bolts stripped/bailer
HM-123	0433054	0438977	25.80	dedicated p.	3/29/01	1624	-1.21	4	0	3.2	NA	NA	none	✓	✓	✓	✓	none	✓	JW, CD	✓	dedicated pump
HM-124	none	0026730	13.19	24.31	3/30/01	1748	-0.22	4	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW, CD	none	no tubing
HM-125	0026889	0026757	19.15	32.87	3/30/01	1714	-0.35	4	0	0	NA	NA	✓	none	✓	✓	✓	none	✓	JW, CD	✓	dedicated pump
HM-126	none	0026774	13.40	35.80	3/29/01	1741	-0.49	4	0	0	NA	NA	none	none	1 stripped	✓	✓	none	✓	JW, CD	none	well not labeled, no seal
HM-127	none	0026772	23.51	dedicated p.	3/29/01	1708	-0.32	4	0.2	240	NA	NA	✓	✓	1 stripped	✓	✓	none	✓	JW, CD	✓	dedicated pump
ITMW-01T	none	none	10.87	21.79	3/28/01	0805	-0.30	4	0	0	NA	NA	none	cracked	1 stripped	✓	✓	✓	✓	JW, CD	✓	ded. p., no seal due to 4" cap
LF01-1B	0438865	0026907	7.86	19.65	3/28/01	0927	-0.45	2	0	103	none	✓	✓	cracked	NA	NA	NA	✓	poor	KD, AK	none	cap doesn't lock, firm btm, dedicated tubing
LF01-1D	0481519/0434921	0026912	12.59	dedicated p.	3/28/01	1022	3.60	2	*	*	✓	✓	none	none	NA	NA	NA	✓	✓	KD, AK	✓	*PID not functioning, dedicated pump
LF01-1E	none	none	8.99	29.15	3/28/01	0841	2.85	2	0	0	none	✓	none	✓	✓	✓	✓	none	PVC	KD, AK	none	PVC cap
LF01-1F	none	none	9.00	29.45	3/28/01	0831	-0.43	2	0	0	none	✓	none	✓	none	✓	✓	none	PVC	KD, AK	none	PVC cap, soft btm, dedicated tubing
LF03-3D	0433095	0026876	below TP	dedicated p.	3/30/01	1644	3.65	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	✓	*PID not functioning/dedicated pump
LF04-01	0438783	0026792	31.00	41.31	3/29/01	1024	2.74	2	0	0	✓	✓	✓	cracked	NA	NA	NA	✓	✓	JW, CD	none	
LF04-02	0438729	0026707	28.44	dedicated p.	3/28/01	1458	2.68	2	0	24.6	✓	✓	✓	✓	NA	NA	NA	✓	✓	JW, CD	✓	dedicated pump

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									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX										
WCHMHTA006	none	0026881	18.24	36.37	3/30/01	1445	-0.49	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, soft bottom
WCHMHTA007	0438669	0026872	15.74	32.06	3/30/01	1435	-0.61	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, silt on probe
WCHMHTA008	0438933	0026826	14.60	24.60	3/29/01	1435	-0.30	2	0	55	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	dedicated tubing, firm bottom
WCHMHTA009	0438688	0026821	7.80	11.70	3/29/01	1352	-0.18	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	dedicated tubing, firm bottom, bailed water from box
WCHMHTA010	0438800	0026823	7.60	24.10	3/29/01	1353	-0.39	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	dedicated tubing, firm bottom, bailed water from box
WCHMHTA011	0438711	0026807	13.19	22.20	3/29/01	1401	-0.52	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	dedicated tubing, soft bottom, bailed water from box
WCHMHTA012	0438904	0026819	14.14	19.01	3/29/01	1658	-0.33	2	0	0	NA	NA	✓	covered	stripped	✓	✓	none	✓	KD, AK	none	stripped bolts
WCHMHTA013	none	0026975	14.95	dedicated p.	3/28/01	1411	-0.50	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	✓	*PID not working, water in curb box, dedicated pump
WCHMHTA014	0438794	0026873	7.29	11.89	3/30/01	1616	-0.32	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	*PID not working, tubing, firm bottom
WHGLPU001	0438927	0433067	75.72	85.82	3/28/01	1413	-0.07	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLWN002	0438929	0433088	5.26	28.42	3/28/01	1222	-0.10	2	0	0	NA	NA	none	✓	✓	✓	none	✓	✓	JW/CD	none	
WHGLPU003	0438918	0438963	72.33	89.35	3/29/01	1642	0.12	2	0.2	12.4	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLPU004	0438749	0433089	44.13	51.04	3/28/01	1212	-0.17	2	0	0	NA	NA	none	✓	✓	✓	none	✓	✓	JW/CD	none	
WHGLRW015	none	none	12.38	23.73	3/28/01	0833	-0.58	4	0	1.3	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	✓	no seal due to 4" cap - dedicated p.
WHGLRW016	0438603	0433055	10.96	22.58	3/28/01	0811	-0.50	4	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLRW017	0438695	0433056	12.90	25.51	3/28/01	0823	-0.40	4	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	well cap leaks allowing water in well
WHGLRW018	0438602	0433100	15.50	27.04	3/28/01	0935	-0.20	4	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLRW019	0180799	0026764	12.73	23.92	3/30/01	0800	-0.23	4	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA002	0180781	0433087	11.81	20.11	3/28/01	1230	-0.20	2	0	0	NA	NA	none	✓	✓	✓	none	✓	✓	JW/CD	none	I-66 lock on well cap
WHGLTA003	0180800	0433099	21.34	dedicated p.	3/28/01	1010	-0.25	2	0	0	NA	NA	none	✓	✓	✓	none	✓	✓	JW/CD	✓	seal broken, dedicated pump
WHGLTA004	0433010	0026718	16.68	dedicated p.	3/29/01	0901	-0.20	2	0	36	NA	NA	none	✓	✓	✓	none	none	✓	JW/CD	✓	dedicated pump
WHGLTA005	0438811	0026865	8.81	dedicated p.	3/30/01	1230	2.98	2	0	28.4	✓	✓	✓	covered	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
WHGLTA007	0438934	0026866	13.31	30.01	3/30/01	1226	-0.40	2	0	1771	none	✓	✓	✓	✓	✓	✓	✓	✓	KD, AK	none	odor, soft bottom, silt (grey) on probe
WHGLTA008	0438831	0026945	4.94	dedicated p.	3/28/01	1710	-0.38	2	*	*	none	✓	none	✓	✓	✓	✓	✓	✓	KD, AK	✓	dedicated pump
WHGLTA009	0180704	0026805	23.22	27.85	3/29/01	1331	2.75	2	0	1600	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	none	dedicated tubing, firm bottom
WHGLTA010	0194345	0026935	26.01	30.21	3/29/01	1250	2.26	2	0	2.1	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	none	dedicated tubing, soft bottom
WHGLTA011	0438797	0026825	11.55	dedicated p.	3/29/01	1431	1.94	2	0	0	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD, AK	✓	dedicated pump
WHGLTA012	0438916	0026998	18.02	23.55	3/29/01	1218	-0.60	2	0	170	none	✓	✓	none	✓	✓	✓	✓	✓	KD, AK	none	water in box, soft bottom, dedicated tubing
WHGLTA013	0438897	0026804	21.82	25.95	3/29/01	1318	-0.55	2	0	13	none	✓	✓	none	✓	✓	✓	✓	✓	KD, AK	none	water in box, firm bottom, dedicated tubing
WHGLTA014	0438925	0026932	20.75	26.95	3/29/01	12.07	-0.20	2	0	83.1	none	✓	✓	none	✓	✓	✓	✓	✓	KD, AK	none	firm bottom, dedicated tubing
WHGLTA020	0438671	0026704	10.01	14.78	3/28/01	1635	-0.32	2	0	0	NA	NA	none	✓	1 stripped	✓	✓	✓	✓	JW/CD	none	
WHGLTA022	0180789	0433098	21.11	32.39	3/28/01	1005	-0.24	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA023	0438601	0433097	15.41	21.38	3/28/01	0945	-0.45	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	casing cut at angle so cap doesn't seal
WHGLTA025	0433063	0433079	14.63	dedicated p.	3/28/01	1605	-0.34	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	✓	dedicated pump
WHGLTA026	0438732	0026776	20.92	27.68	3/30/01	1329	-0.47	2	0	8.3	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	no tubing
WHGLTA027	0438943	0026818	10.89	18.10	3/29/01	1704	-0.33	2	0	0	none	✓	✓	✓	✓	✓	✓	none	✓	KD/AK	none	soft bottom
WHGLTA028	0438901	0026820	13.70	18.60	3/29/01	1653	-0.36	2	0	0	none	✓	✓	✓	✓	✓	✓	none	✓	KD/AK	none	bail water from box, dedicated tubing
WHGLTA029	0438696	0026996	15.24	20.37	3/29/01	1024	-0.27	2	0	0	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	dedicated tubing
WHGLTA030	0438941	0026780	1.70	13.98	3/30/01	1200	-0.48	2	0	0	NA	NA	none	✓	1 stripped	✓	✓	none	✓	JW/CD	none	
WHGLTA031	0438913	0026777	5.51	10.95	3/30/01	1150	-0.52	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA033	0026964	0026767	9.37	27.28	3/30/01	1245	-0.52	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	firm bottom, tubing slipped deep down in well
WHGLTA034	0438906	0026913	7.45	14.50	3/28/01	1050	-0.71	2	*	*	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	*PID not working, dedicated tubing, firm bottom
WHGLTA035	0438907	0026914	7.71	14.50	3/28/01	1055	-0.39	2	*	*	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	*PID not working, dedicated tubing
WHGLTA036	0194348	0026905	4.72	23.60	3/28/01	0907	-0.52	4	0	0	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	dedicated tubing, firm bottom
WHGLTA037	0194333	0026908	10.82	23.20	3/28/01	0900	-0.43	4	0	930	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	dedicated tubing, firm bottom
WHGLTA038	0194349	0026904	24.03	25.60	3/28/01	0854	-0.41	4	0	778	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	firm bottom, no tubing
WHGLTA039	0438763	0026771	16.69	25.34	3/30/01	1212	-0.53	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA040	0438742	0026760	20.44	26.43	3/30/01	1331	-0.37	2	0	3.4	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA043	0438981	0433077	9.59	13.90	3/28/01	1253	-0.30	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA044	0438990	0433090	3.03	8.56	3/28/01	1036	-0.06	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA045	0438989	0026765	7.88	13.44	3/30/01	1114	-0.10	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA046	none	0433068	24.10	36.83	3/28/01	1405	-0.18	4	0	209	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	no seals
WHGLTA047	none	0433078	25.29	36.01	3/28/01	1422	-0.12	2	0	0	NA	NA	none	✓	1 stripped	✓	✓	none	✓	JW/CD	none	no seals

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WELL ID	Previous Seal	Current Seal	DEPTH TO WATER (FTOC)	TOTAL DEPTH (FTOC)	DATE	TIME	MP HEIGHT ABOVE/ BELOW GROUND ELEVATION (Feet)	CASING DIAMETER (inches)	PID READINGS (ppm)		WELL CONDITION										COMMENTS
									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX	ID PLATE	PAD CONDITION	BOLTS	MANHOLE COVER	MANHOLE GASKET	LOCKS	WELL CAP	SAMPLER ID	Ded. Pump	
WHGLTA048	0438752	0433096	12.64	24.98	3/28/01	0927	-0.26	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA049	0438729	*	*	*	*	*	-0.02	*	*	*	*	*	*	*	*	*	*	*	*	JW/CD	none	*well not gauged/5' above ground level
WHGLTA050	none	0026768	4.39	6.99	3/30/01	1052	-0.11	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA051	none	0026770	4.01	6.84	3/30/01	1044	-0.07	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA052	0433042	0026769	4.40	6.96	3/30/01	1103	-0.12	2	0	7.5	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA053	0433017	0026798	14.28	30.01	3/29/01	1045	3.20	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no lock
WHGLTA054	none	0026795	33.82	39.16	3/29/01	1032	3.52	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no seal or lock
WHGLTA055	0433039	0026784	31.56	41.45	3/29/01	1405	3.21	2	0	0	✓	✓	none	✓	NA	NA	NA	✓	✓	JW/CD	none	
WHGLTA056	0433020	0026787	31.00	40.29	3/29/01	1418	3.55	2	0.2	6.0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	
WHGLTA101	0439665	0026903	10.75	34.78	3/28/01	0835	-0.40	4	0	0	none	✓	✓	✓	✓	✓	✓	broken	✓	KD/AK	none	firm bottom, tubing slipped down well
WHGLTA102	0438661	0026901	10.00	37.75	3/28/01	0826	-0.40	4	0	0	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	soft bottom
WHGLTA103	0438662	0026909	18.28	45.60	3/28/01	0820	-0.40	4	0	0	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	soft bottom, dedicated pump
WHGLTA104	0438664	0026910	27.35	45.43	3/28/01	0813	-0.45	4	0	0	none	✓	✓	cracked	✓	✓	✓	✓	✓	KD/AK	✓	silt on probe, dedicated pump
WHGLTA201	0438861	0026860	17.26	22.16	3/30/01	1002	-0.30	2	0	0.1	none	✓	✓	✓	✓	✓	✓	none	✓	KD/AK	none	firm bottom, has tubing
WHGLTA202	0438952	0026859	17.72	21.80	3/30/01	1008	-0.25	2	0	0	none	✓	✓	✓	✓	✓	✓	none	✓	KD/AK	none	
WHGLTA203	0026714	0026851	14.62	dedicated p.	3/30/01	0955	-0.40	2	0	0	none	✓	✓	✓	✓	✓	✓	none	✓	KD/AK	✓	dedicated pump - pulled pump to meas.
WHGLTA204	0438654	0026844	16.97	25.32	3/30/01	0948	-0.42	2	0	0	none	✓	✓	none	✓	✓	✓	none	✓	KD/AK	none	box filled with water, silt on probe, dedicated tubing
WHGLTA302	0438994	0026778	16.67	22.75	3/29/01	1734	2.89	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no lock
WHGLTA303	0438639	0026773	20.03	27.35	3/29/01	1730	2.95	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no lock
WHGLTA601	0438670	0026763	12.23	dedicated p.	3/30/01	0824	-0.24	2	0	19	NA	NA	none	✓	1 stripped	✓	✓	none	✓	JW/CD	✓	dedicated pump
WHGLTA602	0438874	0026761	13.00	18.58	3/30/01	0838	-0.22	2	0	1.3	NA	NA	none	✓	1 stripped	✓	bad	none	✓	JW/CD	none	
WHGLTA603	0438876	0026762	14.25	19.96	3/30/01	0832	2.27	2	0	0.4	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no lock
WHGLTA604	0026848	0026751	17.59	24.03	3/30/01	1357	-0.22	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA701	0438637	0026785	23.55	34.95	3/29/01	1632	-0.23	2	0.2	2.6	NA	NA	none	✓	✓	✓	✓	none	poor	JW/CD	none	well cap has no seal
WHGLTA702	0433014	0438961	10.80	21.55	3/29/01	0927	3.17	2	0	0	✓	✓	none	none	NA	NA	NA	none	✓	JW/CD	none	
WHGLTA703	0433011	0438965	16.16	28.65	3/29/01	1615	2.55	2	0.4	10.4	✓	✓	none	none	NA	NA	NA	none	✓	JW/CD	none	hornets nest inside security post
WHGLTA704	0433023	0026717	8.97	22.30	3/29/01	0918	2.32	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	
WHGLTA705	0433002	0438956	1.84	10.70	3/29/01	0939	-0.53	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA706	0433003	0438957	10.20	18.00	3/29/01	0933	-0.56	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WHGLTA707	none	0438975	20.84	30.45	3/29/01	1550	3.13	2	0	0.9	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no seal or lock
WHGLTA708	0433031	0438976	20.74	29.30	3/29/01	1555	2.90	2	0	0.6	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no lock
WHGLTA709	0433016	0026782	20.30	30.45	3/29/01	1609	3.44	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	
WHGLTA801	0438972	0026711	7.59	13.84	3/28/01	1753	0.02	2	0	0	✓	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA803	none	0026705	6.40	12.23	3/28/01	1741	0.11	2	0	0	✓	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WHGLTA901	0180735	0026925	8.75	21.78	3/28/01	1320	3.30	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, soft bottom, dedicated tubing
WHGLTA902	0180745	0026971	10.99	32.48	3/28/01	1343	3.15	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, soft bottom, dedicated tubing
WHGLTA903	none	0026978	23.78	43.22	3/28/01	1335	2.97	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, soft bottom, dedicated tubing
WHGLTA904	none	0026980	21.07	36.78	3/28/01	1330	2.98	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, firm bottom, dedicated tubing
WHGLTA905	none	0026973	16.35	30.01	3/28/01	1350	2.97	2	*	*	none	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, firm bottom, dedicated tubing
WHGLTA952	0180744	0026972	22.04	57.08	3/28/01	1345	3.12	2	*	*	none	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, soft bottom, dedicated tubing
WHGLTA953	0180746	0026979	22.51	57.12	3/28/01	1335	2.70	2	*	*	none	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, soft bottom, dedicated tubing
WHGLTA954	0180749	0026926	23.65	57.18	3/28/01	1327	2.80	2	*	*	✓	✓	✓	✓	NA	NA	NA	✓	✓	KD/AK	none	*PID not working, firm bottom, dedicated tubing
WITCTA001	none	0026827	15.88	21.06	3/29/01	1457	-0.44	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	KD/AK	none	box filled with water, firm bottom
WITCTA002	0438791	0026829	3.15	7.35	3/29/01	1448	-0.47	2	0	0	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	box filled with water, firm bottom
WITCTA003	0438793	0026828	14.28	23.50	3/29/01	1515	-0.53	2	0	0	NA	NA	✓	✓	1 stripped	✓	✓	✓	✓	KD/AK	none	box filled with water, firm bottom, 1 bolt stripped
WITCTA004	none	0026831	below TP	dedicated p.	3/29/01	1522	-0.35	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	box filled with water, dedicated pump at 12.44'
WITCTA005	0438715	0026840	12.28	18.90	3/29/01	1530	-0.34	2	0	0	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	firm bottom
WITCTA006	0438713	0026832	12.35	15.58	3/29/01	1536	-0.25	2	0	0	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	box filled with water, firm bottom
WITCTA007	0402359	0026838	14.12	22.15	3/29/01	1552	2.97	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD/AK	none	box filled with water, firm bottom
WITCTA008	0402358	0026834	7.98	14.20	3/29/01	1626	2.16	2	0	0	NA	NA	none	none	✓	✓	✓	none	✓	KD/AK	none	no pad, silt on probe
WITCTA009	0402360	0026837	5.55	12.65	3/29/01	1618	-0.59	2	0	1.6	NA	NA	✓	✓	✓	✓	✓	none	✓	KD/AK	none	box filled with water, firm bottom
WITCTA010	0433028	0026833	below TP	dedicated p.	3/29/01	1609	-0.43	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	box filled with water, dedicated pump at 14.12'
WITCTA011	0402352	0026817	17.11	23.36	3/30/01	0818	-0.64	2	0	0	NA	NA	✓	cracked	1 of 2	✓	✓	✓	✓	KD/AK	none	box filled with water, firm bottom

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WELL ID	Previous Seal	Current Seal	DEPTH TO WATER (FTOC)	TOTAL DEPTH (FTOC)	DATE	TIME	MP HEIGHT ABOVE/ BELOW GROUND ELEVATION (Feet)	CASING DIAMETER (inches)	PID READINGS (ppm)		WELL CONDITION												COMMENTS
									PID BZ	PID TOC	BUMPER POSTS	SECURITY BOX	ID PLATE	PAD CONDITION	BOLTS	MANHOLE COVER	MANHOLE GASKET	LOCKS	WELL CAP	SAMPLER ID	Ded. Pump	
WITCTA012	none	0026792	9.75	17.08	4/2/01	0946	-0.62	2	*	*	NA	NA	none	✓	none	✓	none	none	✓	KD/AK	none	*PID not working
WITCTA013	0438776	0026937	below TP	dedicated p.	3/29/01	1127	-0.55	2	0	0	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	✓	*PID not working, box filled with water, dedicated pump
WITCTA014	0438779	0026815	20.48	24.37	3/29/01	1745	-0.18	2	0	0.1	NA	NA	✓	cracked	✓	✓	✓	✓	none	KD/AK	none	
WITCTA015	0438801	0026994	17.63	25.19	3/29/01	1044	-0.29	2	0	2.9	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	firm bottom
WITCTA016	0438881	0026748	18.38	dedicated p.	4/2/01	0934	-0.38	2	*	*	NA	NA	none	✓	stripped	✓	✓	✓	✓	KD/AK	✓	*PID not working, bolts stripped, dedicated pump
WITCTA017	0438777	0028974	8.92	dedicated p.	3/28/01	1400	-0.10	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	*PID not working, dedicated pump
WITCTA019	0438857	0026715	13.97	19.37	3/29/01	0837	-0.21	2	0	1.1	NA	NA	none	✓	✓	✓	✓	frozen	✓	JW/CD	none	lock frozen, no tubing
WITCTA020	none	0026849	19.23	25.50	3/30/01	0911	-0.06	2	*	*	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	*PID not working, box filled with water, dedicated tubing
WITCTA021	0438858	0026852	15.26	24.07	3/30/01	1017	-0.60	2	0	3	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	
WITCTA022	0438859	0026853	16.66	23.50	3/30/01	1022	-0.88	2	0	0	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	firm bottom, dedicated tubing
WITCTA024	0438909	0026995	16.58	dedicated p.	3/29/01	1032	-0.47	2	0	43.7	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	✓	dedicated pump
WITCTA025	0194387	0026976	9.89	12.17	3/28/01	1417	-1.51	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	*PID not working, box filled with water, firm bottom
WITCTA026	0194494	0026950	4.63	9.47	3/28/01	1425	-0.15	2	*	*	NA	NA	✓	cracked	✓	✓	✓	✓	✓	KD/AK	none	*PID not working, box filled with water, firm bottom, threads are stripped
WITCTA027	0194436	0026962	8.14	22.77	3/28/01	1545	-0.30	2	*	*	NA	NA	none	✓	✓	✓	✓	✓	✓	KD/AK	✓	*PID not working, box filled with water, dedicated pump
WITCTA028	01494459	0026906	2.75	14.80	3/28/01	0937	-0.16	2	0	0	NA	NA	✓	cracked	✓	✓	none	✓	✓	KD/AK	none	soft bottom
WITCTA031	0438803	0433007	4.70	6.93	3/29/01	0935	-0.66	2	0	0	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	firm bottom
WITCTA032	0438869	0438968	5.71	12.40	3/30/01	1222	-0.36	2	0	0	NA	NA	✓	✓	1 stripped	✓	✓	✓	✓	JW/CD	none	
WITCTA033	0438837	0026948	8.92	13.88	3/28/01	1617	-0.57	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	*PID not working, box filled with water, dedicated pump
WITCTA034	0438692	0026920	6.62	13.00	3/28/01	1029	-0.59	2	*	*	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	✓	*PID not working, box filled with water, dedicated pump
WITCTA035	0438867	0026857	12.74	18.11	3/30/01	1039	-0.78	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD/AK	none	dedicated tubing
WITCTA037	0438653	0026847	13.68	20.86	3/30/01	0929	-0.31	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	KD/AK	none	
WITCTA039	0438635	0026781	18.39	24.55	3/29/01	1539	-1.38	2	0.1	1.9	NA	NA	✓	✓	✓	✓	✓	none	✓	JW/CD	none	
WITCTA040	0194443	0026713	10.03	22.72	3/29/01	0827	-0.39	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	JW/CD	none	
WITCTA041	0180720	0438966	12.38	21.35	3/29/01	1116	-0.46	2	0	0	NA	NA	none	✓	1 stripped	✓	✓	none	✓	JW/CD	none	1 bolt stripped
WITCTA042	0194335	0026720	11.39	19.48	3/29/01	0747	-0.08	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WITCTA043	0194336	0026719	11.55	19.20	3/29/01	0752	-0.11	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	
WITCTA044	0194344	0026712	11.90	dedicated p.	3/29/01	0800	-0.59	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	✓	dedicated pump
WITCTA045	none	0026864	2.34	7.14	3/30/01	1320	-0.46	2	0	0	none	✓	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	box filled with water, no seal, firm bottom, silt on probe
WITCTA046	0438809	0433009	2.08	7.38	3/29/01	0924	-0.67	2	0	10.8	NA	NA	✓	✓	✓	✓	✓	✓	✓	KD/AK	none	box filled with water
WITCTA047	none	0026749	1.89	7.07	4/2/01	0912	-0.39	2	*	*	none	✓	none	✓	✓	✓	✓	none	✓	KD/AK	none	*PID not working, firm bottom
WITCTA048	none	0026791	2.93	8.32	4/2/01	0908	-0.41	2	*	*	NA	NA	none	✓	✓	✓	none	none	✓	KD/AK	none	*PID not working, firm bottom
WITCTA057	none	0438959	27.15	42.69	3/29/01	0955	2.69	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no seal or lock
WITCTA058	none	0438974	27.26	41.1	3/29/01	0959	2.60	2	0	0	✓	✓	none	✓	NA	NA	NA	none	✓	JW/CD	none	no seal or lock
WJETA530	0438606	0026789	29.21	44.10	3/29/01	1225	-0.23	2	0	0	NA	NA	none	✓	✓	✓	✓	none	✓	JW/CD	none	no tubing
WJETA534	none	none	22.37	39.61	3/29/01	1241	-0.36	2	0	0	NA	NA	none	undermined	✓	✓	✓	✓	✓	JW/CD	none	no tubing, unable to attach seal-dolphin
WJETA535	0438687	0438967	28.55	dedicated p.	3/29/01	1213	-0.21	2	0	0	NA	NA	none	cracked	✓	✓	✓	none	✓	JW/CD	✓	debris on well, well may be comprimised, dedicated pump
WP07-10A	0433001	0026794	28.64	37.95	3/29/01	1010	-0.20	2	0	0	✓	✓	none	none	NA	NA	NA	✓	✓	JW/CD	none	
WP07-10B	none	0433058	below TP	dedicated p.	3/28/01	1359	3.12	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	✓	dedicated pump
WP07-10C	none	0433069	21.16	33.14	3/28/01	1345	1.78	2	0	0	NA	NA	none	✓	✓	✓	✓	✓	✓	JW/CD	none	
WSAICTA002	0438995	0026756	14.45	24.74	3/30/01	1727	-0.27	2	0	0	NA	NA	✓	✓	✓	✓	✓	none	✓	JW/CD	none	no tubing
WSAICTA003	0438997	0026775	16.10	30.80	3/29/01	1802	-0.28	2	0	0	NA	NA	✓	✓	✓	✓	none	none	✓	JW/CD	none	no tubing
WSAICTA004	0438999	0026752	18.14	42.13	3/30/01	1550	-0.59	2	0	6.2	NA	NA	✓	✓	✓	✓	✓	none	✓	JW/CD	none	
WSAICTA005	0438996	0026758	19.92	35.31	3/30/01	1542	-0.21	2	0	2.9	NA	NA	✓	✓	✓	✓	✓	none	✓	JW/CD	none	

APPENDIX C

SAMPLING AND ANALYSIS PLAN FIELD PROCEEDURES

APPENDIX C
GROUNDWATER SAMPLING PROCEDURES

C.1 SITE RECONNAISSANCE AND PREPARATION

Prior to the groundwater sampling event, a site reconnaissance will be performed to check each new well location for accessibility to finalize the sampling sequence and identify storage areas for investigative derived wastes (IDW). Maps detailing vehicle access routes to new well locations will be prepared at this time for field sampling personnel.

A field office site will also be designated for centralization of sample tracking, packaging, and preparation for shipping.

C.1.1 WELL GAUGING/INSPECTION

Prior to groundwater sampling, wells will be inspected for signs of tampering or other damage. Repairs will be made to the wells in accordance with the well maintenance program in Section 4.0 of the Groundwater Sampling and Analysis Plan (GSAP). If tampering is suspected, (i.e., casing damage, missing locks or caps) this will be recorded in the field log book and on the well sampling form, and reported to the Field Coordinator. Wells that are suspected to have been tampered with will not be sampled until the Field Coordinator has discussed the matter with the Project Manager (PM).

Before the start of sampling activities, plastic sheeting will be placed around the well. The plastic sheeting will be used to provide a clean working area around the well head, and to prevent any soil contaminants from contacting sampling equipment. Water will be removed, when present, from the vault around the well casing of flush mounted wells prior to venting and purging. At the moment the well cap is removed, the headspace in the casing will be recorded with a photoionization detector (PID). Procedures in the Health and Safety Plan will be followed when concentrations of organic vapors or explosive gases are detected. Air monitoring data will be recorded on the well sampling form and the field book (Section C.8).

C.1.2 GROUNDWATER LEVEL MEASUREMENTS

Water-level measurements will be taken semi-annually from the majority of wells at the Base to determine the elevation of the water table or potentiometric surface. The wells will be measured consecutively and within the shortest time period possible. These measurements will be taken after all wells have been installed and developed and their water levels have recovered completely. Any conditions that may affect water levels will be recorded in the field log book.

Static water levels will be measured with water level meters prior to equipment entering the well. If the casing cap is airtight prior to measurement, time will be allowed for equilibration of the potentiometric surface after the cap is removed. Measurements will be repeated until

the water level is stabilized. Water levels will be measured from the notch located at the top of the well casing and recorded on the well sampling form. If well casings are not notched, measurements will be taken from the north edge of the top of the well casing, and a notch will be made using a decontaminated metal file.

An interface probe will be used if a light non-aqueous phase liquid (LNAPL) layer or dense non-aqueous phase liquid (DNAPL) is suspected in the well. It will be slowly lowered to the groundwater in order to produce the least disturbance to the liquid surface in the casing. The groundwater level will then be measured to the nearest 0.01 foot. The probe will be used to determine the presence of floating product, if any, prior to measurement of the groundwater. Hydrocarbon detection paste or any other method that may affect water chemistry, will not be used. When detected, the presence of LNAPL or DNAPL will be confirmed by withdrawing a sample with a clear, bottom-loading disposable bailer.

Well depths obtained from well logs will be used to estimate the length of the screened water column. All water level and total depth measuring devices will be decontaminated between wells and routinely checked with a tape measure to ensure that measurements are accurate.

C.1.2.1 LNAPL Removal Procedures

If the measured LNAPL thickness is greater than 0.05 feet, product removal will be initiated and continued until no measurable (<0.01 feet) free product remains. This thickness represents a practical lower limit for potential recovery, beyond which thickness measurements are less reliable and recovery not feasible. The preliminary removal technique used will depend on the thickness of LNAPL and the relative permeability of LNAPL saturated sediments. Initial recovery attempts will use a bottom-loading bailer that is slowly lowered in the well. If this method is not successful, an absorbent sock or pad consisting of ooliphatic membrane will be tethered and lowered into the well. Any LNAPL or wastes containing LNAPL that are generated during this process will be handled and disposed in a manner consistent with the procedures described in Section C.9.2. A description of the LNAPL removal technique used will be summarized in the groundwater monitoring reports and recommendations included to potentially improve LNAPL recovery efforts. The well will not be sampled until free product removal is complete as indicated by no detectable product in consecutive measurements.

C.2 PURGING PRIOR TO SAMPLING

C.2.1 MICROPURGE

Purging of monitor wells is performed to evacuate water that has stagnated in the well and may not be representative of the surrounding aquifer. Purging will be accomplished using micropurge techniques. Micropurge is a low-flow rate monitor well purging and sampling method that induces laminar (non-turbulent) flow in the immediate vicinity of the sampling pump intake, thus drawing groundwater directly from the aquifer, horizontally through the

measured using a flow through chamber in line with the pump during purging. Specific calibration procedures are outlined below.

- Temperature and ORP do not require field calibration. Proper maintenance of the probes will ensure consistent measurements and when discrepancies are noted, the probes will be returned to the manufacturer for repair and calibration.

- The pH will be field-calibrated with two buffer solutions which include the range of actual groundwater pH measurements. The stability of the calibration will be verified through the analysis of one standard periodically throughout the day as deemed necessary by the Field Investigation Task Manager.

- The EC probe will be calibrated with a 1,000 microsiemen solution.

- The DO probe will be calibrated with a 100% saturated environment. The probe will be checked for potential drift at the end of each day.

- Turbidity will be measured with a nephelometer (also known as a turbidimeter). It will be calibrated using a set of laboratory certified calibration vials.

- The hand-held portable PID is used to screen the air vapors when the well casing cap is removed and monitor the breathing zone. It will be calibrated daily with 100-ppm isobutylene in air standard.

C.9.1.2 Equipment Maintenance

Field equipment will be kept in a controlled storage room and will be decontaminated prior to return to storage. Any malfunctions will be reported to the Task Manager, who will initiate actions necessary for the repair or replacement of defective equipment. Equipment maintenance logs are kept updated and on file. Power supplies of battery-powered instruments will be checked daily. Rechargeable instruments will be recharged daily.

C.9.1.3 Decontamination of Field Equipment

Decontamination areas as necessary for personnel and portable equipment will be set up at each well location, and at the field office. The flow through chamber will be decontaminated at the end of the sample event according to the manufacturer's directions. The probes of the temperature, pH, EC, DO, Eh, and turbidity will be rinsed with ASTM reagent-grade water at the end of each day. The measurement vials for the turbidity meter will be rinsed with deionized water before and after each use and the vials will be decontaminated at the end of the sampling event. A mild acid, such as vinegar, will be used to remove any water stains. No decontamination is required for the PID.

All equipment that may directly or indirectly contact samples will be decontaminated in the designated decontamination area. This includes sampling devices and instruments such as slugs, pumps, interface probes, and water level meters. In addition, the sample will be prevented from coming into contact with potentially contaminating substances such as tape, oil, engine exhaust, corroded surfaces, and dirt.

The following procedure will be used to decontaminate sampling devices that can be hand-manipulated. The equipment will be scrubbed with a solution of potable water and Alconox, or equivalent laboratory-grade detergent. The equipment will then be rinsed with copious quantities of potable water followed by a ASTM Type II reagent-grade water. High pressure liquid chromatograph-grade water and distilled water purchased in stores are not acceptable substitutes for ASTM Type II reagent-grade water. Then the equipment will be rinsed with pesticide-grade methanol followed by with pesticide-grade hexane. The equipment will be air-dried on a clean surface or rack, such as Teflon®, stainless steel, or oil-free aluminum, elevated at least two feet above ground. If the sampling device will not be used immediately after being decontaminated, it will be wrapped in oil-free aluminum foil.

Type II reagent-grade water, methanol, and hexane will be purchased, stored, and dispensed only in glass, stainless steel, or Teflon® containers. These containers will have Teflon® caps or cap liners. HydroGeoLogic will assure that these materials remain free of contaminants. If any question of purity exists, new materials will be used. All fluids generated during decontamination will be handled in accordance with section C.9.2.

C.9.2 WASTE HANDLING

Waste handling will be dealt with on a site-by-site basis. Waste will be classified as either non-investigative waste or investigative waste per the requirements of 30 TAC §335 Subchapter R and 40 CFR Part 261, Subpart C. Non-investigative waste, such as litter and household garbage, will be collected as-needed to keep each site clean and orderly. This waste will be containerized and transported to the designated sanitary landfill or collection bin. Acceptable containers will be sealed boxes or plastic garbage bags.

All purge water from on-site monitor wells and decontamination fluids will be containerized for disposition either on- or off-site in accordance with ARARs. Liquid waste will be temporarily stored at the site in 55-gallon drums or in a large aboveground storage tank, and subsequently transported to a waste storage area designated by the AFCEE.

Characterization of IDW will be based on sample analysis obtained during the field investigation following EPA approved methods. Hazardous waste classification will first be determined as per 40 CFR §261.2, §261.3, or §261.4. Waste that is nonhazardous, is then classified as Class 1, Class 2, or Class 3 according to 30 TAC §335.505 - 335.507. Once the IDW has been characterized, an eight digit waste code number will be provided as required in §335.501. The disposal of IDW will be conducted in a timely and cost effective manner, and in accordance with all state and federal regulations.

Depending on the constituents of concern, fencing or other special marking may be required. The number of containers will be estimated on an as-needed basis. Liquid waste will be containerized in sealed, United Nations-approved steel 55-gallon drums or combined in a large aboveground storage tank. The containers will be transported in such a manner as to prevent spillage. To facilitate handling, the containers will be no more than half full when moved.

Each container will be properly labeled with site identification, monitoring well identification, date, matrix, constituents of concern, and other pertinent information for handling.

C.9.3 SITE RESTORATION

Each sampling location will be returned to its original condition when possible. Efforts will be made to minimize impacts to sampling locations, particularly those in or near sensitive environments, such as wetlands. Following the completion of work at a site, all drums, trash, and other waste will be removed. Decontamination and/or purge water will be transported to the designated locations.