

ENVIROTECH INC.

**Hydrogeologic Investigation
Bar-F No. 4
862 East Main Street
San Juan County, Farmington,
New Mexico**

Prepared for
Bar-F Enterprises, Inc.

Project No. 92154-4

February 17, 1994

**HYDROGEOLOGIC INVESTIGATION
BAR - F NO. 4
862 EAST MAIN STREET
SAN JUAN COUNTY, FARMINGTON, NEW MEXICO**

**PREPARED FOR
BAR-F ENTERPRISES, INC.**

**PREPARED BY
ENVIROTECH INC.
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MINIMUM SITE ASSESSMENT
BAR - F NO. 4
862 EAST MAIN St.
SAN JUAN COUNTY, FARMINGTON, NEW MEXICO

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FEBRUARY 17, 1994

Project No: 92154-4

MINIMUM SITE ASSESSMENT
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SAN JUAN COUNTY, FARMINGTON, NEW MEXICO

INTRODUCTION

Bar-F Enterprises, Inc. has retained Envirotech Inc. to perform a Hydrogeologic Investigation of an underground storage tank (UST) hydrocarbon spill incident at Bar-F Station No. 4, 862 East Main Street, Farmington, New Mexico (Figure 1, Site Location Map). This investigation was promulgated by the New Mexico Environment Department (NMED) to meet the requirements of the Underground Storage Tank Regulations (USTRs) Part XII, §1210. A release of hydrocarbons to the environment was discovered on April 5, 1993 during a diesel line repair. An additional spill was identified on April 29, 1993 during removal for closure of three USTs at the site. The Hydrogeologic Investigation of these spill incidents followed the plan prepared by Envirotech and outlined in "Workplan & Proposed Scope of Services, Hydrogeologic Investigation, Bar-F No. 4, 862 East Main Street, Farmington, New Mexico", dated December 21, 1993.

At the time of the initial hydrocarbon release the site contained several USTs including: one (1) 4,000 gallon steel tank for diesel, one (1) 6,000 gallon steel tank for premium unleaded gasoline, one (1) 8,000 gallon steel tank for regular gasoline, one (1) 12,000 gallon steel tank for regular gasoline, and one (1) 16,000 gallon steel tank for unleaded gasoline. There is one building on location consisting of a 15' x 50' convenience store and office. Topographically the site is relatively flat with a surface gradient of less than 1% slope to the southwest.

Envirotech performed a previous subsurface investigation at the property and documented findings in the report "Minimum Site Assessment, Bar-F Enterprises, Inc., 862 East Main Street, San Juan County, Farmington, New Mexico", dated August, 1993. In summary of that report, a release of product from the on-site UST system resulted in contamination of soil and groundwater at concentrations in excess of NMED standards. Information obtained from soil borings and groundwater monitor wells placed on-site indicated limited water and soil contamination, with a low probability of substantial off-site migration.

Field work for this Hydrogeologic Investigation was initiated on January 10, 1994 with the drilling of soil borings and installation

of groundwater monitor wells, and completed on February 10, 1994 following completion of slug testing.

This report includes a summary of the Purpose and Scope of Services for completion of the investigation, presents all field methods and data collected, and provides a discussion and interpretation of the results of the investigation.

PURPOSE AND SCOPE OF SERVICES

The purpose of the Hydrogeologic Investigation was to meet the requirements set forth in USTR Part XII, §1210-C & D. The following Scope of Services was followed to meet these requirements:

- 1) Test borings were advanced with a hollow stem auger drill rig at locations both on and off-site. The magnitude of petroleum hydrocarbon contamination in the soil borings was assessed and recorded at a minimum of 5 foot intervals using a Model 580B Organic Vapor Meter, via NMED Field Headspace method. As the soil borings were advanced, soil characteristics such as color, grain size, texture, degree of lithification, plasticity and clay content were assessed. Certain soil borings were advanced into the aquifer and completed as permanent groundwater monitor wells.
- 2) The newly installed and previously existing monitor wells were surveyed for relative elevation and location. The static depth to water was measured to determine the relative water table elevation.
- 3) The newly installed wells were developed by bailing until returns indicated balanced pH, temperature and conductivity, and minimal turbidity.
- 4) The newly installed and certain previously existing wells were sampled and analyzed for benzene, toluene, ethylbenzene, total xylenes and MTBE following SW846 protocol and USEPA Method 8020 testing procedures.
- 5) A slug/bail test was performed on a select monitor well to determine the aquifer property of transmissivity. The aquifer property of storativity was estimated by grain size analysis of a composite soil sample collected from wells installed during the investigation.
- 6) This report was prepared describing all field methods for drilling, sampling and testing of soils and water,

including discussion of the results of the field and laboratory data collected. The report was prepared to meet the requirements outlined in USTR §1210-C & D.

INVESTIGATIVE PROCEDURES

The Hydrogeologic Investigation commenced on January 10, 1994 with the advancement of borings and installation of monitor wells to complement the existing groundwater monitor system. Five borings, with four borings completed as groundwater monitor wells, were advanced on January 10-14, 1994. A total of 15 test borings and 10 monitor wells have been incorporated at the site, including 10 test borings and 6 monitor wells from previous investigations. All boring and well locations are indicated on the Site Plan, Figure 2, Appendix A (NOTE: Three groundwater monitor wells installed by others in October, 1989, are indicated on the Site Plan and labelled as MW#4-2B, MW#4-3 and MW#4-4. One of these wells, MW#4-3, was used to determine the vertical extent of water quality degradation during the Hydrogeologic Investigation).

Test borings for the Hydrogeologic Investigation were advanced with a CME-55 drill rig utilizing 7" OD x 3-3/4" ID hollow stem auger flights. Cuttings were logged by a qualified professional geological technician (see Appendix B for boring logs). Soil samples were collected with a split tube sample tool at a minimum of 5 foot intervals from the surface to the top of the water table and sample lithology was described. A representative soil specimen from the split tube was subject to the Field Headspace Procedure as described in USTR XII, Appendix C, to quantify the presence of soil hydrocarbon contamination. The split tube sample tool was decontaminated by cleaning with Alconox soap and rinsed in distilled water between sample events, and auger flights were cleaned with high pressure water between boring locations.

Four test borings (TH#12, TH#13, TH#14 and TH#15) were completed as groundwater monitor wells (MW#4-8, MW#4-9, MW#4-10 and MW#4-11, respectively) during the Hydrogeologic Investigation. These wells were constructed with 2-inch PVC casing and a 7 foot slotted screen interval straddling the water table (see Appendix B for monitor well construction details). Groundwater was encountered at approximately 3 feet to 8 feet below the ground surface. A graded 8/12 silica sand was filter packed across and one foot above the screened interval, and a bentonite seal was installed for approximately 0.5 feet above the filter pack. A cement/bentonite grout mix was placed above the bentonite seal and extended to a flush mount bolt down manhole cover installed at the ground surface.

During drilling of groundwater monitor wells MW#4-8 through MW#4-11, a composite sample of soil from within the first 5 feet of water table was collected for a single laboratory grain size analysis.

Construction methods for wells previously installed at the site are outlined in the Envirotech report "Minimum Site Assessment, Bar-F Enterprises, Inc., 862 East Main Street, San Juan County, New Mexico", dated August, 1993.

The newly installed wells MW#4-8, MW#4-9, MW#4-10 and MW#4-11 were developed on January 17, 1994. Well development was performed by hand bailing with a dedicated, disposable bailer until pH, conductivity and temperature reached stable conditions and turbidity was minimal.

A survey of well locations, elevations and water table surface was performed on February 1, 1994. Monitor well plan position was recorded to within +/- 1 foot and elevation was recorded to within +/- 0.01 foot using a Sokkia Set6S Laser Electronic Total Station. The depth to water in each monitor well was measured to +/- 0.01 foot with a steel Lufkin Surveyors tape measure. The PVC casing top on monitor well MW#4-6 was arbitrarily assigned an elevation of 100.00 feet.

Monitor wells MW#4-3 and MW#4-5 through MW#4-11 were sampled on January 27, 1994. Each well was purged by hand bailing a minimum of three well volumes of water using a dedicated PVC disposable bailer. Sampling followed well purging and was performed by filling two 40-ml VOA vials, headspace free, with well water and preserving with HgCl_2 for USEPA Method 8020 analysis. Each specimen was labelled and placed into an ice chest with ice for same day delivery to Envirotech Analytical Laboratory for testing of benzene, toluene, ethylbenzene, total xylenes (BTEX) and MTBE.

A slug/bail test was performed on February 10, 1994 using monitor well MW#4-9 for determination of aquifer flow properties. A pressure transducer connected to a continuous data logger was installed in the well and one bail of water was removed from the well. Transient recovery was recorded at 5 second intervals until stable conditions were achieved.

ANALYTICAL DATA

Analytical data collected during the investigation included soil types, field determination of soil organic hydrocarbon content, water quality data, groundwater gradients and aquifer flow properties. The following section provides information on this field and laboratory data.

The primary soil type encountered during the investigation was interlayered sands, silts, clays and cobbles. The soil type within the aquifer (found at 3 feet to 8 feet below ground surface) was generally a silty to clayey cobble mix. A composite soil sample

collected from within the first 5 feet of the water table was submitted to SHB-AGRA, Inc. for grain size analysis. Laboratory results from this testing are included in Appendix C.

Soil headspace measurements obtained during test hole drilling are included on the boring logs, located in Appendix B. Test hole locations and a plot of the maximum soil headspace measurement obtained from each boring is plotted on Figure 5, Appendix A.

Water samples collected from monitor wells were submitted to Envirotech Analytical Laboratory for analysis of BTEX and MTBE following USEPA Method 8020 protocol, as outlined in USEPA SW-846. The analytical results for this testing are summarized in Table 1 below, along with water quality data collected during previous investigations. Laboratory analytical reports, chain-of-custody forms and QA/QC documentation are included in Appendix C.

TABLE 1

Bar-F No. 4
Hydrogeologic Investigation
Summary Historical Groundwater Analytical Results
EPA Method 8020
(ug/L, equivalent to Parts per Billion)

MONITOR WELL	SAMPLE DATE	BENZENE	TOLUENE	ETHYL BENZENE	TOTAL XYLENES	MTBE
MW#4-3	1/27/94	0.6	ND	ND	ND	1.8
MW#4-5	7/12/93	18.9 ¹	2.9	4.5	6.1	226 ²
	1/27/94	1.3	ND	0.3	ND	48.4
MW#4-6	7/12/93	ND	ND	ND	ND	0.9
	1/27/94	ND	ND	ND	ND	ND
MW#4-7	7/12/93	152 ¹	16.3	61	105.3	9.1
	1/27/94	105 ¹	3.2	54	10.4	10.6
MW#4-8	1/27/94	0.4	0.9	ND	0.9	ND
MW#4-9	1/27/94	ND	3.6	ND	0.9	ND
MW#4-10	1/27/94	0.2	1.1	0.4	2.0	ND
MW#4-11	1/27/94	ND	1.3	0.3	2.4	ND

ND = Below Detection Limits

MTBE = Methyl-t-Butyl Ether

¹ Exceeds NMED regulatory limit of 10 ug/L

² Exceeds NMED regulatory limit of 100 ug/L

Relative well top elevation, groundwater surface and well headspace data obtained on February 1, 1994 is included below in Table 2. A map of the groundwater surface contour is located in Appendix A, Figure 3.

TABLE 2

Bar-F No. 4
Hydrogeologic Investigation
Relative Welltop and Groundwater Surface Data

February 1, 1994

MONITOR WELL	CASING ELEVATION ⁽¹⁾ (FEET)	DEPTH TO WATER (FEET)	RELATIVE WATER TABLE ELEVATION (FEET)	OVM HEAD-SPACE ⁽²⁾ (PPM)
MW#4-2B	99.46	8.48	90.98	NA
MW#4-3	99.63	8.19	91.44	ND
MW#4-4	98.78	6.23	92.55	NA
MW#4-5	99.62	8.09	91.53	3.5
MW#4-6	100.00	7.62	92.38	ND
MW#4-7	98.97	8.24	90.73	122
MW#4-8	98.08	5.03	93.05	6.0
MW#4-9	97.39	5.37	92.02	9.0
MW#4-10	97.51	7.17	90.34	ND
MW#4-11	92.90	3.41	89.49	3.9

⁽¹⁾ Casing elevations measured at the top of PVC casing. Monitor well MW#4-6 arbitrarily assigned an elevation of 100.00 feet.

⁽²⁾ Headspace of well measured with OVM immediately upon removal of locking well cap. ND = none detected. NA = not analyzed.

Transient recovery data obtained during slug testing performed February 10, 1994 on monitor well MW#4-9 is included in Appendix D.

USTR §1210-C-1: EXTENT OF GROUNDWATER CONTAMINATION

A total of 10 groundwater monitor wells have been installed at the site for determination of water quality (see Figure 2, Appendix A). Groundwater gradient information (see "USTR §1210-C-2: Rate & Direction of Migration", below) indicates that monitor locations are adequate to provide up gradient, lateral and down gradient water quality information.

The aquifer at the site appears to fall within jurisdiction of the New Mexico Water Quality Control Commission (NMWQCC) Regulations, Amended through August 18, 1991, Part 3-101-A, which identifies all waters with a total dissolved solids (TDS) content of 10,000 mg/L or less as requiring protection. NMED has adopted the NMWQCC Human Health Standard, Part 3-103, for application to groundwater at leaking hydrocarbon UST sites, as follows:

<u>CONSTITUENT</u>	<u>NMWQCC HUMAN HEALTH STANDARD (FROM COMMISSION REG. 3-103)</u>
Benzene	10 ug/L (Parts per billion)
Toluene	750 ug/L
Ethylbenzene	750 ug/L
Total Xylenes	620 ug/L
MTBE (From USTR §1219-A-3)	100 ug/L

Laboratory analytical data from the sample event performed January 27, 1994 (reference Table 1, above) indicates that only one well, MW#4-7, presently has water quality degradation in excess of NMED standards (for the constituent benzene only), while other gasoline contaminants were tested at below NMED standards in all wells.

Figure 4, Appendix A is a contour of the benzene value reported for monitor wells sampled on January 27, 1994. The general shape of the contaminate plume is oblong, with a north-south axis. It appears that the plume shape has been influenced by the local direction of groundwater flow, with contamination extending down gradient from the potential source area.

There may be a naturally occurring temporal decline in groundwater contamination. Monitor wells MW#4-5 and MW#4-7 were sampled on July 12, 1993 and again on January 27, 1994, with samples submitted for laboratory determination of BTEX and MTBE. Analytical results on both wells indicates a substantial declining or stable trend with all BTEX and MTBE constituents. Natural petroleum degrading microbes (ie, type Pseudomonas) are likely present at the site and biological activity is presumably responsible for reducing both soil and groundwater contaminate levels.

Monitor well MW#4-3 was previously installed by others to monitor groundwater quality. Construction methods for the well (see Figure B-16, Appendix B) make the well ideal for monitoring the vertical extent of groundwater contamination, with a screened interval extending from approximately 6 feet to 12 feet below the top of the water table. Analytical results obtained from the January 27, 1994 sample event found only trace amounts BTEX and MTBE constituents, with no contamination found to exceed NMED standards.

Based on groundwater analytical testing results, it is recommended that reclamation activities for this site be deferred until further trends in natural biodegradation of hydrocarbons can be established.

USTR \$1210-C-2: RATE AND DIRECTION OF MIGRATION

The groundwater elevation surface and contour as measured at the site on February 1, 1994 has been plotted on Figure 3, Appendix A. The gradient was found to be in a south direction with a slope of approximately 0.010 feet per foot.

Annual tank tightness testing has been documented for all tanks at the Bar-F No. 4 site since 1988. All tightness tests have indicated "tight", with no leaks found on tanks or dispenser lines. Therefore, it can be speculated that original groundwater contamination occurred prior to 1988. The groundwater contamination plume, indicated on Figure 4, Appendix A, identifies the maximum down gradient extent of contamination at a location approximately 300 feet from the location of the USTs. Assuming that the aquifer was initially contaminated in 1988 the plume has moved 300 feet in 6 years, or approximately 50 feet per year. This is a worst case scenario and the actual rate of migration is likely at some lesser velocity.

A declining trend in the magnitude of groundwater contamination has been documented at the site (see "USTR \$1210-C-1 Extent of Groundwater Contamination", above) and it is probable that contamination migration has achieved a steady state condition.

USTR \$1210-C-3: TRANSMISSIVITY AND STORATIVITY

The aquifer type at Bar-F No. 4 is an unconfined, poorly consolidated, silty/sandy/clayey cobble. Storativity of an unconfined aquifer is equivalent to porosity and can accurately be estimated by correlation. Correlation of grain size analysis (Reference "Practical Aspects of Groundwater Modeling, 3rd Edition", William C. Walton, 1988, pg 21) on soil samples collected

from within the aquifer during the investigation has determined the storativity to be approximately 0.25.

A slug/bail test was performed February 10, 1994 on monitor well MW#4-9. Well recovery versus time was graphed on a semi-log plot for type curve matching by the Cooper, Bredehoeft and Papadopoulos slug method (Reference "Ground-Water Hydraulics", S.W. Lohman, 1979, USGS Professional Paper 708, pg 27-30). Type curve matching determined the transmissivity of the screened section of the aquifer to be 0.15 feet²/day. Test data, calculations and plots for this analysis are included in Appendix D.

USTR \$1210-C-4: MONITOR WELL DATA

Boring logs and well construction diagrams for all borings and wells are included in Appendix B.

USTR \$1210-C-5: WATER TABLE ELEVATION

A groundwater contour map interpreted from water surface relative elevation information obtained February 1, 1994 is included as Figure 3, Appendix A. The groundwater gradient and flow direction was previously discussed above in "USTR \$1210-C-2: Rate and Direction of Migration".

USTR \$1210-C-6: EXTENT OF SOIL CONTAMINATION

Soil samples collected from the vadose zone during the auguring of test holes advanced for the investigation were subjected to headspace analysis following the procedure outlined in USTR XII, Appendix C. Headspace analysis results are indicated on the individual well boring logs included in Appendix B.

A plot of the maximum soil headspace reading obtained from each boring is included as Figure 5, Appendix A. No borings were advanced within the public streets (Navajo or Main Streets) adjacent to the site and the extent of soil hydrocarbon contamination extending into these streets has been estimated. Soil headspace values exceeding 100 ppm (the NMED regulatory standard for reclamation at sites where the depth to groundwater is less than 50 feet, as per USTR \$1209-D) has been interpreted to be primarily on-site, with very limited off-site migration.

USTR \$1210-C-7: FREE PRODUCT RECOVERY

No free product is known to exist at the leaking UST site and no free product recovery system has been installed.

USTR \$1210-C-8: SOIL TREATMENT

All known highly contaminated soils were removed from the site during UST closure/replacement in April and May, 1993. No soil treatment system has been installed for remediation of remaining contaminated soils at the site.

USTR \$1210-C-9: SAMPLING PROCEDURES

Soil and groundwater sampling procedures were described in Section 2 of this report, under the heading "Investigative Procedures".

CONCLUSIONS

The following conclusions are based on the results obtained during the Hydrogeologic Investigation:

- 1) Soil contamination exceeding NMED USTR standards for field headspace measurement has resulted from a hydrocarbon UST system. The extent of soil contamination is primarily limited to on-site.
- 2) Groundwater contamination exceeding NMED USTR standards for the gasoline constituent benzene is currently present in one on-site well (MW#4-7). No free product was encountered in any test boring or groundwater monitor well. No off-site migration of water with contamination in excess of NMED USTR regulations has been identified.
- 3) The local groundwater gradient is in a south direction with a magnitude of approximately 0.010 feet per foot. Migration of hydrocarbon contamination is estimated at a maximum rate of 50 feet per year, but natural biodegradation may be actively remediating contamination and maintaining a steady state condition.
- 4) The storativity within the contaminated portion of the aquifer is estimated at 0.25 from grain size correlations, and the transmissivity is estimated at 0.15 feet² per day as calculated from slug/bail testing.

RECOMMENDATIONS

- 1) Based on groundwater analytical testing results, it is recommended that reclamation activities for this site be deferred until further trends in natural biodegradation of hydrocarbons can be established.

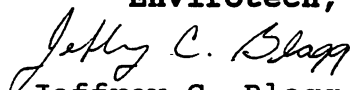
LIMITATIONS AND STATEMENT OF FAMILIARITY

This report has been prepared for the exclusive use of Bar-F Enterprises, Inc. as it pertains to the investigation of hydrocarbon contamination at Bar-F No. 4, 862 East Main Street, Farmington, New Mexico. The conclusions presented herein are based on visual observations, subsurface soil conditions encountered at boring locations and analysis of soil and water samples collected during the investigation. This report does not reflect variations which may exist between sampling locations.

The scope of Envirotech's services was limited to assessment of soil and/or groundwater contamination with respect to hydrocarbons associated with typical fueling facilities. This report was prepared to meet the minimum requirements as set forth in USTR §1210-C & D. All work has been performed in accordance with generally accepted professional practices in geotechnical, environmental and petroleum engineering and hydrology.

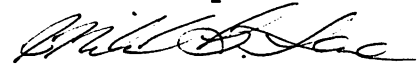
I certify that the work performed by Envirotech as described in this report was directed by my supervision, and that I am personally familiar with the results of the investigation and the contents of this report.

Respectfully submitted,
Envirotech, Inc.


Jeffrey C. Blagg, P.E.
Geological Engineer

JCB/HYGEO.RPT

Reviewed by:


Michael K. Lane, P.E.
Geological Engineer

APPENDIX A

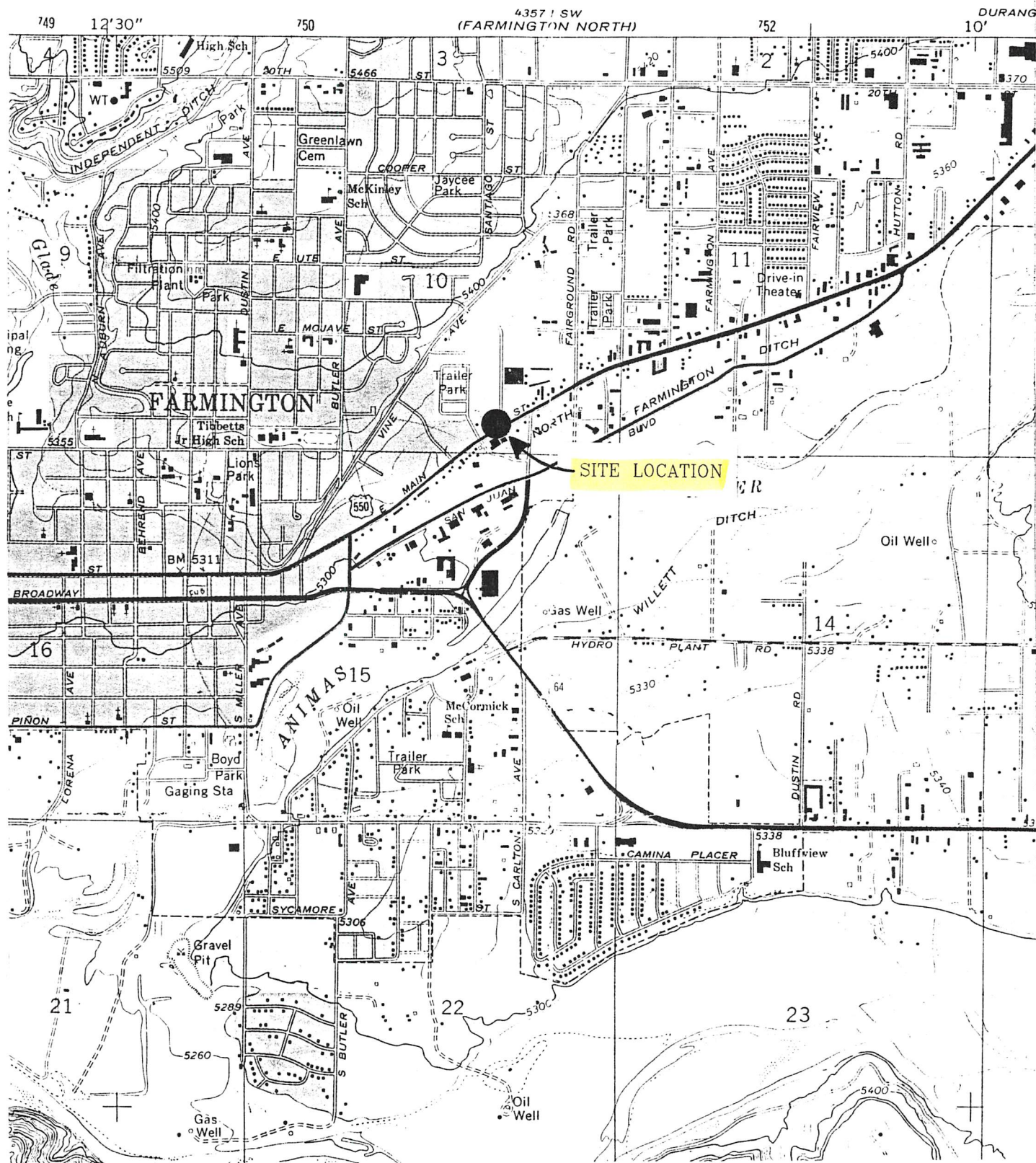
Figure 1: Location Map

Figure 2: Site Plan

Figure 3: Groundwater Contour

Figure 4: Contour of Groundwater Benzene
Concentration

Figure 5: Maximim Soil Headspace
Measurements



BAR-F DIAMOND SHAMROCK
860 EAST MAIN STREET
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SITE LOCATION MAP

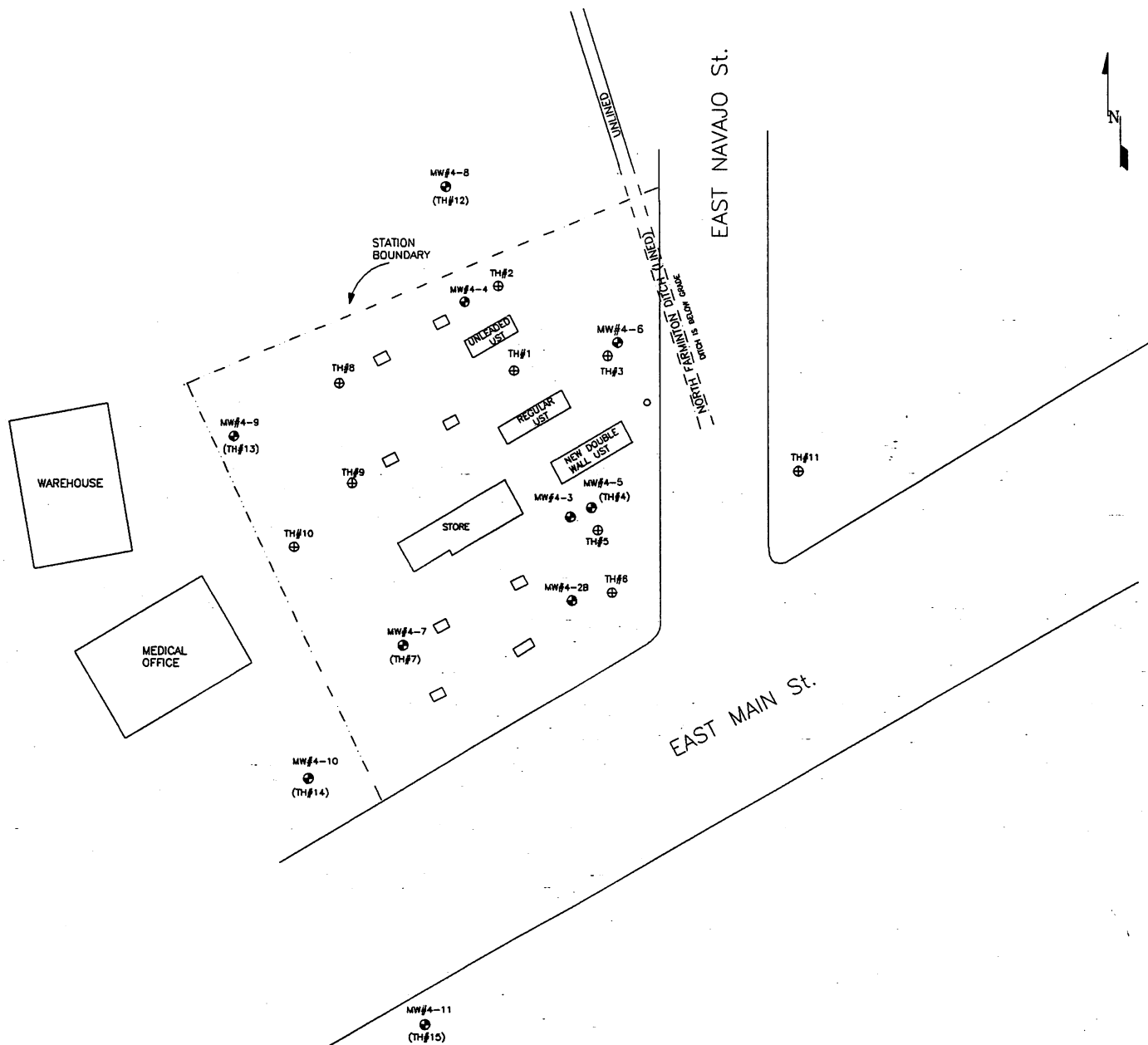
FIGURE 1

DRWN BY:
JCB

2154MAP1

PROJ MANG:
JCB

PROJECT NO. 2154-4 JULY, 1993



LEGEND

- TH#6
⊕ TEST HOLE LOCATION
- MW#4-5
⊕ GROUNDWATER MONITOR WELL LOCATION
- FUEL DISPENSER LOCATION

SCALE

0 25' 50' 100'

LOCATIONS OF MONITOR WELLS AND SOIL BORINGS WERE DETERMINED BY MEASURING FROM EXISTING TOPOGRAPHIC FEATURES & BUILDINGS USING TAPE MEASURES AND STADIA. LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE MEASUREMENT METHODS USED.

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PROJECT NO: 92154-4 FEB, 1993

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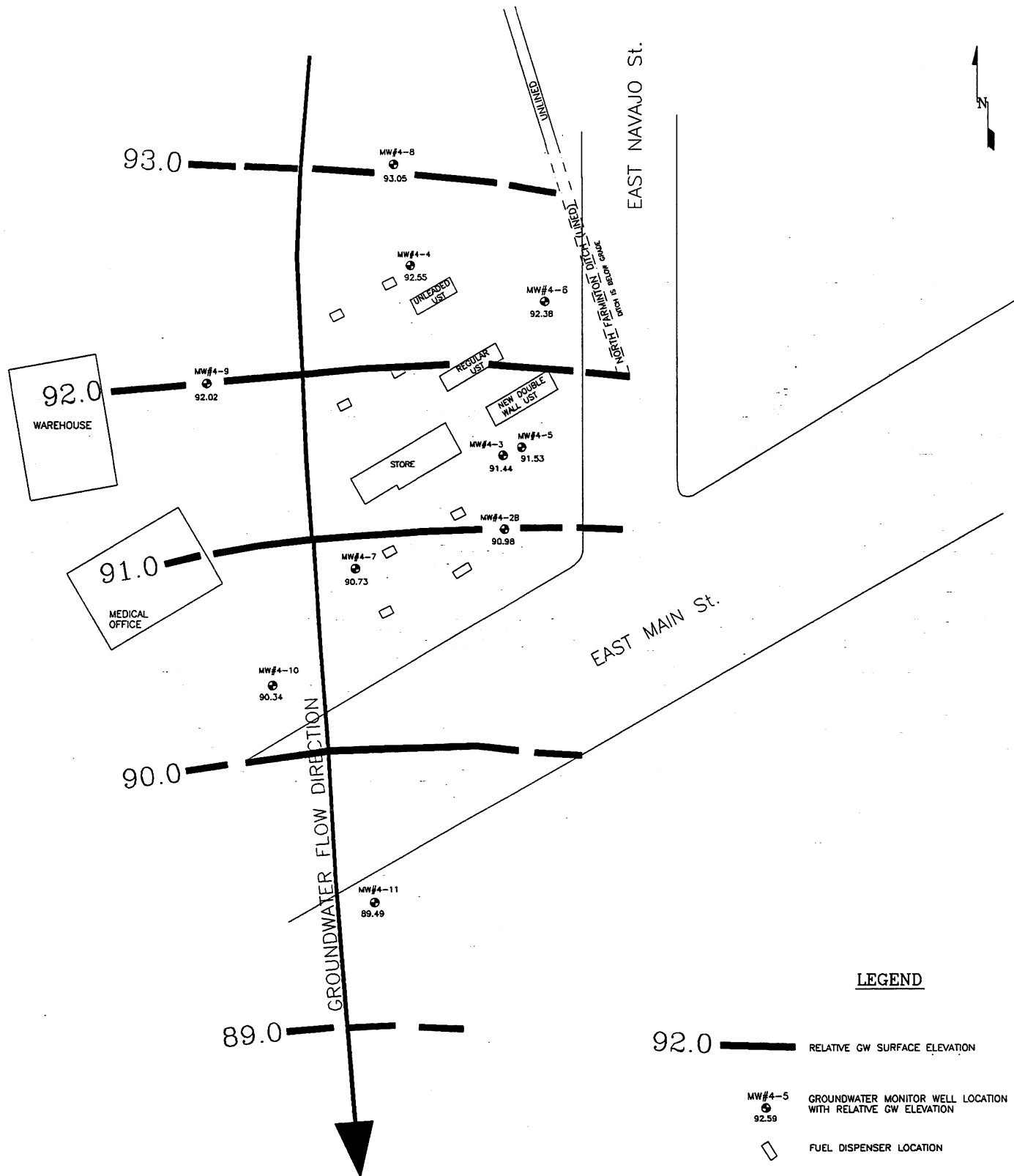
SITE PLAN

FIGURE 2

DRWN BY:
JCB

2154HGFIG2

PROJ MGR:
JCB



LOCATIONS OF MONITOR WELLS AND SOIL BORINGS WERE DETERMINED BY MEASURING FROM EXISTING TOPOGRAPHIC FEATURES & BUILDINGS USING TAPE MEASURES AND STADIA. LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE MEASUREMENT METHODS USED.

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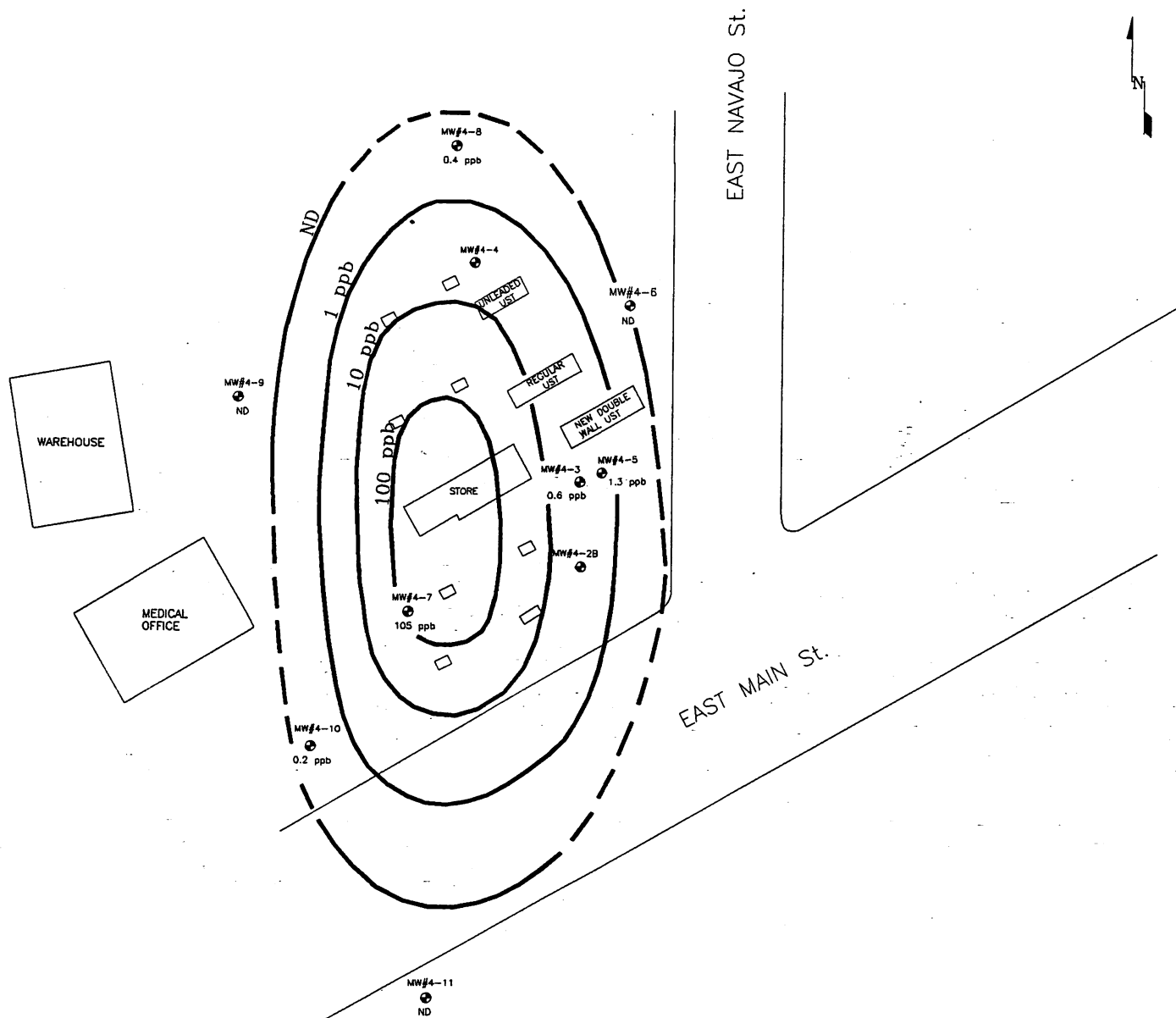
GROUNDWATER
CONTOUR
FEB 1, 1994

FIGURE 3

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2154HGFIG3

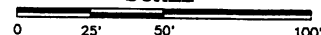
PROJ MGR:
JCB



LEGEND

- 1 ppb
CONTOUR OF BENZENE CONCENTRATION
IN GROUNDWATER, PARTS PER BILLION
- MW#4-5
1.3 ppb
GROUNDWATER MONITOR WELL LOCATION
WITH BENZENE CONCENTRATION, PARTS
PER BILLION
- FUEL DISPENSER LOCATION

SCALE



LOCATIONS OF MONITOR WELLS AND SOIL BORINGS WERE DETERMINED
BY MEASURING FROM EXISTING TOPOGRAPHIC FEATURES
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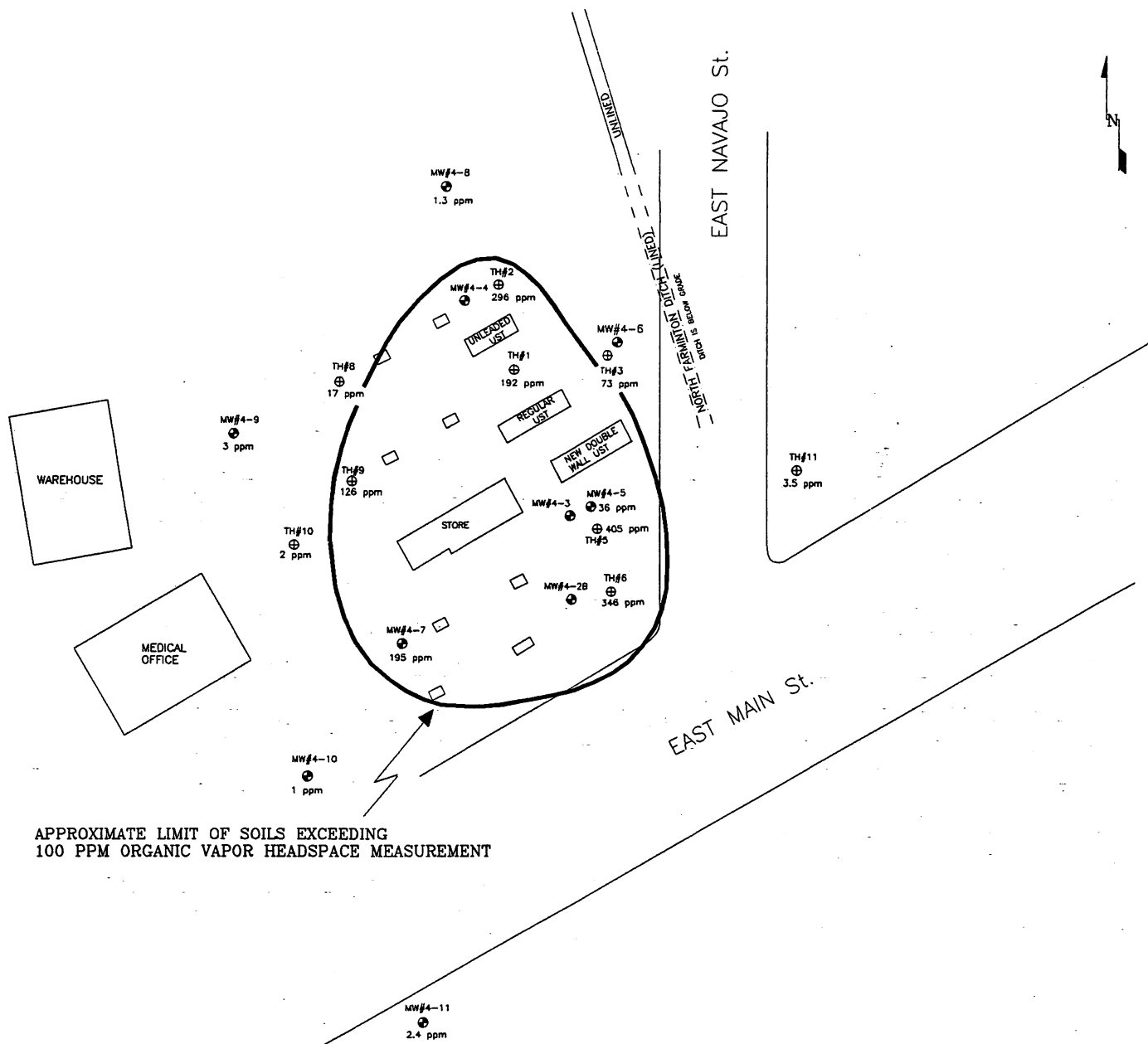
CONTOUR OF GROUNDWATER
BENZENE CONCENTRATION
JANUARY 27, 1994

FIGURE 4

DRWN BY:
JCB

2154HGFIG4

PROJ MGR:
JCB



APPROXIMATE LIMIT OF SOILS EXCEEDING
100 PPM ORGANIC VAPOR HEADSPACE MEASUREMENT

LEGEND

- TH#6
⊕
24 ppm TEST HOLE LOCATION WITH MAXIMUM SOIL HEADSPACE MEASUREMENT, PARTS PER MILLION
- MW#4-5
⊕
24 ppm GROUNDWATER MONITOR WELL LOCATION WITH MAXIMUM SOIL HEADSPACE MEASUREMENT, PARTS PER MILLION
- FUEL DISPENSER LOCATION

SCALE

0 25' 50' 100'

LOCATIONS OF MONITOR WELLS AND SOIL BORDERS WERE DETERMINED BY MEASURING FROM EXISTING TOPOGRAPHIC FEATURES & BUILDINGS USING TAPE MEASURES AND STADIA. LOCATIONS SHOULD BE CONSIDERED ACCURATE ONLY TO THE DEGREE IMPLIED BY THE MEASUREMENT METHODS USED.

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PROJECT NO: 92154-4 FEB, 1994

ENVIROTECH INC.

ENVIRONMENTAL SCIENTISTS & ENGINEERS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

MAXIMUM SOIL HEADSPACE
MEASUREMENTS - PPM

FIGURE 5

DRWN BY:
JCB

2154HGFIG5

PROJ MGR:
JCB

APPENDIX B

Boring Logs
&
Well Construction Details

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

TEST BORING REPORT - TH#1

PROJECT: BAR-F NO. 4 INVESTIGATION
CLIENT: BAR-F ENTERPRISES, INC.
CONTRACTOR: ENVIROTECH, INC.
EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

BORING No: TH NO. 1
JOB No: 92154-4
PAGE No: B1
LOCATION: FARMINGTON
DATE START: 7-1-93
DATE FINISH: 7-1-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

DEPTH FEET	USC	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	SM	109	SS	5%		TAN/GREEN SILTY SAND, COHESIVE, MOIST, FIRM.
	GP		SS	NA		ROUNDED COBBLES W/ SAND, GREY COLOR, MOIST, STRONG ODOR OF HYDROCARBON CONTAMINATION
	SC	192	SS	12%		GREY/BLACK CLAYEY SAND, MOIST, COHESIVE, STRONG ODOR OF HYDROCARBON CONTAMINATION.
5						TOTAL DEPTH DRILLED 3.5 FEET WATER TABLE NOT ENCOUNTERED
10						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 3.5 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE  - INITIAL STATIC WATER LEVEL
15						
20						
25						
30						

ENVIROTECH Inc.

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TEST BORING REPORT - TH#2

BORING No: TH NO. 2

JOB No: 92154-4

PAGE No: B2

LOCATION: FARMINGTON

DATE START: 7-1-93

DATE FINISH: 7-1-93

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	SCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	GP		CTG	NA		BROWN/GREY SAND X GRAVEL, POSSIBLE BACKFILL, DRY, NON COHESIVE.
	SC	296	SS	12%		GREY/BLACK CLAYEY SAND, MOIST, COHESIVE, STRONG ODOR OF HYDROCARBON CONTAMINATION.
5	GP	160	SS	NA		GREY/BLACK COARSE SAND X GRAVEL, V. MOIST, COHESIVE, STRONG ODOR OF HYDROCARBON CONTAMINATION.
						TOTAL DEPTH DRILLED 5.0 FEET WATER TABLE NOT ENCOUNTERED
10						
15						
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 5.0 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						- INITIAL STATIC WATER LEVEL

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TEST BORING REPORT - TH#3

BORING No: TH NO. 3
JOB No: 92154-4
PAGE No: B3
LOCATION: FARMINGTON
DATE START: 7-1-93
DATE FINISH: 7-1-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION
CLIENT: BAR-F ENTERPRISES, INC.
CONTRACTOR: ENVIROTECH, INC.
EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USC	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE
	SC		CTG			BROWN/YELLOW CLAYEY SAND, MOIST, COHESIVE, FIRM.
	SM	62.0	SS	12%		ORANGE/BROWN SILTY SAND, V. MOIST, COHESIVE, FIRM.
			SS			
	SM	44.5		9%		SAA.
			SS			
5	SM	73.0		NA		SAA.
TOTAL DEPTH DRILLED 5.5 FEET WATER TABLE NOT ENCOUNTERED						
10						
15						
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 5.5 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
25						
30						



- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH3LOG
DATE: 7-15-93
DWN BY: JCB

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TEST BORING REPORT - TH#4

BORING No: TH NO. 4
JOB No: 92154-4
PAGE No: B4
LOCATION: FARMINGTON
DATE START: 7-1-93
DATE FINISH: 7-1-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION
CLIENT: BAR-F ENTERPRISES, INC.
CONTRACTOR: ENVIROTECH, INC.
EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
5	AP		CTG	NA		ASPHALT & ROAD BASE.
	SP		CTG			MEDIUM/COARSE GRAINED SAND, YELLOW BROWN, DRY, NON COHESIVE, LOOSE.
	SP	ND	SS	1.2%		SAA, EXCEPT FIRM.
	SP	14.7	SS	4.2%		SAA, EXCEPT SOME MOISTURE.
	SP	15.5	SS	4.8%		SAA.
	SP	36.0	SS	7.0%		SAA.
	CL	NA	SS	NA		GREY GREEN SILTY CLAY, V. MOIST, FIRM, PLASTIC.
	SP	NA	SS	NA		YELLOW BROWN MEDIUM GRAINED SAND, NON COHESIVE, SATURATED, FIRM.
			CTG			SAA, EXCEPT GREY COLOR AND MINOR ODOR OF CONTAMINATION.
	SP		CTG			
10	GP		CTG			BIT BOUNCING, BOULDERS AND COBBLES, NO RECOVERY.
	SP		CTG			YELLOW BROWN COARSE GRAINED SAND X GRAVEL, NON COHESIVE, SATURATED, FIRM.
	SP	NA	SS	NA		SAA.
15						
20						
25						
30						

TOTAL DEPTH DRILLED 14.5' FEET

COMPLETION: SET WITH MONITOR WELL MW-1
RELATIVE ELEVATION: 99.62 (CASING TOP)
WELL TD: 14.5'
CASING: 2" PVC FLUSH THREAD
SCREEN: 2" PVC X 0.010 SLOT
FILTER PACK: 8/12 MESH COLORADO SILICA ACROSS SCREEN
SEAL: 3/8" BENTONITE PELLETS ABOVE FILTER PACK

TOTAL DEPTH DRILLED: 14' FEET

NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
ND - NONE DETECTED
CTG - SAMPLE COLLECTED AS CUTTINGS
SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER
NA - NOT AVAILABLE



- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH4LOG
DATE: 7-15-93
DWN BY: JCB

ENVIROTECH Inc.

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TEST BORING REPORT - TH#5

BORING No: TH NO. 5
JOB No: 92154-4
PAGE No: B5
LOCATION: FARMINGTON
DATE START: 7-1-93
DATE FINISH: 7-1-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	SC	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	SP		CTG			YELLOW BROWN COARSE GRAINED SAND, MOIST, NON COHESIVE, FIRM.
	SP					SAA, EXCEPT DARK GREY AND ODOR OF CONTAMINATION.
	SP	405	SS	NA		SAA.
5						TOTAL DEPTH DRILLED 4.0 FEET WATER TABLE NOT ENCOUNTERED
10						TOTAL DEPTH DRILLED 4.0 FEET WATER TABLE NOT ENCOUNTERED
15						TOTAL DEPTH DRILLED 4.0 FEET WATER TABLE NOT ENCOUNTERED
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 4.0 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE  - INITIAL STATIC WATER LEVEL
25						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 4.0 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE  - INITIAL STATIC WATER LEVEL
30						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 4.0 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE  - INITIAL STATIC WATER LEVEL

DRAWING: 92154TH5LOG
DATE: 7-15-93
DWN BY: JCB

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TEST BORING REPORT – TH#6

BORING No: TH NO. 6

JOB No: 92154-4

PAGE No: B6

LOCATION: FARMINGTON

DATE START: 7-1-93

DATE FINISH: 7-1-93

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED:TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	SP		CTG			YELLOW BROWN COARSE GRAINED SAND, MOIST, NON COHESIVE, FIRM.
	SP	346	SS	15%		SAA, EXCEPT DARK GREY AND ODOR OF CONTAMINATION BEGINNING AT 3'10" DEPTH.
	SP	317	SS	NA		SAA.
5						
						TOTAL DEPTH DRILLED 5.5 FEET WATER TABLE NOT ENCOUNTERED
10						
15						
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS
						RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA
						TOTAL DEPTH DRILLED: 5.5 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
						- INITIAL STATIC WATER LEVEL
30						

DRAWING: 92154TH6LOG
 DATE: 7-15-93
 DWN BY: JCB

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BORING No: TH NO. 7
JOB No: 92154-4
PAGE No: B7
LOCATION: FARMINGTON
DATE START: 7-1-93
DATE FINISH: 7-1-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION
CLIENT: BAR-F ENTERPRISES, INC.
CONTRACTOR: ENVIROTECH, INC.
EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA	[Pattern]	ASPHALT & ROAD BASE.
	SP		CTG		[Pattern]	MEDIUM/COARSE GRAINED SAND, YELLOW BROWN MOIST, NON COHESIVE, FIRM.
					[Pattern]	
					[Pattern]	
	SP	195	SS	6.6%	[Pattern]	SAA, EXCEPT DARK GREY TO BLACK COLOR, ODOR OF CONTAMINTION.
5	CL	8.9	SS	16%	[Pattern]	GREEN BROWN CLAY, MOIST, PLASTIC, FIRM (NO ODOR OF CONTAMINATION).
					[Pattern]	
	CL	3.7	SS	16%	[Pattern]	SAA, WITH OCCASIONAL THIN BLACK STREAKS.
					[Pattern]	
	CL	NA	SS	NA	[Pattern]	GREY GREEN SANDY CLAY, SATURATED, PLASTIC, FIRM.
	CL		CTG		[Pattern]	SAA.
10	GM		CTG		[Pattern]	SAND X COBBLES, V. HARD DRILLING, NO RECOVERY AT SURFACE.
					[Pattern]	
					[Pattern]	
	GM		CTG		[Pattern]	SAA
15						TOTAL DEPTH DRILLED 13'8" FEET
20						COMPLEATION: SET WITH MONITOR WELL MW-3 RELATIVE ELEVATION: 98.97 (CASING TOP) WELL TD: 13'8" CASING: 2" PVC FLUSH THREAD SCREEN: 2" PVC X 0.010 SLOT FILTER PACK: 8/12 MESH COLORADO SILICA ACROSS SCREEN SEAL: 3/8" BENTONITE PELLETS ABOVE FILTER PACK TOTAL DEPTH DRILLED: 13'8" FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
						- INITIAL STATIC WATER LEVEL
30						

DRAWING: 92154TH7LOG
 DATE: 7-15-93
 DWN BY: JCB

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TEST BORING REPORT - TH#8

BORING No: TH NO. 8

JOB No: 92154-4

PAGE No: B8

LOCATION: FARMINGTON

DATE START: 7-2-93

DATE FINISH: 7-2-93

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED:TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET		US	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
5	AP			CTG	NA		ASPHALT & ROAD BASE.
	SP			CTG			YELLOW BROWN COARSE GRAINED SAND X COBBLES, DRY, NON COHESIVE, FIRM.
	SP	14.9		SS	3%		SAA.
5	SP	17.0		SS	3%		SAA, WITH THIN STRINGERS OF YELLOW GREEN SANDY CLAY AND SOME MOISTURE.
5	SP	ND		SS	NA		DARK YELLOW BROWN CLAYEY SAND, SATURATED, COHESIVE, FIRM.
10							
15							
20							
25							
30							

TOTAL DEPTH DRILLED 6.5 FEET
WATER SATURATED SOIL AT THAT DEPTH

COMPLEATION: BACKFILLED BORING WITH CUTTINGS

RELATIVE ELEVATION: NA
WELL TD: NA
CASING: NA
SCREEN: NA
GRAVEL PACK: NA
SEAL: NA

TOTAL DEPTH DRILLED: 6.5 FEET

NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
ND - NONE DETECTED
CTG - SAMPLE COLLECTED AS CUTTINGS
SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER
NA - NOT AVAILABLE

- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH8LOG
DATE: 7-15-93
DWN BY: JCB

ENVIROTECH Inc.

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TEST BORING REPORT - TH#9

BORING No: TH NO. 9
JOB No: 92154-4
PAGE No: B9
LOCATION: FARMINGTON
DATE START: 7-2-93
DATE FINISH: 7-2-93
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION
CLIENT: BAR-F ENTERPRISES, INC.
CONTRACTOR: ENVIROTECH, INC.
EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	SP		CTG			YELLOW BROWN COARSE GRAINED SAND X COBBLES, DRY, NON COHESIVE, FIRM.
5	SC	126	SS	12%		BLACK CLAYEY SAND, COHESIVE, FIRM, MOIST, ODOR OF CONTAMINATION.
	SC	56	SS	10%		SAA.
10						TOTAL DEPTH DRILLED 8.5 FEET WATER TABLE NOT ENCOUNTERED
15						
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 6.5 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						 - INITIAL STATIC WATER LEVEL

ENVIROTECH Inc.

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(505) 632-0615

TEST BORING REPORT - TH#10

BORING No: TH NO. 10

JOB No: 92154-4

PAGE No: B10

LOCATION: FARMINGTON

DATE START: 7-2-93

DATE FINISH: 7-2-93

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG	NA		ASPHALT & ROAD BASE.
	SP		CTG			YELLOW BROWN COARSE GRAINED SAND X COBBLES, MOIST, NON COHESIVE, FIRM.
	SC		CTG			YELLOW BROWN CLAYEY SAND, MOIST, COHESIVE, FIRM.
5	SC	2.0	SS	NA		SAA, EXCEPT V. MOIST.
	SC	2.0	SS	NA		SAA, EXCEPT WATER SATURATED.
10						TOTAL DEPTH DRILLED 6.5 FEET SOIL WATER SATURATED AT THAT DEPTH.
15						
20						COMPLETION: BACKFILLED BORING WITH CUTTINGS RELATIVE ELEVATION: NA WELL TD: NA CASING: NA SCREEN: NA GRAVEL PACK: NA SEAL: NA TOTAL DEPTH DRILLED: 6.5 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH10LOG
DATE: 7-15-93
DWN BY: JCB

ENVIROTECH Inc.

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TEST BORING REPORT - TH#11

BORING No: TH NO. 11

JOB No: 92154-4

PAGE No: B11

LOCATION: FARMINGTON

DATE START: 1-10-94

DATE FINISH: 1-10-94

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP CL		CTG CTG			ASPHALT & ROAD BASE.
						CLAYEY SAND WITH MINOR COBBLES, YELLOW GREEN, MOIST, FIRM, PLASTIC.
5	GC		CTG			COBBLES WITH SANDY CLAY, DARK YELLOW GREEN, MOIST, FIRM, NON COHESIVE.
		2.4	SS			
		3.5	SS			
		1.0	SS			
						SAA, EXCEPT WATER SATURATED.
10						
15						
20						
25						
30						

TOTAL DEPTH DRILLED 9.0 FEET
SOIL WATER SATURATED AT THAT DEPTH.

COMPLETION: BACKFILLED BORING WITH CUTTINGS

RELATIVE ELEVATION: NA
WELL TD: NA
CASING: NA
SCREEN: NA
GRAVEL PACK: NA
SEAL: NA

TOTAL DEPTH DRILLED: 9.0 FEET

NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
ND - NONE DETECTED
CTG - SAMPLE COLLECTED AS CUTTINGS
SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER
NA - NOT AVAILABLE



- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH11LOG
DATE: 1-31-94
DWN BY: JCB

ENVIROTECH Inc.

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TEST BORING REPORT - TH#12

BORING No: TH NO. 12

JOB No: 92154-4

PAGE No: B12

LOCATION: FARMINGTON

DATE START: 1-10-94

DATE FINISH: 1-12-94

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	CL		CTG CTG			CLAYEY SAND, DARK YELLOW BROWN, MOIST, FIRM, COHESIVE.
	GC					COBBLES WITH CLAYEY SAND, YELLOW BROWN, MOIST, FIRM, PLASTIC.
5	SP	1.3	SS			SILTY SAND, YELLOW GREY, VERY MOIST, FIRM, NON COHESIVE. SAA, EXCEPT WATER SATURATED.
	GC		CTG			COBBLES WITH SILTY/SANDY/CLAY MIXTURE, YELLOW GREEN, SATURATED, NON-COHESIVE.
10			SS			SAA.
15						TOTAL DEPTH DRILLED 11.0 FEET BORING CONVERTED TO GROUNDWATER MONITOR WELL.
20						COMPLETION: SET WITH MONITOR WELL MW#4-8 RELATIVE ELEVATION: NA WELL TD: 10'7" CASING: 2" PVC FLUSH THREAD SCREEN: 2" PVC X 0.010 SLOT GRAVEL PACK: 8/12 COLORADO SILICA ACROSS SCREEN SEAL: 3/8" BENTONITE PELLETS ABOVE GRAVE PACK TOTAL DEPTH DRILLED: 11.0 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						- INITIAL STATIC WATER LEVEL

DRAWING: 92154TH12LOG
DATE: 1-31-94
OWN BY: JCB

ENVIROTECH Inc.

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(505) 632-0615

TEST BORING REPORT - TH#13

BORING No: TH NO. 13

JOB No: 92154-4

PAGE No: B13

LOCATION: FARMINGTON

DATE START: 1-13-94

DATE FINISH: 1-13-94

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVN PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG			ASPHALT WITH ROAD BASE SAND X GRAVEL.
	CL		CTG			CLAY TO SANDY CLAY MIX, DARK GREEN BROWN, MOIST, FIRM, PLASTIC.
	GC					COBBLES WITH CLAYEY SAND, YELLOW BROWN, MOIST, FIRM, NON COHESIVE.
		3.0	SS			
5			CTG			SAA, EXCEPT WATER SATURATED.
			SS			
10			CTG			SAA.
15						TOTAL DEPTH DRILLED 11.0 FEET BORING CONVERTED TO GROUNDWATER MONITOR WELL.
20						COMPLETION: SET WITH MONITOR WELL MW#4-9
						RELATIVE ELEVATION: NA
						WELL TD: 11'5"
						CASING: 2" PVC FLUSH THREAD
						SCREEN: 2" PVC X 0.010 SLOT
						GRAVEL PACK: 8/12 COLORADO SILICA ACROSS SCREEN
						SEAL: 3/8" BENTONITE PELLETS ABOVE GRAVE PACK
						TOTAL DEPTH DRILLED: 12.0 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE
						ND - NONE DETECTED
						CTG - SAMPLE COLLECTED AS CUTTINGS
						SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER
						NA - NOT AVAILABLE
						 - INITIAL STATIC WATER LEVEL
30						

DRAWING: 92154TH13LOG
DATE: 1-31-94
OWN BY: JCB

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

TEST BORING REPORT - TH#14

BORING No: TH NO. 14
JOB No: 92154-4
PAGE No: B14
LOCATION: FARMINGTON
DATE START: 1-13-94
DATE FINISH: 1-14-94
DRILLER: DONOHUE
PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVPM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP CL		CTG CTG			ASPHALT WITH ROAD BASE SAND & GRAVEL. CLAYEY SAND, LIGHT YELLOW BROWN, MOIST, FIRM, COHESIVE.
5		1.0	SS			
	GC		CTG			COBBLES WITH CLAYEY SAND, YELLOW BROWN, MOIST, FIRM, NON COHESIVE. SAA. EXCEPT WATER SATURATED.
10			SS			
			CTG			SAA.
15						TOTAL DEPTH DRILLED 12.0 FEET BORING CONVERTED TO GROUNDWATER MONITOR WELL.
20						COMPLETION: SET WITH MONITOR WELL MW#4-10 RELATIVE ELEVATION: NA WELL TD: 11'6" CASING: 2" PVC FLUSH THREAD SCREEN: 2" PVC X 0.010 SLOT GRAVEL PACK: 8/12 COLORADO SILICA ACROSS SCREEN SEAL: 3/8" BENTONITE PELLETS ABOVE GRAVE PACK TOTAL DEPTH DRILLED: 12.0 FEET
25						NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						 - INITIAL STATIC WATER LEVEL

DRAWING: 92154TH14LOG
DATE: 1-31-94
OWN BY: JCB

ENVIROTECH Inc.

5796 US HWY. 64, FARMINGTON, NM 87401
(505) 632-0615

TEST BORING REPORT - TH#15

BORING No: TH NO. 15

JOB No: 92154-4

PAGE No: B15

LOCATION: FARMINGTON

DATE START: 1-14-94

DATE FINISH: 1-14-94

DRILLER: DONOHUE

PREPARED BY: BLAGG

PROJECT: BAR-F NO. 4 INVESTIGATION

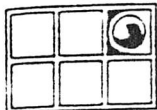
CLIENT: BAR-F ENTERPRISES, INC.

CONTRACTOR: ENVIROTECH, INC.

EQUIPMENT USED: TRUCK MOUNTED CME-55 HOLLOW STEM AUGER DRILL

DEPTH FEET	USCS	OVM PPM	SAMPLE TYPE	SOIL MOIST.	ICON	FIELD CLASSIFICATION AND REMARKS
	AP		CTG			ASPHALT WITH ROAD BASE SAND X GRAVEL.
	GC		CTG			COBBLES WITH SANDY CLAY, YELLOW BROWN, MOIST, FIRM, PLASTIC.
5		2.4	SS			SAA, EXCEPT WATER SATURATED.
10			CTG			SAA.
15						TOTAL DEPTH DRILLED 10.0 FEET BORING CONVERTED TO GROUNDWATER MONITOR WELL.
20						COMPLETION: SET WITH MONITOR WELL MW#4-11 RELATIVE ELEVATION: NA WELL TD: 9'9" CASING: 2" PVC FLUSH THREAD SCREEN: 2" PVC X 0.010 SLOT GRAVEL PACK: 9/12 COLORADO SILICA ACROSS SCREEN SEAL: 3/8" BENTONITE PELLETS ABOVE GRAVE PACK
25						TOTAL DEPTH DRILLED: 10.0 FEET NOTES: SAA - SAME SOIL TYPE AS DESCRIBED ABOVE ND - NONE DETECTED CTG - SAMPLE COLLECTED AS CUTTINGS SS - SAMPLE COLLECTED FROM SPLIT SPOON SAMPLER NA - NOT AVAILABLE
30						 - INITIAL STATIC WATER LEVEL

DRAWING: 92154TH15LOG
DATE: 1-31-94
DWN BY: JCB



GROUNDWATER TECHNOLOGY, INC.

Monitoring Well BF4-3

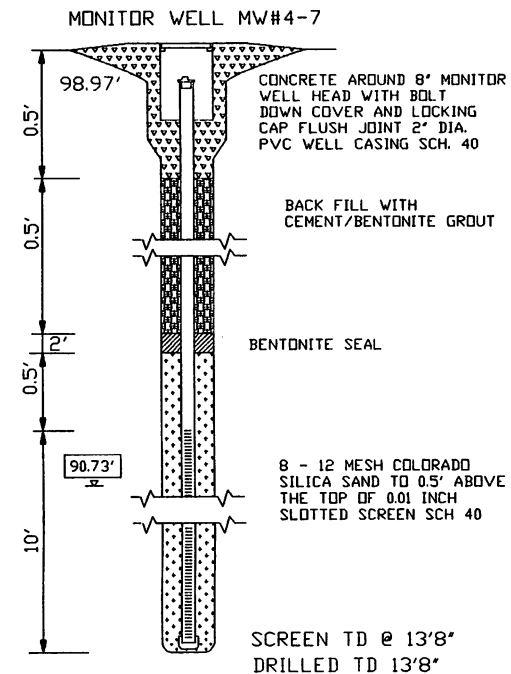
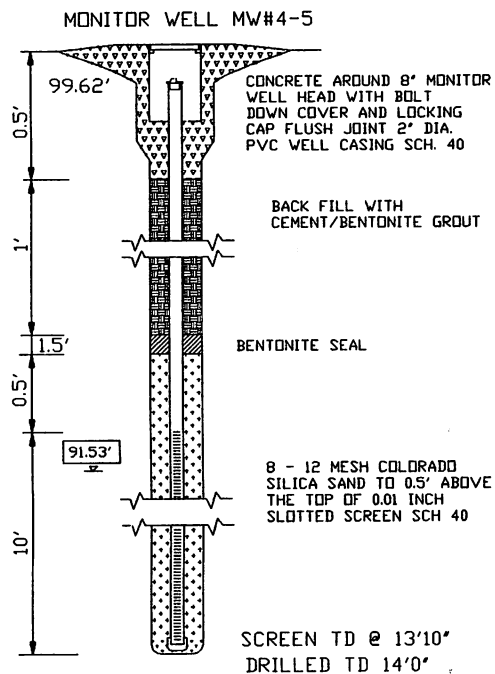
Drilling Log

Project Bar-F Owner Bar-F Enterprises
Location Bar-F #4, Farmington, NM Project Number 43209594.04
Date Drilled 10-24-89 Total Depth of Hole 25' Diameter 10" to 5'
Surface Elevation NA Water Level Initial 18' 24-hour 7" to 25' 8.24'
Screen: Dia. 4" Length 7.8' Slot Size 0.010
Casing: Dia. 4" Length 12.8' Type SCH40 PVC
Drilling Company Beeman Bros. Drilling Method Air Rotary w/ tophead
Driller Dan Hogan Log by S. Hines hammer
Geologist / Engineer S. Hines License No. -

Sketch Map

Notes:

Depth (Feet)	Well Construction	PI (ppm)	Sample Number	Graphic Log	Description/Soil Classification (Color, Texture, Structures)
0					Asphalt (3") over sand and gravel base
2					Grey fine to very fine-grained sand (dry, no hydrocarbon odor)
4		13.8	BF4-3-5	SW	
6					Quartzite cobbles in gravel and grey sand matrix (dry, no hydrocarbon odor)
8					
10		5.5	BF4-3-10	GP	(Grades coarser sand)
12					
14		30.5	BF4-3-15		(Grades moist)
16					
18					Encountered water 10-24-89 (1000)
20		5.7	BF4-3-20		Light yellow-brown clay (wet, no hydrocarbon odor, slightly plastic)
22				CL	
24		2.2	BF4-3-25		(Grades less plastic, grey-blue clay)



97.31' RELATIVE GROUNDWATER SURFACE ELEVATION ON DATE MEASURED
114.08' RELATIVE ELEVATION OF WELL MEASURING POINT

BAP-F NO. 4
862 EAST MAIN
FARMINGTON, NEW MEXICO

PROJECT 92154-4

JULY, 1993

ENVIROTECH INC.

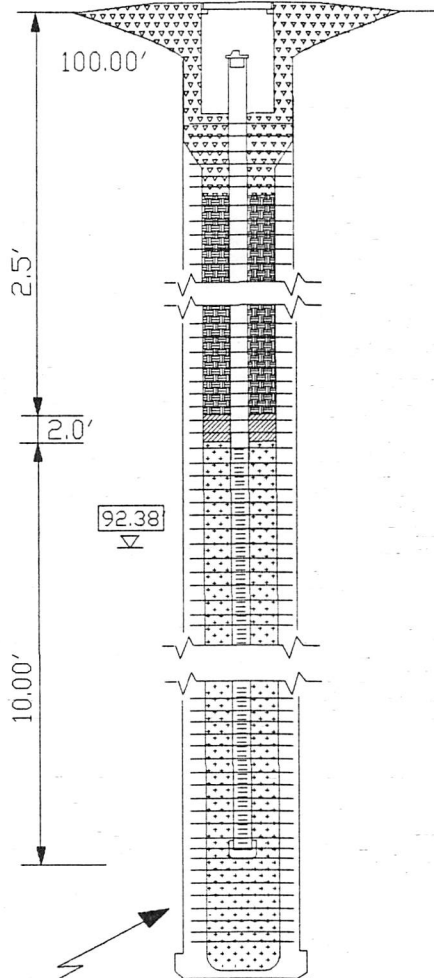
ENVIRONMENTAL SCIENTISTS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

MONITOR WELL CONSTRUCTION DETAIL

MW#4-5, MW#4-7

SHEET B-17

MONITOR WELL MW#4-6



CONCRETE AROUND 12" MONITOR
WELL HEAD WITH BOLT
DOWN COVER AND LOCKING
CAP, SLIP JOINT SECURED WITH
BRASS SCREWS, 6" DIA. PVC WELL
CASING SCH. 40 AROUND 2" DIA. WELL.

BACK FILL WITH
5% BENTONITE CEMENT

BENTONITE SEAL

8 TO 12 MESH COLORADO
SILICA SAND TO 1' ABOVE
THE TOP OF 0.02 INCH
SLOTTED SCREEN SCH 40

2" WELL ID @ 14'6"

6" CASING, 0.020 SLOT
FROM GL TO 16' SUBGRADE.
FILTER PACKED WITH 8-12
MESH SILICA SAND.
2" WELL SET INSIDE OF
6" WELL.

BORRING TD @ 19.00'

94.40' RELATIVE GROUNDWATER SURFACE ELEVATION ON DATE MEASURED
100.27' RELATIVE ELEVATION OF THE MEASURING POINT

BAR-F DIAMOND SHAMROCK
860 EAST MAIN St.
FARMINGTON, NEW MEXICO

PROJECT NO: 92154-4 JULY 1993

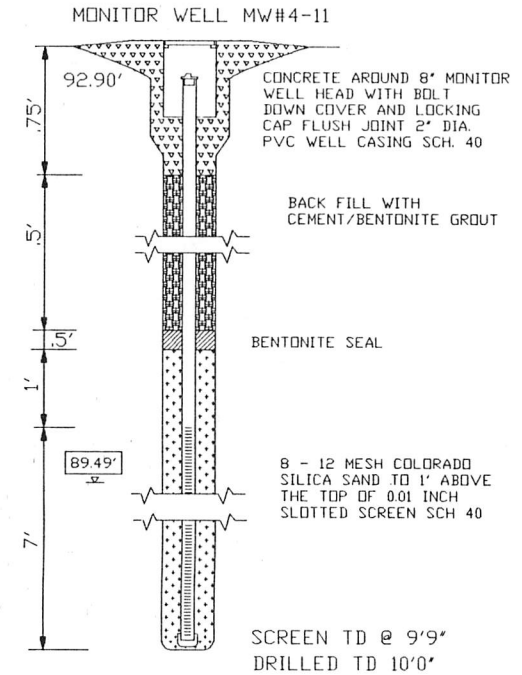
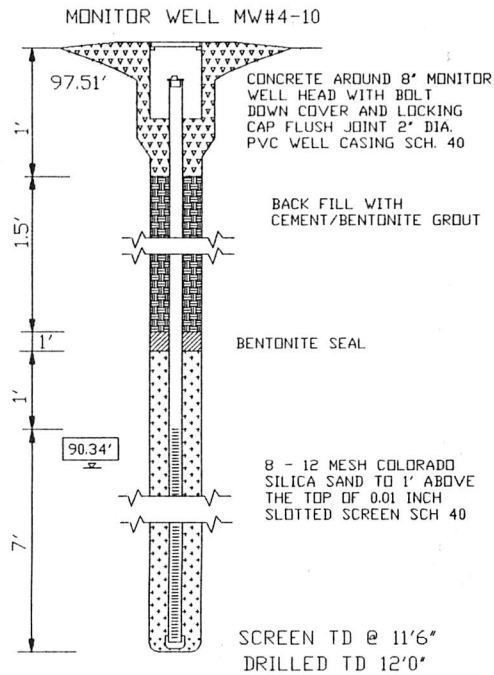
ENVIROTECH INC.

ENVIRONMENTAL SCIENTISTS & ENGINEERS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

MONITOR WELL
DETAIL

B18 DRWN BY:
JCB

MW#4-6 PROJ MANG:
JCB



[97.31'] RELATIVE GROUNDWATER SURFACE ELEVATION ON DATE MEASURED
114.08' RELATIVE ELEVATION OF WELL MEASURING POINT

BAR-F NO. 4
862 EAST MAIN
FARMINGTON, NEW MEXICO

PROJECT 92154-4

FEB, 1994

ENVIROTECH INC.

ENVIRONMENTAL SCIENTISTS
5796 U.S. HIGHWAY 64-3014
FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615

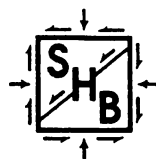
MONITOR WELL
CONSTRUCTION DETAIL

MW#4-10, MW#4-11

SHEET B-20

APPENDIX C

Laboratory Analytical Data Sheets



SHB AGRA, INC.

Engineering & Environmental Services

2060 Afton Place
Farmington, New Mexico 87401
Phone: 505-327-7928
Fax: 505-326-5721

LABORATORY REPORT

Client Envirotech Inc.
Attention: Mr. Jeff Blagg
5796 U.S. Highway 64-3014
Farmington, NM 87401

Project No. C94-9625
Client P.O. No. _____
Date of Report 01/26/94

Project Bar-F #4
Location Farmington, New Mexico
Type of Material Silty Sand w/Trace Gravel Source of Material Native
Requested By Jeff Blagg Date 01/24/94 Sampled By Jeff Blagg Date 01/24/94
Submitted By Jeff Blagg Date 01/24/94 Reviewed By L. W. Winesbach

Sieve Analysis, ASTM

Sieve Size	Accumulative % Passing	Specification
3"		
2½"		
2"		
1½"	100	
1"	86	
¾"	78	
½"	75	
⅜"	73	
¼"	--	
No. 4	69	
8	65	
10	65	
16	62	
30	55	
40	43	
50	36	
100	24	
200	17	

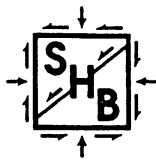
Moisture Density Relationship, Test Method _____
Maximum Dry Density, PCF _____ Optimum Moisture, % _____

Plasticity Index, ASTM D4318	Results	Specs.
LL:	_____	_____
PL:	_____	_____
PI:	_____	_____

Other

Distribution: _____ Billing /mja

san juan repro Form 551-3



SHB AGRA, INC.

Engineering & Environmental Services

2060 Afton Place
Farmington, New Mexico 87401
Phone: 505-327-7928
Fax: 505-326-5721

LABORATORY REPORT

Client Envirotech Inc.
Attention: Mr. Jeff Blagg
5796 U.S. Highway 64-3014
Farmington, NM 87401

Project No. C94-9625
Client P.O. No. _____
Date of Report 01/26/94

Project Bar-F #4
Location Farmington, New Mexico
Type of Material Silty Sand w/Trace Gravel Source of Material Native
Requested By Jeff Blagg Date 01/24/94 Sampled By Jeff Blagg Date 01/24/94
Submitted By Jeff Blagg Date 01/24/94 Reviewed By L. W. [Signature]

Sieve Analysis, ASTM

Sieve Size	Accumulative % Passing	Specification
3"		
2½"		
2"		
1½"	100	
1"	86	
¾"	78	
½"	75	
⅜"	73	
¼"	--	
No. 4	69	
8	65	
10	65	
16	62	
30	55	
40	43	
50	36	
100	24	
200	17	

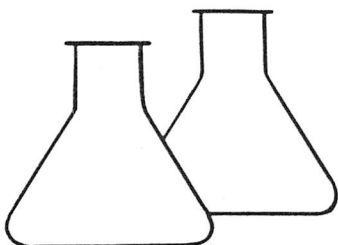
Moisture Density Relationship, Test Method _____
Maximum Dry Density, PCF _____ Optimum Moisture, % _____

Plasticity Index, ASTM D4318	Results	Specs.
LL:	_____	_____
PL:	_____	_____
PI:	_____	_____

Other

Distribution: C11 [Signature] Billing /mja

san juan repro Form 551-3



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 3	Date Reported:	01-28-94
Laboratory Number:	6790	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	1.8	0.6
Benzene	0.6	0.2
Toluene	ND	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	ND	0.3
o-Xylene	ND	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	99 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

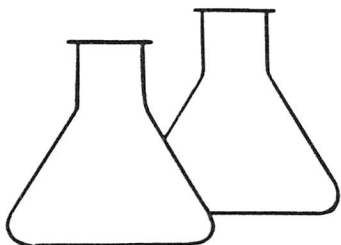
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Kevin L. Jensen
Analyst

Morris D. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 5	Date Reported:	01-28-94
Laboratory Number:	6791	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	48.4	0.6
Benzene	1.3	0.2
Toluene	ND	0.4
Ethylbenzene	0.3	0.2
p,m-Xylene	ND	0.3
o-Xylene	ND	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	96 %
	Bromfluorobenzene	100 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

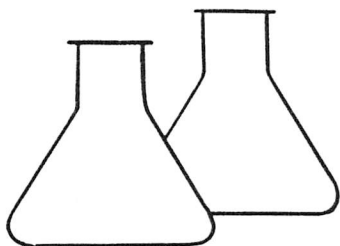
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Kevin L. Jensen
Analyst

Morris D. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 6	Date Reported:	01-28-94
Laboratory Number:	6792	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	ND	0.6
Benzene	ND	0.2
Toluene	ND	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	ND	0.3
o-Xylene	ND	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	97 %
	Bromfluorobenzene	97 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

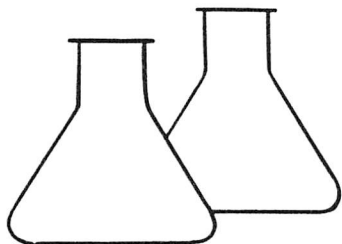
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Kevin L. Cramer
Analyst

Mavis D. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 7	Date Reported:	01-28-94
Laboratory Number:	6793	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	10.6	0.6
Benzene	105	0.2
Toluene	3.2	0.4
Ethylbenzene	54	0.2
p,m-Xylene	7.6	0.3
o-Xylene	2.8	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	95 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

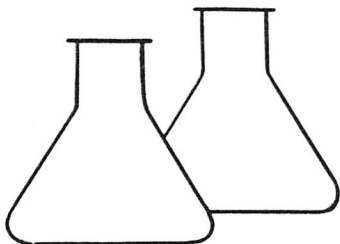
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Dennis L. Grewer
Analyst

Maris D. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 8	Date Reported:	01-28-94
Laboratory Number:	6794	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	ND	0.6
Benzene	0.4	0.2
Toluene	0.9	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	0.6	0.3
o-Xylene	0.3	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	98 %
	Bromfluorobenzene	97 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

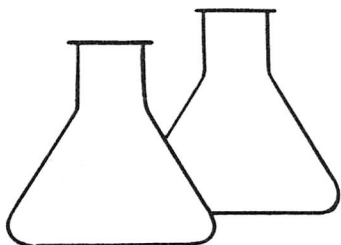
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Dennis L. Cieniewicz
Analyst

Myron S. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 9	Date Reported:	01-28-94
Laboratory Number:	6795	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	ND	0.6
Benzene	ND	0.2
Toluene	3.6	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	0.6	0.3
o-Xylene	0.3	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	96 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

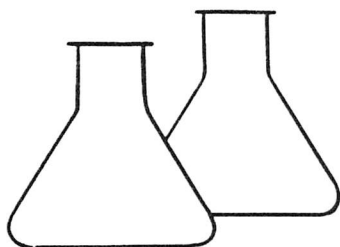
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Dennis L. Jensen
Analyst

Morris D. Young
Review



ENVIROTECH LABS

5796 US HIGHWAY 64-3014 • FARMINGTON, NEW MEXICO 87401
PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 10	Date Reported:	01-28-94
Laboratory Number:	6796	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	ND	0.6
Benzene	0.2	0.2
Toluene	1.1	0.4
Ethylbenzene	0.4	0.2
p,m-Xylene	0.5	0.3
o-Xylene	1.5	0.2

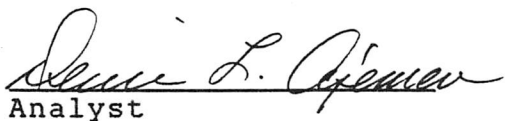
SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	97 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

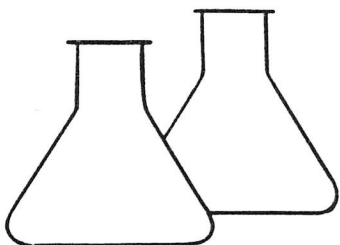
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main


Analyst


Review



ENVIROTECH LABS

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PHONE: (505) 632-0615 • FAX: (505) 632-1865

EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	Bar-F #4	Project #:	92154-4
Sample ID:	MW #4 - 11	Date Reported:	01-28-94
Laboratory Number:	6797	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Preservative:	HgCl & Cool	Date Analyzed:	01-28-94
Condition:	Cool & Intact	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-Butyl Ether	ND	0.6
Benzene	ND	0.2
Toluene	1.3	0.4
Ethylbenzene	0.3	0.2
p,m-Xylene	1.7	0.3
o-Xylene	0.7	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	99 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

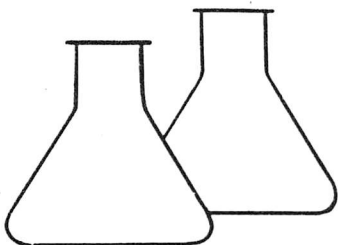
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments: 860 E. Main

Kevin L. Givner
Analyst

Morris D. Young
Review



ENVIROTECH LABS

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EPA METHOD 8020 AROMATIC VOLATILE ORGANICS

Client:	NA	Project #:	NA
Sample ID:	Laboratory Blank	Date Reported:	01-28-94
Laboratory Number:	0128AM.BLK	Date Sampled:	NA
Sample Matrix:	Water	Date Received:	NA
Preservative:	NA	Date Analyzed:	01-28-94
Condition:	NA	Analysis Requested:	BTEX

Parameter	Concentration (ug/L)	Det. Limit (ug/L)
Methyl-t-butyl Ether	ND	0.6
Benzene	ND	0.2
Toluene	ND	0.4
Ethylbenzene	ND	0.2
p,m-Xylene	ND	0.3
o-Xylene	ND	0.2

SURROGATE RECOVERIES:	Parameter	Percent Recovery
	Trifluorotoluene	96 %
	Bromfluorobenzene	98 %

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

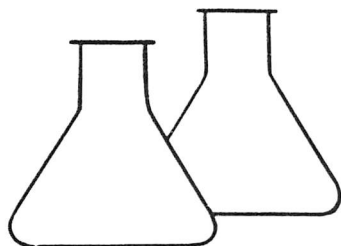
Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments:

Kevin L. Jensen
Analyst

Mavis D. Young
Review



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** QUALITY ASSURANCE EPA METHOD 8020
MATRIX SPIKE - AROMATIC VOLATILE ORGANICS

Client:	NA	Project #:	NA
Sample ID:	Sample Spike	Date Reported:	01-28-94
Laboratory Number:	6790-S-MTBE	Date Sampled:	01-27-94
Sample Matrix:	Water	Date Received:	01-27-94
Analysis Requested:	BTEX	Date Analyzed:	01-28-94
Condition:	NA		

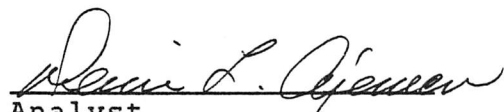
Parameter	Sample Result (ug/Kg)	Spike Added (ug/Kg)	Spiked Sample Result (ug/Kg)	Det. Limit (ug/Kg)	Percent Recovery	SW-846 % Rec. Accept. Range
Methyl-t-Butyl Ether	1.8	20.0	20.6	0.6	95	
Benzene	0.6	20.0	19.6	0.2	95	39-150
Toluene	ND	20.0	19.3	0.4	96	46-148
Ethylbenzene	ND	20.0	19.6	0.2	98	32-160
p,m-Xylene	ND	20.0	19.1	0.3	95	46-148
o-Xylene	ND	20.0	19.8	0.2	99	46-148

Method: Method 5030, Purge-and-Trap, Test Methods for Evaluating Solid Waste, SW-846, USEPA, July 1992.

Method 8020, Aromatic Volatile Organics, Test Methods for Evaluating Solid Waste, SW-846, USEPA, Sept. 1986

ND - Parameter not detected at the stated detection limit.

Comments:


Analyst


Review

CHAIN OF CUSTODY RECORD

Client/Project Name BAR-F # 4			Project Location 860 E. MAIN		ANALYSIS/PARAMETERS								
Sampler: (Signature) J. C. Blagg			Chain of Custody Tape No. 92154-4		No. of Containers	BTEX	MTBE					Remarks	
Sample No./ Identification	Sample Date	Sample Time	Lab Number	Sample Matrix									
MW # 4-3	1/27/94	1115	6790	WATER	2	X	X						
MW # 4- 5 5	1/27/94	1057	6791	"	2	X	X						
MW # 4-6	1/27/94	1040	6792	"	2	X	X						
MW # 4-7	1/27/94	1137	6793	"	2	X	X						
MW # 4-8	1/27/94	0955	6794	"	2	X	X						
MW # 4-9	1/27/94	0947	6795	"	2	X	X						
MW # 4-10	1/27/94	1006	6796	"	2	X	X						
MW # 4-11	1/27/94	1022	6797	"	2	X	X						
Relinquished by: (Signature) J. C. Blagg					Date 1/27/94	Time 1330	Received by: (Signature) Tony Tristano					Date 01/27/94	Time 1330
Relinquished by: (Signature)							Received by: (Signature)						
Relinquished by: (Signature)							Received by: (Signature)						

ENVIROTECH INC.
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 Farmington, New Mexico 87401
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APPENDIX D

Slug Test Data & Interpretation

BAR-F #4

SLUG TEST

FEB 10, 1994

1/2

WELL: MW #4-9

DEPTH 11.5' ±

DEPTH TO WATER 5.4' ±

SCREENED INTERVAL 4.5' - 11.5'

AQUIFER TYPE: WATER TABLE (TOTAL THICKNESS UNKNOWN)

LITHOLOGY: COBBLES WITH SANDS/SILTS/CLAYS (STORATIVITY ESTIMATED @ 25%)

SLUG TEST RUN WITH ELECTRIC TRANSDUCER [0"-100" WATER] PLACED AT WELL ID. DATA COLLECTED WITH RUSTRAK RANGER RECORDER. REMOVED ONE SLUG OF WATER WITH DISPOSABLE BAILER.

TIME SINCE PULL SLUG	WATER LEVEL	H	H/H ₀
-1 SECOND	6.31		
0 SECONDS	4.68 [H ₀ = 1.63']	1.63	1.00
2	4.95	1.36	.83
5	5.21	1.10	.67
10	5.36	.95	.58
15	5.41	.90	.55
20	5.43	.88	.54
25	5.45	.86	.53
30	5.46	.85	.52
40	5.49	.82	.50
50	5.51	.80	.49
60	5.53	.78	.48
75	5.55	.76	.47
90	5.57	.74	.45
120	5.60	.71	.44
180	5.66	.65	.40
240	5.71	.60	.37
300	5.75	.56	.34
600	5.90	.41	.25
960	6.00	.31	.19

$$\text{BAILER VOLUME} = \pi r^2 H = \pi \left(\frac{.125}{2} \right)^2 \times 2.9' = 0.0356 \text{ ft}^3$$

$$\text{WELL VOLUME} = \pi r^2 H = \pi \left(\frac{.125}{2} \right)^2 \times 1' = 0.022 \text{ ft}^3$$

$$\text{BAILER DISPLACEMENT} = 0.0356 / 0.022 = 1.63' = H_0$$

FROM LOHMAN, USGS PAPER 708, PG 27-30 + PLATE 2

TYPE CURVE MATCH @ $Tt/r_e^2 = 1.0$, $\alpha = 10^{-1}$, $H/H_0 = 0.5$ STORATIVITY ESTIMATED @ 25% [WALTON, PRACTICAL ASPECTS of GW MODELING, 3rd Ed, 1988, PG 21]

$$\text{TRANSMISSIVITY} = \frac{1.0 \times \left(\frac{1}{12}\right)^2}{4000} \frac{ft^2}{\text{SECOND}}$$

$$= 1.74 \times 10^{-6} \frac{ft^2}{\text{SECOND}}$$

$$= 0.15 \text{ FEET}^2/\text{DAY}$$

50 SHEETS
100 SHEETS
200 SHEETS22-141
22-142
22-144

 H/H_0

MATCH POINT

+

 $t = 4000$ $Tt/r_e^2 = 1.0$ $H/H_0 = 0.5$

TIME (SECONDS) →