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REPORTS

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**COMPREHENSIVE REPORT
FOR THE BLOOMFIELD CRUDE STATION
BLOOMFIELD, NEW MEXICO**

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Prepared for:

ENVIRONMENTAL BUREAU
OIL CONSERVATION DIVISION

GIANT INDUSTRIES ARIZONA, INC.

Project 62800075



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1.0 Introduction

This report compiles all investigative information obtained to date at the Bloomfield Crude Station (the site) since activities began in 1994.

1.1 SITE LOCATION

The site, which is owned by Giant Industries Arizona, Inc. (Giant), is located on the southwest corner of Blanco Boulevard and Fifth Street in the City of Bloomfield, San Juan County, New Mexico. The site is within the N1/2, NW1/4, NW1/4 of Section 22, Township 29 North, Range 11 West. A regional location map is shown in Figure 1.

1.2 SITE DESCRIPTION

The site covers an area of approximately 5.5 acres. Prior to December 1996, the site contained several buildings and tanks. The tanks included one 55,000, one 10,000, and one 2,500-barrel storage tank as well as a fuel tank for use by Giant vehicles. The 55,000-barrel storage tank burned and was removed in late 1995 to early 1996. Currently, several tanks and buildings are present on the site (Figure 2).

1.3 HISTORICAL BACKGROUND

The site was originally leased for oil exploration and production on September 6, 1929. Since that time the site has been owned and leased by several companies that operated various process units and tanks on or near the site, including refining operations. Aerex Refining, Plateau Refining, Shell Oil Company, El Paso Products, Malco, and Clayton Investment of Thriftway Marketing are known to have operated refining or other businesses on or near the property.

This investigation is centered on Tank 967-D, the (former) 55,000-barrel tank. The tank was located in the western half of the site within an approximate 340-ft x 280-ft bermed area. Based on interviews and other research, Giant believes that Tank 967-D was constructed in 1956 and used through 1991. The tank was closed in 1994. Complete descriptions of the materials stored in Tank 967-D are not available.

2.0 Investigative Activities

2.1 TANK CLOSURE

In connection with the closure of Tank 967-D, an excavation was made by Giant using a backhoe on the east side of the tank to a depth of approximately 12 feet to investigate the presence of hydrocarbons. Soil samples were collected from the excavation and analyzed by Environmental Protection Agency (EPA) Method 8015 for total petroleum



hydrocarbons (TPH) and by EPA Method 8020 for benzene, toluene, ethylbenzene, and total xylenes (BTEX) (Table 1). On March 15, 1994, Giant notified the New Mexico Oil Conservation Division (NMOCD) that hydrocarbons were found in the subsurface soil at the site. Additional verification samples were collected from several locations within the excavation on March 29, 1994. The samples were analyzed using a photoionization detector (PID) and are recorded in Table 2.

Giant summarized the results of the tank closure investigation in a report entitled "Initial Site Assessment and Characterization Plan", dated May 9, 1994. The report was submitted to the NMOCD in May 1994. As a result of this investigation, Giant proposed to characterize the extent of potential contamination at the site by drilling and soil sampling, in addition to visual observation.

2.2 SITE CHARACTERIZATION – PHASE I

A letter dated June 23, 1994 from Giant to the NMOCD clarified the site characterization work plan described in the May 9, 1994 report. In a letter dated August 19, 1994, NMOCD approved the work plan submitted by Giant.

On September 14, 1994, Giant contracted with Philip Environmental Services Corporation (Philip) (*formerly Burlington Environmental Inc.*) to provide site characterization services. This scope of work included soil borings, soil sampling, ground water monitor well installation and ground water sampling. During the week of September 19, 1994, Philip supervised the installation of four monitoring wells, MW-1 through MW-4, and eight exploratory soil borings, SB-1 through SB-8. Locations of the monitor wells and borings are shown on Figure 3. Geologic logs and well completion diagrams are included as Appendix A. Soil samples were collected from the soil borings, and ground water samples were collected from the monitoring wells.

Hydrocarbons were detected in all eight soil borings, concentrated in sandy clays or clayey sands beneath a dry, loose, surface sand layer (Table 3). Hydrocarbons were detected in three of the four monitor wells. Free phase hydrocarbons were found only in MW-2. Ground water analytical results are included in Tables 4 - 7.

A report titled "Site Assessment and Proposed Action Plan for the Bloomfield Crude Station, Bloomfield, New Mexico", dated January 1995, was generated from the information gathered in this phase of the site investigation and submitted to the NMOCD. The January 1995 report included recommendations for a second phase of investigation. In a letter dated March 13, 1995, the NMOCD approved the recommendations for further investigation as described in the January 1995 report.

2.2 SITE CHARACTERIZATION – PHASE 2

On March 23, 1995 Philip submitted a technical approach for the next phase of investigation. The NMOCD approved the approach and during the week beginning April 24, 1995, Philip completed 13 soil borings, SB-9 through SB-21, and installed one monitoring well off-site, MW-5 (Figure 3). Field headspace readings were taken with a photoionization detector (PID) on soil samples collected from all of the borings. Ground water samples were collected from the newly installed well and from three of the four existing on-site wells. Hydrocarbons were detected in seven of the thirteen new soil borings (Table 3). Ground water elevation data is included in Table 8. This information, combined with the first round of soil borings, was used to delineate the approximate area of impacted soils (Figure 3). No hydrocarbons were detected in water from MW-5. A report titled "Site Assessment for the Bloomfield Crude Station, Bloomfield, New Mexico" was prepared by Philip in May 1995.

2.4 PROPOSED REMEDIATION - 1995

On August 9, 1995 a letter from the NMOCD to Giant indicated that NMOCD had reviewed the May report and found it to be lacking in proposed remediation for the contaminated soil and ground water. NMOCD set forth a deadline of October 6, 1995 for submittal of a remedial action work plan.

On August 21, 1995, Philip submitted a proposal to Giant to perform pilot testing and remedial system design and installation at the Bloomfield Crude Station. This included removal of free product and the in situ remediation of hydrocarbon contaminated soils in the tank area by bioventing.

On October 5, 1995, a follow-up letter was submitted to NMOCD by Giant thanking them for a deadline extension and proposing to submit the remedial action work plan by November 6, 1995.

On October 12, 1995 Giant approved the remedial action work plan and issued Purchase Order # 05327 authorizing Philip to conduct pilot testing and remedial system design and installation for the Bloomfield Crude Station.

The Remedial Action Work Plan was submitted to the NMOCD on November 3, 1995. On December 8, 1995, NMOCD wrote to Giant approving the Remedial Action Work Plan if certain conditions were met, including submitting a work plan by January 26, 1996 for the installation of additional monitoring well(s), additional water sampling, and submission of annual reports starting December 1, 1996. In addition, NMOCD required

the results of the remediation pilot test and final proposed design of the remediation system by March 1, 1996. However, and as discussed in the following section (Section 2.5), this work was cancelled because of the fire and subsequent removal of Tank 967-D.

2.5 TANK FIRE AND SUBSEQUENT REMEDIATION OF LEAD AND HYDROCARBON-IMPACTED SOIL

On December 12, 1995, a contractor of Giant's was in the process of cleaning Tank 967-D when a fire occurred. The tank burned resulting in the release of hydrocarbons from within the tank (tank bottom material) and lead based paint chips from the outside of the tank onto the soil in a limited, contained area.

Work on the subsurface hydrocarbon investigation and remediation was suspended while the tank was removed and the results of the fire were mitigated.

Between March 7 and April 24, 1996, Philip performed cleanup and removal of the lead and hydrocarbon impacted soils and removed the damaged tank. The lead based paint chips were vacuumed up from March 7 to March 20, 1996. On March 20-21 the material that flowed from the tank bottom during the fire was excavated and stockpiled for later transportation and disposal. Tank 967-D was dismantled between April 18 and April 24, 1996.

Transportation and disposal of the tank bottom waste occurred between April 19 and July 24, 1996. Tank bottom wastes that were relatively free of soil (approximately 240 cubic yards) were transported to Controlled Recovery Inc, located in Hobbs, New Mexico. Non-hazardous impacted soil was taken to Envirotech Inc.'s land farm, located in San Juan County, New Mexico, completing the cleanup of hydrocarbons released during the tank fire. On June 4, twenty-four drums of sand mixed with lead-based paint chips were shipped to Grassy Mountain, Utah, for disposal. Scrap iron from the tank demolition was sold to Acme Iron and Metal located in Albuquerque, New Mexico and to Valley Scrap Metal located in Kirtland, New Mexico.

Between August 1996 and June 1999, Giant pursued closure of the site lead issues with the New Mexico Environment Department. On August 5, 1996, Philip forwarded a letter to the NMOCD describing how the site would be sampled for closure of the lead paint clean-up task. The NMOCD approved the methods on August 6, and on August 7, Philip collected soil samples for TCLP lead analysis. In August of 1996, Philip prepared a draft report entitled "Bloomfield Crude Station, Tank Removal Operations Report", which summarized tank removal operations, sampling, and the disposition of all waste generated during site activities. Giant submitted the draft report to the NMOCD and based on the

results of the clean-up and lead investigation, Giant requested closure of the remedial activities completed at the site.

Giant submitted another report titled "Giant Industries Arizona, Inc., Soil Lead Survey - Bloomfield Crude Station, Bloomfield, New Mexico" to the NMOCD on April 28, 1999. This document detailed the results of the tank fire investigation and requested closure of the soil lead remedial actions. On June 21, 1999 the NMOCD granted closure and requested a work plan to completely define the extent of soil and ground water contamination at the site.

3.0 Current Investigation - 1999

On September 27, 1999, Giant submitted the "Work Plan for the Giant Bloomfield Crude Station" to the NMOCD. Due to the length of time having passed between the tank fire and this September 27 work plan, Giant requested to re-evaluate the remedial strategies best suited for the Bloomfield Crude Station. Therefore, Giant's scope of work included the following: inspection of the existing monitor wells; re-surveying the elevation of the monitor wells; collecting water surface elevation and product thickness measurements for three consecutive months; sampling the existing monitor wells on a quarterly basis for two quarters (September and December 1999), and analyzing the samples for BTEX, TPH, general water chemistry constituents and New Mexico Water Quality Control Commission metals; manually remove product from MW-2. This scope of work was proposed to gain more data about the site in order to move forward with remedial action.

On October 29, 1999, the NMOCD approved the September 27 work plan and as part of that approval, requested this report.

3.1 GROUND WATER ELEVATION

Depth-to-ground water measurements were collected with an ORS oil/water interface probe on September 30, November 16, and December 14, 1999. Ground water elevation data is summarized in Table 8. As with previous sampling events, free product was only found in MW-2.

The apparent ground water gradient, constructed from the most current static ground water elevation data measured on December 14, 1999, is presented on Figure 4. Depth to ground water was measured between 15.25 ft (MW-3) and 16.63 ft (MW-5) below the top of the monitor well casings. As with previous investigation reports, MW-1 was not used to estimate the configuration of the potentiometric surface because MW-1 is completed above the potentiometric surface as is evidenced by the limited amount of water measured in this well. The water detected in MW-1 is most likely standing water that has

accumulated in the bottom of the well through condensation in the well and is not a true reflection of the elevation of the potentiometric surface. Therefore, water level measurements from MW-2, MW-3, MW-4, and MW-5 were used because these wells are screened in the same interval – the shallow saturated zone. The water level in MW-2 was corrected for product thickness using a specific gravity of 0.8251, as analyzed by Giant's fuels laboratory. Plotted contours indicate the prevailing ground water direction is 41° toward the southwest at an average hydraulic gradient of 0.02 ft/ft.

3.2 GROUND WATER SAMPLING AND ANALYTICAL RESULTS

Ground water samples were collected in September and December of 1999. Samples were not collected from MW-2 because free product was detected in this well. MW-1 was completed in a thin sand stringer that appeared to be saturated with water above the water table. To avoid creating a vertical conduit for contaminant migration, MW-1 was screened only across this shallow sand stringer and has never produced sufficient water for well development or sample collection. However, MW-4 is completed adjacent to MW-1 and is screened across the water table. Although minimal water was obtained from MW-1 during the October 1999 sampling event, this water represents standing water trapped in the casing and is not representative of the aquifer. These analytical results are therefore not included in the tables. Monitoring wells MW-3, -4, and -5 were purged and sampled using disposable bailers. Concurrent with sample collection, water quality measurements, including temperature, pH, and conductivity, were recorded. Monitor well purging, water quality, and sample collection information are provided in Appendix B.

Ground water samples were collected after three casing volumes of water were removed and/or when the water being bailed from the wells was no longer silty and the temperature, pH, and conductivity readings stabilized. Samples were collected for analysis of BTEX (EPA Method 8021B), dissolved metals (EPA Methods 200, 245, and SM3114B), TPH (EPA Method 8015), and general chemistry parameters. Samples for BTEX, dissolved metals, and TPH were packed in an insulated storage chest, along with chain-of-custody documentation, and shipped to Assaigai Analytical Laboratories, Inc., in Albuquerque, New Mexico for chemical analysis. The general chemistry samples were also packed in an insulated storage chest, along with chain-of-custody documentation, and delivered to Inter-Mountain Laboratories, Inc., in Farmington, New Mexico for analysis. Certified analytical reports, quality control data, and chain-of-custody documentation for the September and December 1999 sampling events are included as Appendix C. Results are summarized in Tables 4 – 7.

BTEX constituents and TPH were not detected in any of the sampled monitor wells during the September 1999 and December 1999 sampling events (Table 4). Dissolved

metal concentrations were not detected or detected below NMWQCC standards (Table 6). Except for slightly elevated concentrations of total dissolved solids (TDS) (MW-3, MW-4, MW-5), chloride (MW-5), and sulfate (MW-3, MW-4, MW-5), general chemistry parameters were also not detected or detected below NMWQCC standards (Table 7).

3.3 FREE PRODUCT REMOVAL

Table 9 summarizes free product removal activities to date. Approximately 9.75 gallons of product have been extracted since manual removal activities started in September 1999. The product is currently bailed from the well and stored in on-site 55-gallon drums for eventual refining at the Giant Refinery.

4.0 Remedial Plan

Based on the previous investigations, hydrocarbons appear to be concentrated in the sandy clays or clayey sands beneath the dry, loose, surface-sand layer. Borings drilled directly adjacent to the former tank location indicated impacted soils extending to a depth of approximately 14 to 17 feet bgs, with an average thickness of approximately 9 feet. The top of this impacted layer is approximately 8 to 12 feet bgs. Based upon the area and the data collected from soil borings, a substantial volume of impacted soil may remain at the site. Headspace readings indicate that the hydrocarbons in the soil extend south and west from the tank. The direction of ground water migration inferred from measured water levels in the monitoring wells confirms this direction of hydrocarbon migration. Plotted contours indicate the prevailing ground water direction is 41° to the southwest at an average hydraulic gradient of 0.02 ft/ft.

The ground water at the site is found under water table conditions approximately 23-feet beneath ground surface. In addition, saturated thin sand stringers, approximately 6-inches thick, are found within and separated from underlying ground water by clay units. Recharge to these sand stringers is most likely from direct infiltration of rainfall from within the bermed area surrounding the former tank, or from seasonal irrigation upgradient.

Crude oil has migrated through the soil and is found floating on ground water at MW-2. Site-wide ground water samples indicate elevated concentrations of TDS, sulfate, and chloride. The general chemistry analytical results indicate TDS and sulfate concentrations, including samples from upgradient monitor well MW-3, above NMWQCC standards. However, the concentrations of these general chemistry

parameters are consistent with natural conditions. If the former tank is the source of the hydrocarbons, the direction of ground water flow indicates that the contaminant plume may migrate to the southwest. The results of the ground water sampling suggest that MW-2 is in a free-phase hydrocarbon plume; MW-3, MW-4, and MW-5 are outside this plume. This suggests that any dissolved-phase plume is of limited areal extent.

The results of the ground water sampling indicate that the ground water quality is not suitable for use as a domestic water supply, based upon high naturally occurring TDS, sulfate, and chloride concentrations. There are no known users, either domestic or industrial, of the shallow water at or downgradient of the site. Low anticipated well yield, poor chemical quality, and other existing sources are the probable reasons for the lack of production; possible future use of this water is unlikely. Therefore, the free product found in the immediate vicinity of MW-2 is the main concern at this site; hydrocarbon constituents were not detected in downgradient MW-5.

The following section details Giant's proposed remedial alternative for ground water and soil impacted with hydrocarbons. As required by the NMOCD, soil must be remediated to 100 ppm TPH and 50 ppm combined BTEX. Concentrations of hydrocarbon constituents in groundwater must be clean, or below standards, for eight consecutive quarters before closure will be approved by the NMOCD.

5.0 Selected Remedial Alternative

Based on previous investigations at the site, Giant believes the best remedial alternative would be hydrocarbon source removal. This alternative would include the excavation of soil in the vicinity of MW-2 and from beneath the tank. Excavation will proceed to groundwater. In the event free phase hydrocarbons are present on the groundwater surface, the excavation will be left open and the free phase will be manually removed from the water surface. The excavated soil would be hauled to Giant's Landfarm and clean backfill from the Landfarm or from on-site would be placed within the excavation. Semi-annual monitoring of ground water for BTEX / TPH and annual reporting to the NMOCD would continue until two clean years of analytical results have been obtained.

In addition to the excavation activities and as part of the remedial alternative selected, MW-1 would be abandoned following NMOCD approved guidelines which include pulling the casing materials to the extent practical and then filling the borehole and remaining casing material with a cement/bentonite grout.

Following abandonment of MW-1, an additional monitoring well will be installed downgradient of MW-2 as shown on Figure 4.

Table 1

Table 1

(Former) Tank 967-D Soil Samples --- March 15, 1994
Giant Industries Arizona, Inc.
Bloomfield Crude Station

Constituent	Sample 1	Sample 2
Fuel Hydrocarbons C6 - C10 Range (mg/kg)	16,000	22,000
Fuel Hydrocarbons C10 - C22 Range (mg/kg)	9,300	14,000
Fuel Hydrocarbons C22 - C36 Range (mg/kg)	7,600	12,000
Benzene (ug/l)	1,800	2,300
Toluene (ug/l)	2,500	3,600
Ethyl Benzene (ug/l)	630	640
Xylene (ug/l)	4,700	4,800

Samples collected north (1) and south (2) of (the former) Tank 967-D using a rotary rig.

Soil samples were analyzed by Environmental Protection Agency (EPA) Method 8015 for total petroleum hydrocarbons (TPH) and by EPA Method 8020 for benzene, toluene, ethylbenzene, and total xylenes (BTEX) .

Table 2

Table 2

(Former) Tank 967-D Soil Samples --- March 29, 1994
Giant Industries Arizona, Inc.
Bloomfield Crude Station

Depth	Reading
0.5 ft	180 ppm
1.0 ft	192 ppm
3.0 ft	220 ppm
3.0 ft	180 ppm

Samples collected in the excavated area - east of (the former) Tank 967-D.

Samples were analyzed in the field using a photoionization detector (PID).

Table 3

Table 3**Soil Sampling - - - Site Characterization (Phase 1 and Phase 2)****1994 / 1995****Giant Industries Arizona, Inc.****Bloomfield Crude Station**

Sample ID (Location - Depth)	C6 - C18 Range (mg/kg)	C12 - C36 Range (mg/kg)	Field Screening (ppm)
Phase 1			
SB-1 (9.0 ft)	15	33	465
SB-2 (12.5 ft)	1,300	1,300	432
SB-3 (11.0 ft)	490	830	383
SB-4 (16.5 ft)	4,900	3,200	305
SB-5 (17.0 ft)	3,400	2,200	187
SB-6 (5.0 ft)	180	78	236
SB-7 (12.3 ft)	2,000	1,500	176
SB-8 (12.0 ft)	550	410	202
Phase 2			
SB-9*	NS	NS	0
SB-10 (14 ft)	NS	NS	>2000
SB-11 (10 ft)	NS	NS	>2000
SB-12 (10 ft)	NS	NS	>2000
SB-13 *	NS	NS	0
SB-14*	NS	NS	<5
SB-15 (15 ft)	NS	NS	382
SB-16 (14 ft)	NS	NS	1142
SB-17 (16 ft)	NS	NS	1601
SB-18 (17 ft)	NS	NS	435
SB-19*	NS	NS	<5
SB-20*	NS	NS	<5
SB-21*	NS	NS	<5

NS: Analytical sample not collected

*: average field screening reading over entire sampling interval

Samples collected using a hollow-stem auger drill rig equipped with a split-spoon sampling tube

Table 4

Table 4

Summary of Ground Water Sample BTEX and TPH Analytical Results
Giant Industries Arizona, Inc.
Bloomfield Crude Station

NMWQCC Standards		Benzene (ug/l)	Toluene (ug/l)	Ethylbenzene (ug/l)	Total Xylenes (ug/l)	TPH (mg/l)
		10	750	750	620	None
MW-1 (see note)	Sep-94	NS	NS	NS	NS	NS
	Apr-95	NS	NS	NS	NS	NS
	Sep-99	NS*	NS*	NS*	NS*	NS*
	Dec-99	NS*	NS*	NS*	NS*	NS*
MW-2	Sep-94	640	600	82	690	5
	Apr-95	220	280	53	430	3
	Sep-99	NS**	NS**	NS**	NS**	NS**
	Dec-99	NS**	NS**	NS**	NS**	NS**
MW-3	Sep-94	ND	ND	ND	ND	ND
	Apr-95	ND	ND	ND	ND	ND
	Sep-99	ND	ND	ND	ND	ND
	Dec-99	ND	ND	ND	ND	ND
MW-4	Sep-94	2.1	ND	ND	1.2	ND
	Apr-95	ND	ND	ND	ND	ND
	Sep-99	ND	ND	ND	ND	ND
	Dec-99	ND	ND	ND	ND	ND
MW-5	Sep-94	NS	NS	NS	NS	NS
	Apr-95	ND	ND	ND	ND	NS
	Sep-99	ND	ND	ND	ND	ND
	Dec-99	ND	ND	ND	ND	ND

ND=Not Detected

NS*=Insufficient sample volume

NS**=Product in well, sample not collected

MW-1 was initially completed in a thin sand stringer that appeared to be saturated. To avoid creating a vertical conduit for contaminant migration, MW-1 was only screened across this shallow sand stringer and has never produced sufficient water for well development or sample collection. However, MW-4 is completed adjacent to MW-1, and is screened across the water table.

Table 5

Table 5

Ground Water Sample Results - - - September 1994
Polynuclear Aromatic Hydrocarbons (EPA Method 610)
Giant Industries Arizona, Inc.
Bloomfield Crude Station

All units are ug/l (micrograms per liter)

Analyte	MW-2	MW-3	MW-4
Naphthalene	8.9	ND	ND
Acenaphthylene	ND	ND	ND
Acenaphthene	ND	ND	ND
Fluorene	1.2	ND	ND
Phenanthrene	1.8	ND	ND
Anthracene	ND	ND	ND
Fluoranthene	1.2	ND	ND
Pyrene	ND	ND	ND
Benzo(a)Anthracene	ND	ND	ND
Chrysene	0.17	ND	ND
Benzo(b)Fluoranthene	ND	ND	ND
Benzo(k)Fluoranthene	ND	ND	ND
Benzo(a)Pyrene	ND	ND	ND
Dibenzo(a,h)Anthracene	ND	ND	ND
Benzo(g,h,i)Perylene	ND	ND	ND
Indeno(1,2,3-CD)Pyrene	ND	ND	ND
1-Methylnaphthalene	5.9	ND	ND
2-Methylnaphthalene	5.8	ND	ND

MW-1 not sampled

ND=Not Detected

WQCC Standards:

PAH's - total naphthalene plus monomethylnaphthalenes 30 ug/l

Benzo (a) Pyrene 0.7 ug/l

Table 6

Table 6

Ground Water Sample Results - - - Dissolved Metals
Giant Industries Arizona, Inc.
Bloomfield Crude Station

All units are mg/l (milligrams per liter)

NMWQCC Standards		Arsenic	Beryllium	Cadmium	Chromium	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
MW-1 (see note)	Sep-94	0.1	NA	0.01	0.05	1.0	0.05	0.002	0.2	0.05	0.05	NA	10.0
	Sep-99	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Dec-99	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MW-2	Sep-94	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Sep-99	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Dec-99	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
MW-3	Sep-94	ND	ND	ND	0.010	0.012	ND	ND	ND	ND	ND	ND	0.032
	Sep-99	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**
	Dec-99	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**
MW-4	Sep-94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.023
	Sep-99	ND	ND	ND	ND	0.01	ND	ND	ND	ND	ND	0.275	0.125
	Dec-99	ND	ND	ND	ND	0.0573	ND	ND	0.0048	0.0027	ND	ND	ND
MW-5	Sep-94	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.026
	Sep-99	ND	ND	ND	ND	ND	0.005	ND	ND	ND	ND	ND	0.2
	Dec-99	ND	ND	ND	ND	0.0673	ND	ND	0.0081	ND	ND	ND	ND
	Sep-94	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	Sep-99	ND	ND	ND	ND	ND	ND	ND	0.02	ND	ND	0.382	0.079
	Dec-99	0.0012	ND	ND	ND	0.087	ND	0.0003	0.0234	0.0029	ND	0.001	ND

ND=Not Detected

NS=No Sample Collected

NS*=Insufficient sample volume

NS**=Product in well, sample not collected

NA=Not Applicable

---Analytical results for MW-1 are not included as any samples collected are not representative of the aquifer.

MW-1 was initially completed in a thin sand stringer that appeared to be saturated. To avoid creating a vertical conduit for contaminant migration, MW-1 was only screened across this shallow sand stringer and has never produced sufficient water for well development or sample collection. However, MW-4 is completed adjacent to MW-1, and is screened across the water table.

Table 7

Table 7

Ground Water Sample Results - - - General Chemistry
Giant Industries Arizona, Inc.
Bloomfield Crude Station

	pH (s.u.)	Conductivity (umhos/cm)	TDS (mg/l)	Alkalinity (mg/l)	Hardness (mg/l)	Bicarbonate (mg/l)	Carbonate (mg/l)	Chloride (mg/l)	Hydroxide (mg/l)	Sulfate (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Potassium (mg/l)	Sodium (mg/l)
NMWQCC Standards	6-9	NA	1000	NA	NA	NA	NA	250	NA	600	NA	NA	NA	NA
MW-1	Sep-94	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Sep-99	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
	Dec-99	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*	NS*
MW-2	Sep-94	6.6	4920	957	NS	1170	0	1050	0	245	325	30	1.4	828
	Sep-99	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**
	Dec-99	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**	NS**
MW-3	Sep-94	7.1	4250	521	NS	635	0	48	0	1920	439	37	1.4	661
	Sep-99	7.2	4790	551	1270	672	ND	54	ND	2420	445	39.7	1.9	777
	Dec-99	7.3	5010	570	1320	695	ND	72	ND	2530	460	42.4	2.5	804
MW-4	Sep-94	7.0	5420	576	NS	703	0	175	0	2470	439	53	3.5	907
	Sep-99	7.1	5530	551	1360	672	ND	190	ND	2420	464	48.8	3.8	860
	Dec-99	7.3	5410	523	1380	638	ND	88	ND	2840	468	50.8	3.6	897
MW-5	Apr-95	6.9	6000	775	NS	945	0	996	0	1390	634	51	6.6	861
	Sep-99	6.9	6870	713	2000	868	ND	1469	ND	1200	704	60.2	5.2	869
	Dec-99	6.8	7280	827	2110	1010	ND	1530	ND	1230	739	64.3	5.1	960

NA=Not Applicable

ND=Not Detected

NS*=Insufficient sample volume

NS**=product in well, sample not collected

Table 8

Table 8

**Ground Water Elevation Data
Giant Industries Arizona, Inc.
Bloomfield Crude Station**

Well ID	Date Measured	Measured DTW	TOC Elevation	Ground Water Elevation
MW-1	September 22, 1994	13.28	5484.25	NA*
	October 31, 1994	13.53		NA*
	April 27, 1995	13.57		NA*
	May 4, 1995	NA		NA*
	September 30, 1999	13.58		NA*
	November 16, 1999	13.72		NA*
	December 14, 1999	13.71		NA*
MW-2	September 22, 1994	13.28	5483.04	5469.76
	October 31, 1994	12.66		5470.29
	April 27, 1995	13.15		5469.50
	May 4, 1995	NA		NA
	September 30, 1999	17.48		5463.52
	November 16, 1999	17.00		5464.10
	December 14, 1999	16.76		5464.55
MW-3	September 22, 1994	13.02	5486.21	5473.19
	October 31, 1994	12.39		5473.82
	April 27, 1995	12.98		5473.23
	May 4, 1995	12.68		5473.53
	September 30, 1999	15.81		5470.40
	November 16, 1999	15.41		5470.80
	December 14, 1999	15.25		5470.96
MW-4	September 22, 1994	14.38	5483.88	5469.50
	October 31, 1994	14.01		5469.87
	April 27, 1995	13.73		5470.15
	May 4, 1995	13.67		5470.21
	September 30, 1999	16.21		5467.67
	November 16, 1999	15.51		5468.37
	December 14, 1999	16.00		5467.88
MW-5	September 22, 1994	NA	5479.41	NA
	October 31, 1994	NA		NA
	April 27, 1995	NA		NA
	May 4, 1995	14.38		5465.03
	September 30, 1999	16.93		5462.48
	November 16, 1999	16.52		5462.89
	December 14, 1999	16.63		5462.78

Notes: Measuring points are marked by a notch in top of well casing
 NA = Not Available
 TOC (top of casing)
 Water Elevation = (Surveyed Well Casing Elevation) - (DTW)
 Water level elevation is given in feet above mean sea level
 MW-2 is corrected for product thickness using a specific gravity of 0.8251
 NA* = Water levels for MW-1 are not included because this well is not screened in the aquifer

Table 9

Table 9

**Recovered Product - - - MW-2
Giant Industries Arizona, Inc.
Bloomfield Crude Station**

Date	Depth to product	Depth to Water	Product Thickness	Volume Removed (gallons)
5/4/95	NA	NA	NA	9 (includes purge water)
9/30/99	15.00	17.48	2.47	2.75
11/16/99	14.65	17	2.35	2
12/15/99	14.66	16.76	2.1	5
Total Gallons of Product Removed (1999) =				9.75

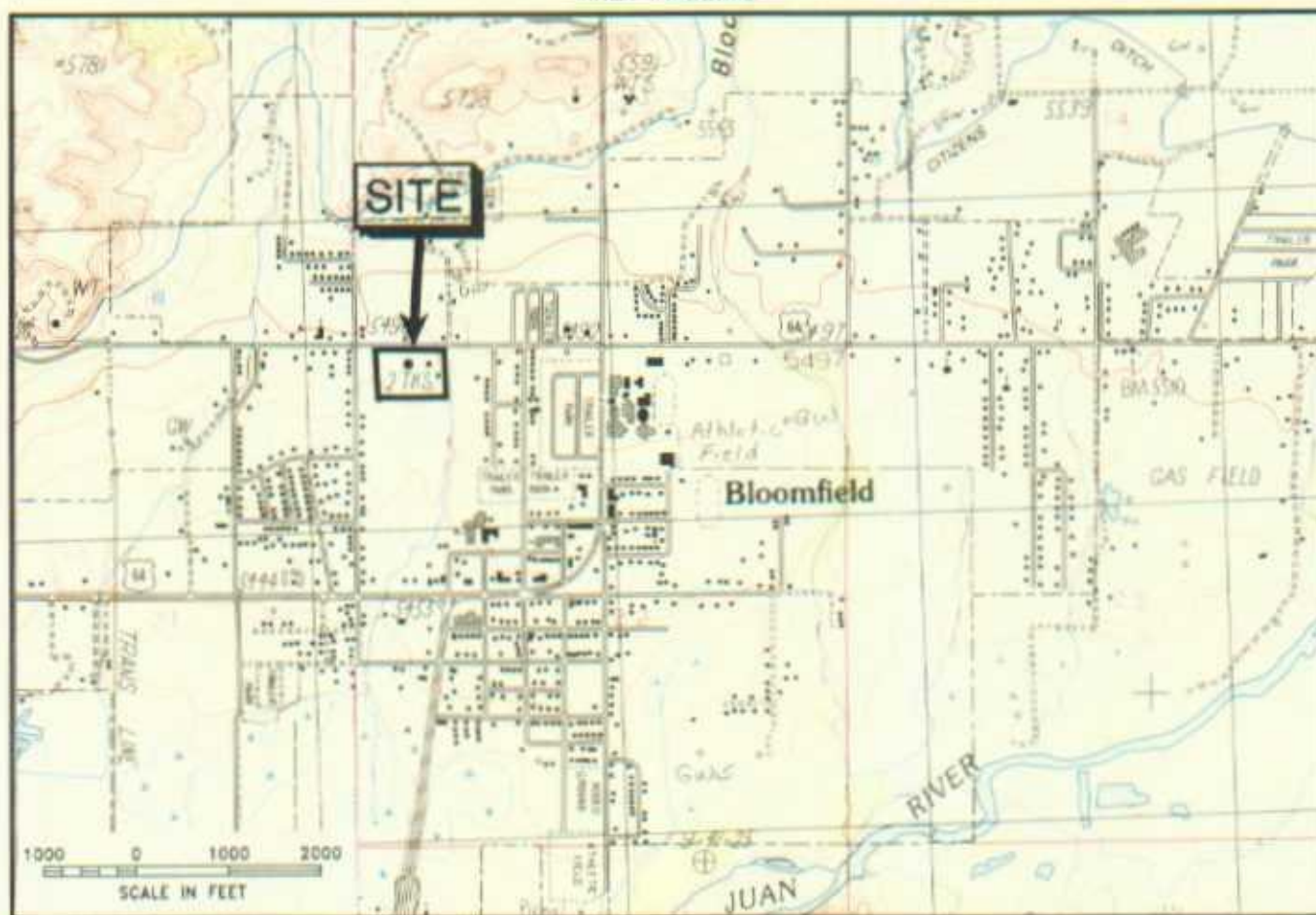
Figure 1

NEW MEXICO

SAN JUAN COUNTY



AREA IN DETAIL



Modified from U.S. Geological Survey Quadrangle of Bloomfield, New Mexico, Provisional Edition 1985.

SCALE IS VARIABLE



SITE LOCATION MAP

DWG: TVM
CHKD: APPD:
DATE: 12/30/99
REV: 0

PROJECT NO: 62800075
GIANT INDUSTRIES
BLOOMFIELD, NM

FIGURE 1

Figure 2



TITLE:
GIANT INDUSTRIES ARIZONA, INC.
BLOOMFIELD, NEW MEXICO
SITE LAYOUT

DWN: TMM
CHKD: APPD:
DATE: 1/3/00
REV: 1

PROJECT NO.: 62800075
GIANT INDUSTRIES
BLOOMFIELD, NM
FIGURE 2

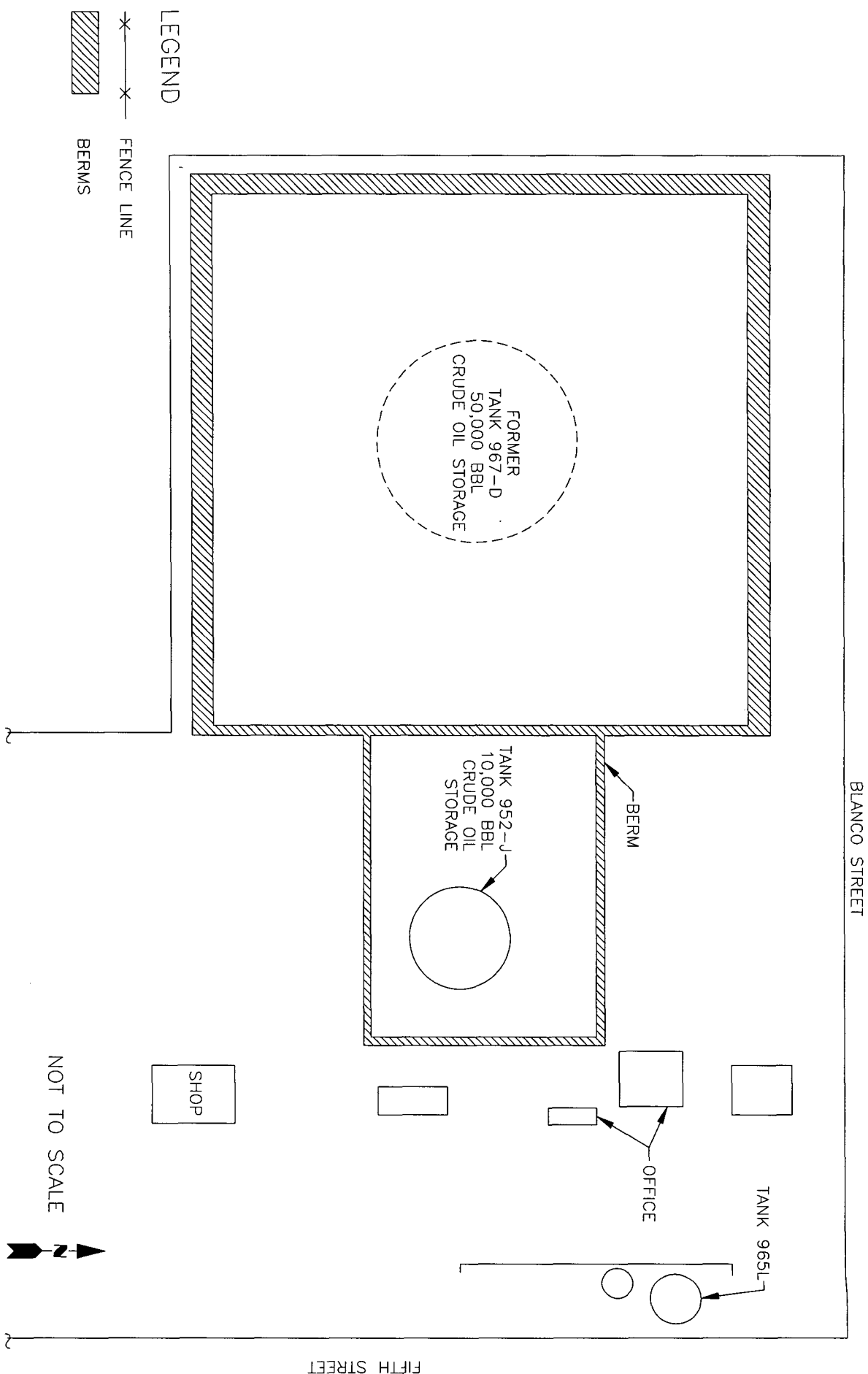
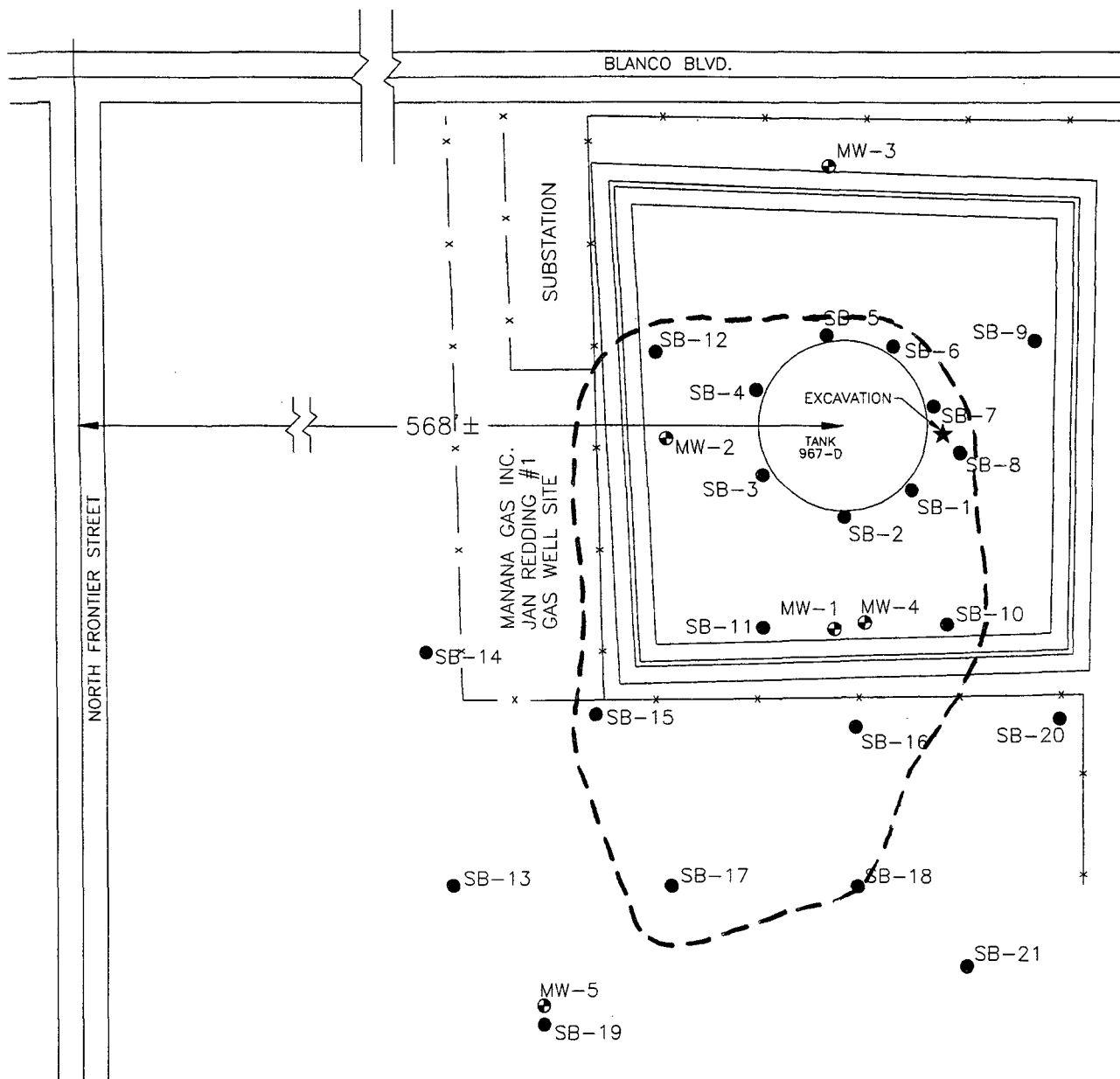


Figure 3



LEGEND

- x—x— FENCE LINE
- MW-1 APPROXIMATE MONITORING WELL LOCATION AND NUMBER
- SB-1 APPROXIMATE BOREHOLE LOCATION AND NUMBER
- ★ APPROXIMATE LOCATION OF MARCH 15, 1994 EXCAVATION
- - - - - ESTIMATED BOUNDARY OF IMPACTED SOILS

0 100
FEET



COL. 628/000759-002



TITLE:

GIANT INDUSTRIES ARIZONAL, INC.
BLOOFIELD, NEW MEXICO
SAMPLING LOCATIONS

DWN:

TMM

CHKD:

DATE:

1/3/00

DES.:

APPD:

REV.:

1

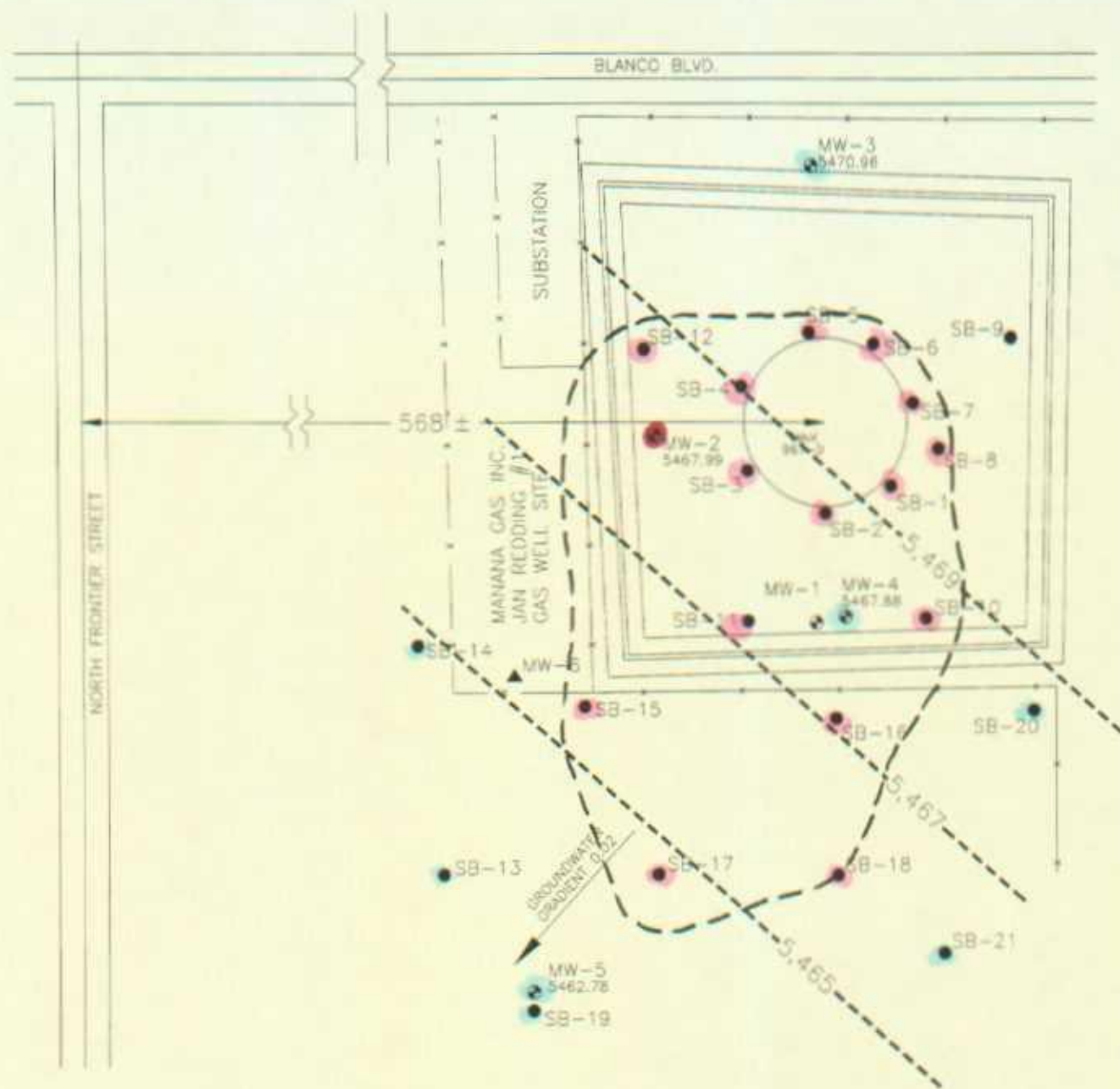
PROJECT NO.:

62800075

GIANT INDUSTRIES
BLOOMFIELD, NM

FIGURE 3

Figure 4



LEGEND

- FENCE LINE
- APPROXIMATE MONITORING WELL LOCATION, NUMBER AND ELEVATION
- PROPOSED MONITORING WELL LOCATION
- ESTIMATED BOUNDARY OF IMPACTED SOILS
- APPROXIMATE EQUIPOTENTIAL LINE

NOTE: MW-2 water level corrected for product thickness.

0 100
FEET



COL. 628/000758-004



TITLE:
GROUNDWATER GRADIENT
MAP

DWN: TMM	DES.:
CHKD:	APPRD:
DATE: 1/3/00	REV.: 1

PROJECT NO.: 62800075
GIANT INDUSTRIES
BLOOMFIELD, NM

FIGURE 4

Appendix A

RECORD OF SUBSURFACE EXPLORATION

Page 1 of 1
Borehole No.
Well No. MW-1

PROJECT NAME: <u>Giant-Bloom Field</u>				PROJECT NO: <u>1302.3</u>				
ELEVATION: _____				BOREHOLE LOCATION/COORDINATES: _____				
LOGGED BY: <u>SK</u>				GWL: depth _____ date/time _____				
DRILLED BY: <u>Rodgers</u>				GWL: depth _____ date/time _____				
DRILLING/BIG METHODS: <u>HSM</u>								
DATE/TIME STARTED: <u>9/19/94 0730</u>				DATE/TIME COMPLETION(S): <u>9/20/94 0930</u>				
AIR MONITORING TYPE: <u>PID</u>				BZ = Breathing Zone; BH = Borehole; S = Sample				
DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: <u>USCS</u>	USCS SYMBOL	DEPTH CHNG (feet)	AIR MONITORING UNITS <u>ppm</u> BZ BH S	DRILLING CONDITIONS AND (BLOW COUNTS)
5			3.2 5.0	SAND, med. - 30% to very coarse, loose, damp, light brown, well graded, angular to sub-angular.	SW		50	2
10			9.7	sandy CLAY, 20% fine to med. sand soft, med plasticity, light brown damp.	CL	9.7	10.0	239
			3.2 5.0	same as above but dk. grey	CL	12.0	13.0	150
15				same as above but light brown		14.5	15.0	78
			3.1 5.0	clayey SAND, fine to med 60%, coarse 40%, trace fines, loose damp, light brown, poorly graded angular to subangular.	SC	15.0	18.0	4
				sandy CLAY, 10% fine sand, stiff, low plasticity, light brown, damp		18.0		42
20				SAND, 40% coarse, 60% fine to med. loose moist, light brown, poorly graded, subang.	SP	21.0	20.0 20.5	24
				B.O.H. at 20.00 (drove sampler to 22.0 ft.)		22.0	22.0	14

COMMENTS: _____

GEOLOGIST SIGNATURE

Mark Kelly

BURLINGTON
ENVIRONMENTAL

Well Installation Record

Well Number MW-1Serial No. WIR-

Borehole Number (if different) _____

Project Name Giant - BloomfieldProject No. 13023Client Company Giant Inc.Phase/Task No. 0077.77

Site Name _____

Site Address 5th and Blanco St, Bloomfield, NMWell Diameter 4" inchesConductor Casing ☒ None
(To seal off upper water-bearing zones)

Well Type

- ☒ Monitoring Well
☐ Piezometer
☐ Recovery Well
☐ Other _____

Diameter _____ inches

Material _____

Length _____ feet

Depth to Bottom of Casing _____ feet

Seal Material _____

Permit

Number _____

Date _____

Well Construction Details

Well Component	Material (specify type)				Length (feet)	Depth Below Grade (feet)	
	PVC	Stainless Steel	Teflon	Other		Bottom	Top
Borehole						13.6	
Bottom Cap/Plug	<u>1/2"</u>					13.6	
Sump (Tailpipe below screen)							Same as bottom of screen
Screen (Slot Size: _____ in.)	<u>10'</u>					13.5	3.5
Riser (Blank Casing above Screen)	<u>3.5'</u>					Same as top of screen	0

Annular Fill Materials

Use minus sign if top of riser is above ground. /

Component	Material Name/Description	Quantity (No. of Bags/ Volume per Bag)	Tremied		Depth Below Grade (feet)	
			Yes	No	Bottom	Top
Plug beneath sand pack	<u>bentonite pellets</u>	<u>1 bucket</u>		X	<u>20'</u>	<u>19'</u>
Sand Pack	<u>CSSI 10-20 sand</u>	<u>5-100#</u>			<u>13.5</u>	<u>2.5</u>
Bentonite Seal	<u>Pellets</u>	<u>1 bucket</u>			<u>2.5</u>	<u>1.2</u>
Grout Seal						
Backfill (if any)	<u>sugar cuttings</u>	<u>52 9/21/94</u>			<u>19'</u>	<u>15'</u>
Surface Seal	<u>neat cement, 5% bentonite</u>	<u>3 bags</u>			<u>1.2'</u>	<u>surface</u>

Well Cover

Finish

- ☐ Stick-up
☒ Flush
☐ Vault

Material

- ☐ Steel
☐ Aluminum

Lock

☒ Yes

Lock Number _____
☐ No

Measuring Point

- ☐ Top of Riser
☐ Top of Cover

Well Collision

Protectors Installed?

☐ Yes

Quantity _____
☐ No

Comments Bentonite pellets from 15' to 14'. Clean CSSI 10-20 from 14' to 13.5'
2.5'. Bentonite pellet seal from 2.5' to 1.2'.

Recorded by (print name) Sarah KellySignature Sarah Kelly Date 9/20/94 Reviewer _____ Date _____

MONITORING WELL INSTALLATION RECORD

Burlington Environmental Inc.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # _____
Well # MW-1
Page 1 of 1

Project Name GIANT - BLOOMFIELD
Project Number 13023 Phase 0077
Project Location 5TH AND BLANCO STREETS

Elevation _____
Well Location _____
GWL Depth _____
Installed By RODGERS DRILLING

On-Site Geologist SARAH KELLY
Personnel On-Site _____
Contractors On-Site RODGERS
Client Personnel On-Site _____

Date/Time Started 9/20/94 0730
Date/Time Completed 9/20/94 1130

Depths in Reference to Ground Surface				
Item	Material	Depth (feet)		
Top of Protective Casing		0.0		Top of Protective Casing <u>0.0</u>
Bottom of Protective Casing				Top of Riser <u>-0.2</u>
Top of Permanent Borehole Casing				Ground Surface <u>0.0</u>
Bottom of Permanent Borehole Casing				
Top of Concrete	NEAT CEMENT WITH 5% BENTONITE	0.0		
Bottom of Concrete		-1.2		
Top of Grout				
Bottom of Grout				
Top of Well Riser	PVC	-0.0		
Bottom of Well Riser	PVC	-3.5		
Top of Well Screen	PVC	-3.5		
Bottom of Well Screen	PVC	-13.5		
Top of Peltonite Seal	BENTONITE PELLETS	-1.2		Top of Seal <u>-1.2</u>
Bottom of Peltonite Seal	BENTONITE PELLETS	-2.5		
Top of Gravel Pack	CSSI, 10-20 SAND	-2.5		Top of Gravel Pack <u>-1.2</u>
Bottom of Gravel Pack	CSSI, 10-20 SAND	-14.0		Top of Screen <u>-3.5</u>
Top of Natural Cave-In				
Bottom of Natural Cave-In				
Top of Groundwater		DRY		
Total Depth of Borehole		-14.0		Bottom of Screen <u>-13.5</u> Bottom of Borehole <u>-14.0</u>

Comments: _____

Geologist Signature _____

RECORD OF SUBSURFACE EXPLORATION

Page 1 of 1
Borehole No.
Well No. MW-2

PROJECT NAME: Giant-Bloomfield PROJECT NO: 13023
ELEVATION: _____ BOREHOLE LOCATION/COORDINATES: _____
LOGGED BY: S.K. GWL: depth 13.35 date/time 9/20/94 1800.
DRILLED BY: Rodgers GWL: depth _____ date/time _____
DRILLING/RIG METHODS: HSA
DATE/TIME STARTED: 9/19/94 9/20/94 1255 DATE/TIME COMPLETION(S): 9/20/94 1430
AIR MONITORING TYPE: PID BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: <u>USCS</u>	USCS SYMBOL	DEPTH CHG (feet)	AIR MONITORING UNITS <u>ppm</u>			DRILLING CONDITIONS AND (BLOW COUNTS)
							BZ	BH	S	
5		3.9 5.0		SAND, very coarse 30%, med and fine 70%, trace fine gravel, loose, damp, light brown w/ some rust staining, poorly graded, sub angular	SP		0.0		1	
10		2.5 5.0		clayey SAND, 25% fines, fine to med. sand, soft, damp, light grey,	SK 9/20/94 7.8 3.8		9.5		535	Hydrocarbon odor coarse sand layer from 9.2' to 9.8' contains same material as 1st layer. clay rich layer for lost core?
15		3.2 5.0		same as above, still grey.	SC		0.0	0.0	112	Layer with coarse sand from 15.0 to 14.8. Hydrocarbon odor.
20				sandy CLAY, 20% fine sand, soft, damp, olive, low plasticity	CL	19.0	19.0		10	
				20.0 BOH			20.0		9	

COMMENTS: _____

GEOLOGIST SIGNATURE

Sarah Kelly



Well Installation Record

BURLINGTON
ENVIRONMENTAL

Serial No. WIR-

Well Number MW-2

Project Name Giant-Bloomfield

Borehole Number (if different) SK 9/20/94

Project No. 120 13023

Client Company Giant Inc.

Phase/Task No. 0077.77

Site Name _____

Site Address 5th and Blanco St, Bloomfield N.M.

Well Diameter 4" inches

Conductor Casing

☒ None

(To seal off upper water-bearing zones)

Well Type

- ☒ Monitoring Well
☐ Piezometer
☐ Recovery Well
☐ Other _____

Diameter _____ inches

Material _____

Length _____ feet

Depth to Bottom of Casing _____ feet

Seal Material _____

Permit

Number _____

Date _____

Well Construction Details

Well Component	Material (specify type)				Length (feet)	Depth Below Grade (feet)	
	PVC	Stainless Steel	Teflon	Other		Bottom	Top
Borehole						19'	
Bottom Cap/Plug	2"						
Sump (Tailpipe below screen)							Same as bottom of screen
Screen [Slot Size: _____ in.]	15"					18.7	3.7
Riser (Blank Casing above Screen)	3'6"					Same as top of screen	.2

Annular Fill Materials

(3.5)

Use minus sign if top of riser is above ground. ✓

Component	Material Name/Description	Quantity (No. of Bags/ Volume per Bag)	Tremied		Depth Below Grade (feet)	
			Yes	No	Bottom	Top
Plug beneath sand pack	bentonite pellets	.5 bucket	X		20'	19'
Sand Pack	CSSI 10-20 sand	7 100# bags	X		19'	2.5'
Bentonite Seal	bentonite pellets	.5 bucket	X		2.5'	2.0'
Grout Seal						
Backfill (if any)		9 SK 9/20/94				
Surface Seal	neoreament, 5% bentonite	3 80# bags	X		2.0	surface

Well Cover

Finish

- ☐ Stick-up
☒ Flush
☐ Vault

Material

- ☐ Steel
☐ Aluminum

Lock

☒ Yes

Lock Number _____
☐ No

Measuring Point

- ☐ Top of Riser
☐ Top of Cover

Well Collision

Protectors Installed?

☐ Yes

Quantity _____
☒ No

Comments _____

Recorded by (print name) Sarah Kelly

Signature Sarah Kelly

Date 9/20/94

Reviewer _____ Date _____

MONITORING WELL INSTALLATION RECORD

Burlington Environmental Inc.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole #

Well # MW-2

Page 1 of 1

Project Name GIANT - BLOOMFIELD

Project Number 13023 Phase 0077

Project Location 5TH AND BLANCO STREETS

Elevation

Well Location

GWL Depth

Installed By RODGERS DRILLING

On-Site Geologist SARAH KELLY

Personnel On-Site

Contractors On-Site RODGERS

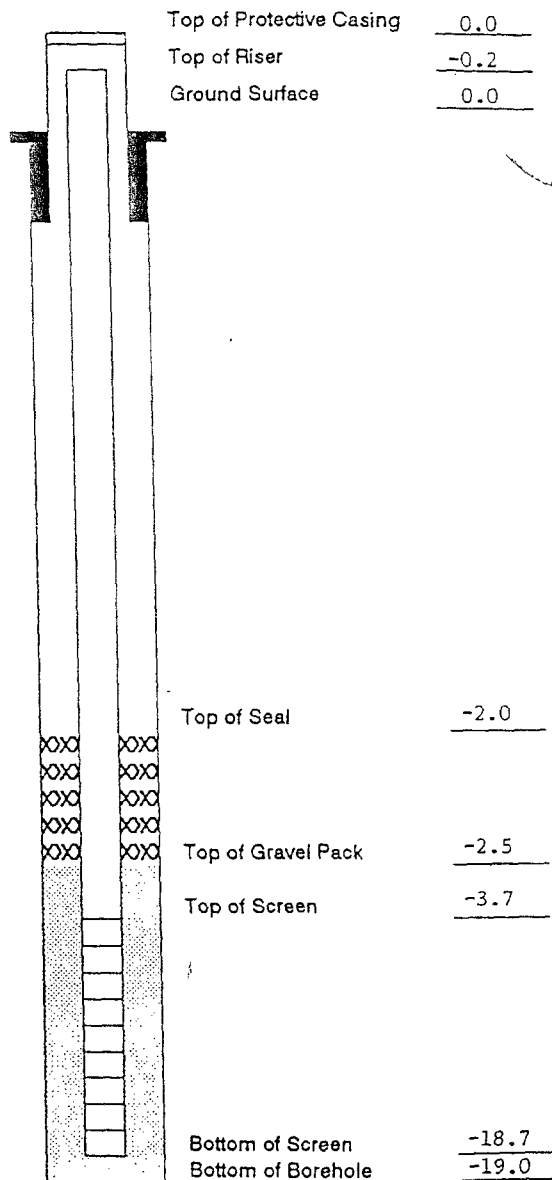
Client Personnel On-Site

Date/Time Started 9/20/94 1250

Date/Time Completed 9/20/94 1530

Depths in Reference to Ground Surface

Item	Material	Depth (feet)
Top of Protective Casing		-0.0
Bottom of Protective Casing		
Top of Permanent Borehole Casing		
Bottom of Permanent Borehole Casing		
Top of Concrete	NEAT CEMENT WITH 5% BENTONITE	-0.0
Bottom of Concrete	NEAT CEMENT WITH 5% BENTONITE	-2.0
Top of Grout		
Bottom of Grout		
Top of Well Riser	PVC	-0.2
Bottom of Well Riser	PVC	-3.7
Top of Well Screen	PVC	-3.7
Bottom of Well Screen	PVC	-18.7
Top of Peltonite Seal	BENTONITE PELLETS	-2.0
Bottom of Peltonite Seal	BENTONITE PELLETS	-2.5
Top of Gravel Pack	CSSI 10-20 SAND	-2.5
Bottom of Gravel Pack	CSSI 10-20 SAND	-19.0
Top of Natural Cave-In		
Bottom of Natural Cave-In		
Top of Groundwater		-13.35
Total Depth of Borehole		-19.0



Comments:

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Page 1 of 1
Borehole No.
Well No. MW-3

PROJECT NAME: Giant - Bloom Field PROJECT NO: 13023
ELEVATION: _____ BOREHOLE LOCATION/COORDINATES: _____
LOGGED BY: S.K. GWL: depth 13.35' ToC date/time 9/20/94 1800.
DRILLED BY: Rodgers GWL: depth 14.39' ToC date/time _____
DRILLING/RIG METHODS: HSA SK 9/20/94
DATE/TIME STARTED: 9/20/94 1600 DATE/TIME COMPLETION (S): 9/20/94 1730.
AIR MONITORING TYPE: PID BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMP TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: <u>USCS</u>	USCS SYMBOL	DEPTH OF CORING (feet)	AIR MONITORING UNITS <u>ppm</u>			DRILLING CONDITIONS AND (BLOW COUNTS)
							BZ	BH	S	
			3.8 5.0	SAND, 20% very coarse, 80% fine to med, loose, light brown, dry, poorly graded, angular	SP					
						4.2	0.0	0.0	.5	
5			3.5 5.0	clayey SAND, fine to med sand 25% fines, soft, light brown, poorly graded, damp.	SC			5.0		
							0.0	0.0	1.1	
10			3.9 5.0	sandy CLAY, 20% fine to med sand, soft to stiff, light olive, damp, med. plasticity.	CL	11.5		10.0	.7	
						13.5				
				clayey SAND, same as above moist.	SC			15.0	1.0	
15			3.9 5.0	same as above, but with 40% coarse to very coarse sand, angular. wet	SC	16.6				
						19.7				
20				sandy CLAY, same as above	CL			20.0	1.0	
				BOH. at 20.0						

COMMENTS: _____

GEOLOGIST SIGNATURE

Mark Kelly



BURLINGTON
ENVIRONMENTAL

Well Installation Record

Well Number MW-3

Serial No. WIR- _____

Borehole Number (if different) _____

Project Name Giant-Bloomfield

Project No. 13023

Client Company Giant Inc.

Phase/Task No. 007777

Site Name _____

Site Address 5th and Blanco St., Bloomfield N.M.

Well Diameter 4" inches

Conductor Casing ☒ None
(To seal off upper water-bearing zones)

Well Type

- ☒ Monitoring Well
☐ Piezometer
☐ Recovery Well
☐ Other _____

Diameter _____ inches

Material _____

Length _____ feet

Depth to Bottom of Casing _____ feet

Seal Material _____

Permit

Number _____

Date _____

Well Construction Details

Well Component	Material (specify type)				Length (feet)	Depth Below Grade (feet)	
	PVC	Stainless Steel	Teflon	Other		Bottom	Top
Borehole							
Bottom Cap/Plug	2"					19'	
Sump (Tailpipe below screen)							Same as bottom of screen
Screen [Slot Size: _____ in.]	15'					18.7'	3.7'
Riser (Blank Casing above Screen)	6.6'					Same as top of screen	2.9' above grade

Annular Fill Materials

Use minus sign if top of riser is above ground. ✓

Component	Material Name/Description	Quantity (No. of Bags/ Volume per Bag)	Tremied		Depth Below Grade (feet)	
			Yes	No	Bottom	Top
Plug beneath sand pack	bentonite pellets	.5 ⁵⁹⁸¹ bucket		X	20'	19'
Sand Pack	CSST 10-20 sand	100#		X	19'	2.5'
Bentonite Seal	bentonite pellets	.5 ⁵⁹⁸¹ bucket		X	2.5'	2.0'
Grout Seal						
Backfill (if any)						
Surface Seal	neat cement, 5% bentonite	8 ⁸⁰⁴ bags		X	2.0'	surface

Well Cover

Finish

- ☐ Stick-up
☒ Flush
☐ Vault

Material

- ☐ Steel
☐ Aluminum

Lock

☒ Yes

Lock Number _____
☐ No

Measuring Point

- ☐ Top of Riser
☐ Top of Cover

Well Collision

Protectors Installed?

☐ Yes

Quantity _____

☒ No

Comments

Recorded by (print name) _____

Signature Sarah Kelly Date 9/20/94 Reviewer _____ Date _____

MONITORING WELL INSTALLATION RECORD

Burlington Environmental Inc.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # _____
Well # MW-3
Page 1 of 1

Project Name GIANT - BLOOMFIELD
Project Number 13023 Phase 0077
Project Location 5TH AND BLANCO STREETS

Elevation _____
Well Location _____
GWL Depth _____
Installed By RODGERS DRILLING

On-Site Geologist SARAH KELLY
Personnel On-Site _____
Contractors On-Site RODGERS
Client Personnel On-Site _____

Date/Time Started 9/20/94 1600
Date/Time Completed 9/20/94 1820

Depths in Reference to Ground Surface				
Item	Material	Depth (feet)		
Top of Protective Casing		-0.0		
Bottom of Protective Casing				
Top of Permanent Borehole Casing				
Bottom of Permanent Borehole Casing				
Top of Concrete	NEAT CEMENT WITH 5% BENTONITE	-0.0		
Bottom of Concrete	NEAT CEMENT WITH 5% BENTONITE	-2.0		
Top of Grout				
Bottom of Grout				
Top of Well Riser	PVC	-0.2		
Bottom of Well Riser	PVC	-3.7		
Top of Well Screen	PVC	-3.7		
Bottom of Well Screen	PVC	-18.7		
Top of Peltonite Seal	BENTONITE PELLETS	-2.0		
Bottom of Peltonite Seal	BENTONITE PELLETS	-2.5		
Top of Gravel Pack	CSSI 10-20 SAND	-2.5		
Bottom of Gravel Pack	CSSI 10-20 SAND	-19.0		
Top of Natural Cave-In				
Bottom of Natural Cave-In				
Top of Groundwater		-14.39		
Total Depth of Borehole		-19.0		

Top of Protective Casing 0.0
Top of Riser -0.2
Ground Surface 0.0

Top of Seal -2.0
Top of Gravel Pack -2.5
Top of Screen -21.3

Bottom of Screen -26.3
Bottom of Borehole -26.5

Comments: _____

Geologist Signature _____

RECORD OF SUBSURFACE EXPLORATION

Page 1 of 2
Borehole No.
Well No. MW-4

SK 9/21/94

PROJECT NAME: Giant-Bloomfield PROJECT NO: 13023
ELEVATION: _____ BOREHOLE LOCATION/COORDINATES: _____
LOGGED BY: SK GWL: depth 13.28' date/time 9/23/94
DRILLED BY: Rodgers GWL: depth _____ date/time _____
DRILLING/RIG METHODS: HSA
DATE/TIME STARTED: 9/21/94 0730 DATE/TIME COMPLETION (S): 9/21/94 1330
AIR MONITORING TYPE: PID BZ = Breathing Zone; BH = Borehole; S = Sample

DEPTH (feet)	SAMPLE NUMBER	SAMPLE INTERVAL	SAMPLE TYPE RECOV. (in)	SAMPLE DESCRIPTION CLASSIFICATION SYSTEM: <u>USCS</u>	USCS SYMBOL	DEPTH CNG (feet)	AIR MONITORING UNITS <u>ppm</u> BZ BH S	DRILLING CONDITIONS AND (BLOW COUNTS)
0				SAND- med-30%, very coarse 70% loose dry to damp, light brown, well graded, angular to sub-angular (description from MW-1 log)	SW			Augering to 20.0'
5								
10				Approx. sandy CLAY, 20% fine to med. sand, soft, med. plasticity, light brown turning to grey, damp (description taken from MW-1 log)	CL	10		
15				Approx. clayey SAND, 60% fine to med, 40% coarse, trace fines, loose, damp, light brown, poorly graded, angular to sub-angular (description taken from MW-1 log)	SC	14.5		
20			14.5	Approx. clayey SAND and sandy CLAY as described above.	CL SC	18.0	60	Sample recovery poor. Driller says he feels a change at 21.0
25			2.4 5.0	SAND, coarse to very coarse, 5% fines, loose to medium dense, wet, light brown, well graded, angular.	SW	21.0		
30			23.5					
			3.2 5.0	sandy CLAY, 30% fine sand, stiff, med plasticity, brown, damp, some plant material.	CL	26.5 26.0	SK 9/21/94	At 25.5', 26' driller felt a change.
			28.5	26.5 BHT (sample barrel driven to 28.5')				

COMMENTS: Had to stop drilling at 0830 so driller could make an appointment.
Resumed drilling at 1330.

GEOLOGIST SIGNATURE

David Kelly



Well Installation Record

Well Number MW-4

BURLINGTON
ENVIRONMENTAL

Serial No. WIR-

Borehole Number (if different) _____

Project Name Giant-Bloomfield

Project No. 13023

Client Company Giant Inc.

Phase/Task No. 0077.77

Site Name _____

Site Address Fifth and Blanco St's, in Bloomfield

Well Diameter 4" inches

Conductor Casing ☒ None
(To seal off upper water-bearing zones)

Well Type

- ☒ Monitoring Well
☐ Piezometer
☐ Recovery Well
☐ Other _____

Diameter _____ inches

Material _____

Length _____ feet

Depth to Bottom of Casing _____ feet

Seal Material _____

Permit

Number _____

Date _____

Well Construction Details

Well Component	Material (specify type)				Length (feet)	Depth Below Grade (feet)	
	PVC	Stainless Steel	Teflon	Other		Bottom	Top
Borehole							
Bottom Cap/Plug	<u>2"</u>					<u>26.5</u>	
Sump (Tailpipe below screen)							Same as bottom of screen
Screen (Slot Size: _____ in.)	<u>5'</u>					<u>26.3</u>	<u>21.3</u>
Riser (Blank Casing above Screen)	<u>21.05</u>					Same as top of screen	<u>5' 8" 2</u>

Annular Fill Materials

Use minus sign if top of riser is above ground. ✓

Component	Material Name/Description	Quantity (No. of Bags/ Volume per Bag)	Tremied		Depth Below Grade (feet)	
			Yes	No	Bottom	Top
Plug beneath sand pack	<u>none</u>			☒		<u>21.0</u>
Sand Pack	<u>CSST 10-20 sand</u>	<u>4 bags</u>		☒	<u>26.5</u>	<u>20.8</u>
Bentonite Seal	<u>bentonite pellets</u>	<u>2 bags</u>		☒	<u>21.0</u>	<u>14.0</u>
Grout Seal	<u>Hydrogel-bentonite powder</u>	<u>2 bags</u>		☒	<u>14.0</u>	<u>6.0</u>
Backfill (if any)						
Surface Seal	<u>neat cement, 5% bentonite</u>	<u>9 bags</u>		☒	<u>6.0</u>	<u>surface</u>

SK
9/21/94
sand
settled
as auger
is
withdrawn.

Well Cover

- Finish
☐ Stick-up
☒ Flush
☐ Vault

- Material
☐ Steel
☐ Aluminum

Lock

- ☒ Yes
Lock Number _____
☐ No

Measuring Point

- ☐ Top of Riser
☐ Top of Cover

Well Collision

Protectors Installed?

- ☐ Yes
☒ No

Comments _____

Recorded by (print name) Sarah Kelly

Signature Sarah Kelly Date 9/21/94 Reviewer _____ Date _____

MONITORING WELL INSTALLATION RECORD

Burlington Environmental Inc.
4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # _____
Well # MW-4
Page 1 of 1

Project Name GIANT - BLOOMFIELD
Project Number 13023 Phase 0077
Project Location 5TH AND BLANCO STREETS

Elevation _____
Well Location _____
GWL Depth _____
Installed By RODGERS DRILLING

On-Site Geologist SARAH KELLY
Personnel On-Site _____
Contractors On-Site RODGERS
Client Personnel On-Site _____

Date/Time Started 9/21/94 0730
Date/Time Completed 9/21/94 1600

Depths in Reference to Ground Surface				
Item	Material	Depth (feet)		
Top of Protective Casing		0.0	Top of Protective Casing <u>0.0</u>	
Bottom of Protective Casing			Top of Riser <u>-0.2</u>	
Top of Permanent Borehole Casing			Ground Surface <u>0.0</u>	
Bottom of Permanent Borehole Casing				
Top of Concrete	NEAT CEMENT WITH 5% BENTONITE	0.0		
Bottom of Concrete	NEAT CEMENT WITH 5% BENTONITE	-6.0		
Top of Grout				
Bottom of Grout				
Top of Well Riser	PVC	-0.2		
Bottom of Well Riser	PVC	-21.3		
Top of Well Screen	PVC	-21.3		
Bottom of Well Screen	PBC	-26.3	Top of Seal <u>-6.0</u>	
Top of Peltonite Seal	BENTONITE PELLETS AND POWDER	-6.0		
Bottom of Peltonite Seal	BENTONITE PELLETS AND POWDER	-21.0	Top of Gravel Pack <u>-21.0</u>	
Top of Gravel Pack	CSSI, 10-20 SAND	-21.0	Top of Screen <u>-21.3</u>	
Bottom of Gravel Pack	CSSI, 10-20 SAND	-26.5		
Top of Natural Cave-In				
Bottom of Natural Cave-In				
Top of Groundwater		-13.28		
Total Depth of Borehole		-26.5	Bottom of Screen <u>-26.3</u> Bottom of Borehole <u>-26.5</u>	

Comments: _____

Geologist Signature _____



BURLINGTON
ENVIRONMENTAL

Soil/Sediment/Sludge Sampling Data

Serial No. SSSSD-

Date 9/19/94

Project Name Giant - Bloomfield

Project No. 13023

Project Manager Martin Nee

Phase/Task No. 0077.77

Client Company Giant Inc.

Site Name _____

Site Address Fifth and Blano St.'s in Bloomfield

Sampling Method

- ☐ Hand Auger
☐ Spoon
☐ Backhoe
☒ Drill Rig
☐ Other

QA

- ☐ Primary
☐ Duplicate

Reason For Collection

- ☒ Lab Analysis
☐ On-Site Headspace
☐ Physical Testing
☐ Other

Portable Screening Instrument Used

- Type Manufacturer Model
☒ PID (Lamp 10.0 eV) Thermo - Env. 580B OVM.
☐ FID
☐ CGI
☐ Other
☐ Other

☐ None
Model

Type of Sample

- ☒ Grab
☐ Composite

Sample No.	Location	Time Collected	Sample Type			Volume Collected	Field Instrument Reading
			Soil	Sed.	Slg.		
SB1-9.0	Soil Boring #1	1100	X			40z	465 ppm
SB2-12.5	" " #2	1200	X				432 ppm
SB3-11.0	" " #3	1315	X				383 ppm
SB4-16.5	" " #4	1430	X				305 ppm
SB5-17.0	" " #5	1530	X				187 ppm
SB6-5.0	" " #6	1615	X				236 ppm
SB7-12.3	" " #7	1704	X				176 ppm
SB8-12.0	" " #8	1740	X			✓	202 ppm

Chain-of-Custody Form Number C1864

Comments Sample # includes depth as the last numbers.

Signature Sarah Kelly Date 9/21/94 Reviewer _____ Date _____

MONITORING WELL INSTALLATION RECORD

Philip Environmental Services Corporation

4000 Monroe Road
Farmington, New Mexico 87401
(505) 326-2262 FAX (505) 326-2388

Borehole # _____
Well # MW-5
Page 1 of 1

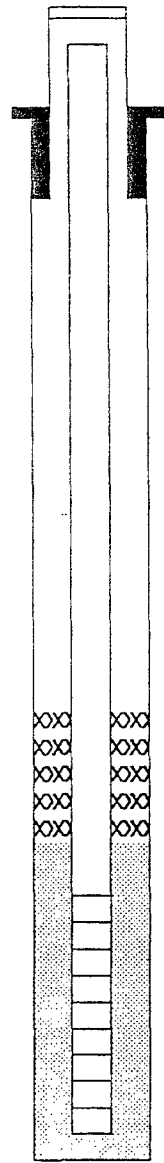
Project Name Giant Bloom Field
Project Number 13023 Phase 3000
Project Location _____

Elevation _____
Well Location _____
GWL Depth _____
Installed By _____

On-Site Geologist S. Kelly
Personnel On-Site M. Donohue, R. Padilla
Contractors On-Site _____
Client Personnel On-Site _____

Date/Time Started 5/2/95, 1000
Date/Time Completed 5/2/95, 1120

Depths in Reference to Ground Surface		
Item	Material	Depth (feet)
Top of Protective Casing		0.0
Bottom of Protective Casing		-1.0
Top of Permanent Borehole Casing		
Bottom of Permanent Borehole Casing		
Top of Concrete		
Bottom of Concrete		
Top of Grout	3- 94# sacks	0.0
Bottom of Grout	210 Type I-II cement	6.0
Top of Well Riser		
Bottom of Well Riser		10.0
Top of Well Screen	PVC, sch. 40 .010 slot	10.0
Bottom of Well Screen	" "	25.0
Top of Bentonite Seal	22	6.0
Bottom of Bentonite Seal	50# bucket 1/4 bent. pellets	7.8
Top of Gravel Pack	↓ 192	7.8
Bottom of Gravel Pack	50# 50# 10-20 CSSI sand	23.5
Top of Natural Cave-In		23.5
Bottom of Natural Cave-In		25.0
Top of Groundwater		
Total Depth of Borehole		25.0



Top of Protective Casing 0.0
Top of Riser -0.45
Ground Surface 0.0

Top of Seal -6.0
Top of Gravel Pack -7.8
Top of Screen -10.0

Bottom of Screen -25.0
Bottom of Borehole -25.0

Comments: Well end cap - PVC is .53' from bottom of end cap to beginning of slotting.

Geologist Signature _____

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole #

MW-5

Well #

Page

of

Project Name

Giant Bloomfield

Project Number

13023

Phase

3000.77

Project Location

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method

HSA

Air Monitoring Method

PIP

Elevation

Borehole Location

GWL Depth

Logged By

Drilled By

Date/Time Started

5/2/95, 0815

Date/Time Completed

5/2/95, 0940

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
0				SAND, med. to coarse, loose, light brown, damp well graded.						
5						8.0				
10				silty CLAY, non-plastic 15% silt, light brown, damp.						At approx 12.0' begins to contain 5% med. sand.
15		15.3 17.3	7/20			19.0				2 at 17.3
20		19.0 21.0	1.0 2.0	silty SAND, 5% silt fine sand, loose, light brown, damp, well- graded. Turnisto wet.		24.0				2 at 19.0
25	23.0	24.0 25.0	1.0 1.0	silty CLAY, same as above						2 at 25.0
30				BOH 25.0						
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-9

Well #

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase ###

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/24/95, 0845

Date/Time Completed 4/24/95, 1000

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
0				SAND, med to coarse, loose, light brown, damp, well graded	SW		BZ	BH	S	
5										
		6.5 - 8.5	.5/2.0			7.5				
10		8.5 - 10.5	.7/2.0	silty CLAY, soft, med. plasticity, light brown, damp, some fine organics- roots	CL					0 at 8.5
		10.5 - 12.5	1.1/ 2	sandy CLAY, med to fine sand - 30%, soft light brown, some fine organics, damp	CL	10				0 at 10.5
		12.5 - 14.5	.5/2.0							0 at 12.5
15		14.5 - 16.5	.5/2.0			15				0 at 14.5
				SAND, med to coarse, loose, light brown trace clay to some clay, wet, well graded	SW					0 at 16.5
20				BOH at 16.5						
25										
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2282 FAX (505) 326-2388

Borehole # SB-10

Well #

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase ###

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/24/95, 1045

Date/Time Completed 4/24/95, 1130

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ BH S			Drilling Conditions & Blow Counts
0				SAND, med to coarse, loose, light brown, damp, well graded	SW					
5										
		7.0 - 8	.4/2.0							
10		9.0 - 11	1.3/ 2	Silty CLAY, 25% silt, soft, grey, damp, hydrocarbon odor	CL	9.9				6 at 9.0
		11.0 - 13	1.2/ 2	Clayey SAND, fine to med sand, grey, damp, hydrocarbon odor	SW- SC	10.5				508 at 11.0
15		13.0 - 15	.8/2.0	Silty CLAY, same as above, but firm, hydrocarbon odor, with some sandy intervals .1' to .2' thick	CL	11.9				23 at 13.0
		15.0 - 17		SAND, fine to med, loose, olive grey, wet, hydrocarbon odor	SW	16.5				2788 at 15.0
20				BOH at 17.0						3703 at 17.0 PID reads "overrange" at 15.0 and 17.0.
25										Water encountered at approx. 16.5
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-11

Well #

Page 1 of 1

Project Name

Giant Bloomfield Tank

Project Number

13023

Phase

3001

Project Location

5th St. and Blanco Blvd, Bloomfield, NM

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method

HSA

Air Monitoring Method

PID, CGI

Elevation

Borehole Location

GWL Depth

Logged By

S.Kelly

Drilled By

M. Donohue

Date/Time Started

4/24/95, 1245

Date/Time Completed

4/24/95, 1330

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				SAND, med to coarse, loose, light brown, damp, well graded	SW					
5										
		6.5 - 8.5	.5/2.0			8				
10		8.5 - 11	.75/ 2	clayey SAND, fine sand, med density damp, grey-olive, less clay toward 11.0. Hydrocarbon odor	SP-SC				66	at 9.0
		10.5 - 12.5	0.35 2						4526	at 11.0
15		12.5 - 14.5							3871	at 13.0
		14.5 - 16.5	.2/2.0			16				
		16.5 - 18.5	1.4/ 2	SAND, med to fine, loose, wet, olive grey strong hydrocarbon odor, oily sheen, has some clay rich layers	SW				2000	at 16.5
20				BOH at 18.5					21	at 18.5
25										PID reads "overrange" at 11.0, 13.0 and 16.5.
30										At apprx. 17.0', color turns to light brown.
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-12

Well #

Page 1 of 1

Project Name

Giant Bloomfield Tank

Project Number

13023

Phase

3000

Project Location

5th St. and Blanco Blvd, Bloomfield, NM

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method

HSA

Air Monitoring Method

PID, CGI

Elevation

Borehole Location

GWL Depth

Logged By

S. Kelly

Drilled By

M. Donohue

Date/Time Started

4/24/95, 1415

Date/Time Completed

4/24/95, 1500

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
0				SAND, med to coarse, loose, light brown, damp, well graded	SW		BZ	BH	S	
5										
		7.0 - 9	.7/2.0	same as above, with hydrocarbon odor,		8.5				
10		9.0 - 11	.7/2.0	more fines		9.5				909 at 9.0
		11.0 - 13	.9/2.0	sandy CLAY, 25% fine sand, soft, low plasticity, olive grey, damp, hydrocarbon odor	CL	12.5				2066 at 11.0
15		14.0 - 16		SAND, fine, 15% silt, loose, olive grey, damp, hydrocarbon odor	SW	15				2624 at 13.0
				same as above with more clay, olive brown						
20				BOH at 16.0'						4 at 16.0
25										
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2282 FAX (505) 326-2388

Borehole # SB-13

Well #

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3001

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/25/95, 0850

Date/Time Completed 4/25/95, 1015

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				silty SAND, med to fine sand, 5% silt loose, light brown, damp, well graded	SW					
5										
		6.5 - 8.5	.95/ 2							0 at 5.0
10		8.5 - 10.5	.4/2.0	becomes richer in clay - approx. 10% at 10.5'						0 at 8.5
		10.5 - 12.5	.65/ 2							0 at 10.5
		12.5 - 14.5	No rec.	Has some intervals richer in clay, some richer in sand, difficult to see due to poor recovery.						
15		14.5 - 16.5	.7/2.0							1 at 16.5
		16.5 - 18.5	.6/2.0			19				3 at 18.5
20		19.0 - 21.0	.8/2.0	CLAY, soft, med plasticity, light brown damp, grading to sandy clay at 21.0 with 25% fine sand	CL					3 at 21.0
		21.0 - 23.0		silty SAND, fine to med sand, loose, light brown, wet, well graded	SP-SM	22				Water at approx. 21.5.
25				BOH at 23.0						
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 328-2262 FAX (505) 326-2388

Borehole # SB-14

Well #

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3000

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/25/95, 1110

Date/Time Completed 4/25/95, 1210

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ BH S			Drilling Conditions & Blow Counts
0				SAND, med to fine sand, loose light brown, dry, well graded occasionally includes some clay	SW					
5										
10		9.5 - 12	.4/2.0							
		11.5 - 13.5	.65/ 2			13			3	at 11.5
15		13.5 - 15.5	.35/ 2	silty CLAY, 15% silt, firm, low plasticity, light brown, moist	CL				3	at 13.5
		15.5 - 17.5	.8/2.0			17			4	at 15.5
		17.5 - 19.5	.65/ 2	clayey SAND, 10% clay, loose, light brown, moist, well graded	SC	18.5			4	at 17.5
20		19.5 - 21.5		silty CLAY, same as above	CL				3	at 19.5
		21.5 - 23.5	1.3/ 2			22.5			3	at 21.5
		23.5 - 25.5	1.0/ 2	silty CLAY, 15% silt, 5% fine sand, firm, non-plastic, light olive grey, moist	CL	23.5			4	at 21.5
25				SAND, fine to med sand, 15% silt, loose, light brown, wet, poorly graded	SW-SM					to 22.5, wet
				BOH at 25.5						Water at approx. 21.5
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-15

Well #

Page 1 of 1

Project Name

Giant Bloomfield Tank

Project Number

13023

Phase

3000

Project Location

5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By

S.Kelly

Drilled By

M. Donohue

Date/Time Started

4/25/95, 1330

Date/Time Completed

4/25/95, 1430

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method

HSA

Air Monitoring Method

PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10		9.5 - 12	.4/2.0	increasing clay content toward 11.5' to approx. 5%						
		11.5 - 13.5	.65/ 2			13			6	at 11.5
15		13.5 - 15.5	.35/ 2	silty CLAY, 15% silt, 5% fine sand, soft non plastic, light brown, moist	CL	15.5			3	at 13.5
		15.5 - 17.5	.8/2.0	silty SAND, med to fine sand, 5% silt, loose, dark olive grey, wet with oily sheen	SW-SM				3	at 15.5
		17.5 - 19.5	.65/ 2	hydrocarbon odor sandy SILT, 10% fine sand, 5% clay, soft, light brown, moist	ML	17.3			382	at 17.5
20									3	at 19.5
25				BOH at 19.5						
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-16

Well #

Page 1 of 1

Project Name

Giant Bloomfield Tank

Project Number

13023 Phase 3001

Project Location

5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/25/95, 1515

Date/Time Completed 4/25/95, 1600

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU BZ BH S			Drilling Conditions & Blow Counts
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10		9.5 - 12	.4/2.0			11				
		11.5 - 13.5	.65/ 2	silty CLAY, 15% silt, soft, light brown, moist	CL	13.4			1	at 11.5
15		13.5 - 15.5	.35/ 2	same as above but dark grey color, in 15.5 to 17.5 sample, color appears to be mottled brown/grey.	CL				1142	at 13.5
		15.5 - 17.5	.8/2.0						586	at 15.5
		17.5 - 19.5	.65/ 2						231	at 17.5
20									134	at 19.5
		21.5 - 23.5		SAND, med to fine sand, 5% silt, loose, light brown, wet, well graded	SW	21				
25				BOH at 23.5					4	at 23.5
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.

4000 Monroe Road

Armington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-17

Well # _____

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3001

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation _____

Borehole Location _____

GWL Depth _____

Logged By S. Kelly

Drilled By M. Donohue

Date/Time Started 4/26/95, 0900

Date/Time Completed 4/26/95, 1030

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site _____

Client Personnel On-Site _____

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10		9 - 11	.35/ 2							
		11.0 - 13	.25/ 2			13			1	at 11.0
15		13.0 - 15	.3/2.0	silty CLAY, 25% silt, stiff, low plasticity, light brown, moist, some small pockets of med sand	CL				1	at 13.0
		15.0 - 17	.7/2.0	silty SAND, fine to med sand, loose, dark	SW-SM	16.5			4	at 15.0
		17.0 - 19	.8/2.0	olive grey, moist, well graded, hydrocarbon odor		18.5			1601	at 17.0
20		19.0 - 21	.5/2.0	silty CLAY, same as above, but with 20% fine sand	CL				19	at 19.0
		21.0 - 23	.5/2.0	silty SAND, fine sand, 15% silt, 5% clay,	SW-SM	22			5	at 21.0
25		23.0 - 25	2.0/ 2	dense, light greyish brown, moist silty CLAY, same as above	CL	24.4			4 2 2	at 23.0 at 24.0 at 25.0
				BOH at 25.0						Water at apprx 22.5'
										grades to med sand toward 25.0'
30										
35										
40										

Comments: _____

Geologist Signature _____

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-18

Well # _____

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3000

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation _____

Borehole Location _____

GWL Depth _____

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/26/95, 1040

Date/Time Completed 4/26/95, 1130

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site _____

Client Personnel On-Site _____

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	8H	S	
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10										
		9	.2/2.0							
		11				11				
		11.0 -	.4/2.0	same as above, but with 10% clay					1	at 11.0
		13								
		13.0 -	.4/2.0			14.5			1	at 13.0
15		15		silty CLAY, 20% silt, stiff, low plasticity, light brown, moist					1	at 15.0
		15.0 -	.55/							
		17	2			17				
		17.0 -	.9/2.0	clayey SAND, same as silty CLAY above, but with med sand					435	at 17.0
		19								
20		19.0 -	.85/						4	at 19.0
		21	2							
				BOH at 21.0					1	at 21.0
25										organic matter present at 17.0', also .25" to .5" black beds have hydrocarbon odor, black beds are present over a .3' interval down from 17'
30										
35										
40										

Comments: _____

Geologist Signature _____

RECORD OF SUBSURFACE LOCATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-19

Well # _____

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3000

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation _____

Borehole Location _____

GWL Depth _____

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/26/95, 1230

Date/Time Completed 4/26/95, 1330

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site _____

Client Personnel On-Site _____

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10		9 11	.4/2.0			10.5				
		11.0 - 13	.5/2.0	silty CLAY, 10% silt, firm, non-plastic, light brown, moist	CL	13			2	at 11.0
15		13.0 - 15	.2/2.0	silty SAND, fine to med sand, 5% silt, loose, light brown, moist, well graded	SW-SM				2	at 13.0
		15.0 - 17	.7/2.0			17			4	at 15.0 med sand layer at aprx
		17.0 - 19	.85/ 2	silty CLAY, same as above	CL				2	at 17.0 16.0, aprx 1.0' thick
20		19.0 - 21	.9/2.0			20.8			2	at 19.0
		21.0 - 23	2.0/ 2	silty SAND, same as above silty CLAY, same as above	SW-S CL	22.3			2	at 21.0 some grey mottling at aprx 17.0'
25				BOH at 23.0					2	at 23.0 med to coarse sand layer from 21' to 22.4'. 5% silt, well graded, photo 12
30										
35										
40										

Comments:

Geologist Signature _____

RECORD OF SUBSURFACE INFORMATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-20

Well #

Page 1 of 1

Project Name

Giant Bloomfield Tank

Project Number

13023

Phase

3000

Project Location

5th St. and Blanco Blvd, Bloomfield, NM

Elevation

Borehole Location

GWL Depth

Logged By

S. Kelly

Drilled By

M. Donohue

Date/Time Started

4/27/95, 0900

Date/Time Completed

4/27/95, 1000

Well Logged By

S. Kelly

Personnel On-Site

M. Donohue, K. Padilla

Contractors On-Site

Client Personnel On-Site

Drilling Method

HSA

Air Monitoring Method

PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10		9	.4/2.0							
		###								
		11.0 -	.75/						0	at 11.0
		13	2							
15		13.0 -	.9/2.0			14.2			1	at 13.0
		15		silty CLAY, 20% silt, firm, non-plastic, light brown, moist.						
		15.0 -	.7/2.0			16.8			1	at 15.0
		17		SAND, same as above, moist, turning to wet						
		17.0 -	.9/2.0						1	at 17.0
		19								
20		19.0 -		BOH at 21.0					1	at 19.0
		21								
25										coarse to med sand layer, wet, from approx. 17.0' to 18.5
30										
35										
40										

Comments:

Geologist Signature

RECORD OF SUBSURFACE EXPLORATION

Philip Environmental Services Corp.

4000 Monroe Road

Farmington, New Mexico 87401

(505) 326-2262 FAX (505) 326-2388

Borehole # SB-21

Well # _____

Page 1 of 1

Project Name Giant Bloomfield Tank

Project Number 13023 Phase 3000

Project Location 5th St. and Blanco Blvd, Bloomfield, NM

Elevation _____

Borehole Location _____

GWL Depth _____

Logged By S.Kelly

Drilled By M. Donohue

Date/Time Started 4/27/95, 1015

Date/Time Completed 4/27/95, 1115

Well Logged By S. Kelly

Personnel On-Site M. Donohue, K. Padilla

Contractors On-Site _____

Client Personnel On-Site _____

Drilling Method HSA

Air Monitoring Method PID, CGI

Depth (Feet)	Sample Number	Sample Interval	Sample Type & Recovery (inches)	Sample Description Classification System: USCS	USCS Symbol	Depth Lithology Change (feet)	Air Monitoring Units: NDU			Drilling Conditions & Blow Counts
							BZ	BH	S	
0				SAND, med to fine sand, loose light brown, dry, well graded	SW					
5										
10	9	.5/2.0				10.7				
	11			silty CLAY, 20% silt, soft, low plasticity, light brown, moist	CL					3 at 11.0
	11.0 - 13	.8/2.0								3 at 13.0
15	13.0 - 15	.9/2.0		14.4 to 14.8 is a layer with 10% med sand with some organic matter						1 at 15.0
	15.0 - 17	.4/2.0								3 at 17.0
	17.0 - 19	.6/2.0				19				3 at 19.0
20	19.0 - 21	1.1/ 2		SAND, med to fine sand, 10% silt, loose, light brown, wet, well graded	SW					1 at 21.0
				BOH at 21						
25										
30										
35										
40										

Comments:

Geologist Signature _____

Appendix B

- ☐ Development
- ☐ Purging

Serial No. WDPD-Page 1 of 2

Project Name Giant Bloomfield

Project Manager R. Thompson Project No. 64000

Client Company GIANT

Phase.Task No._____

Site Name Giant Bloomfield

Site Address BLANCO 4th, ACOOP FIELD, NM

Development Criteria

☒ 3 to 5 Casing Volumes of Water Removal

☒ Stabilization of Indicator Parameters☐ Other

Methods of Development

Pump
Bailer

☐ Centrifugal ☐ Bottom Valve

☐ Submersible ☐ Double Check Valve

- ☐ Ferrous
- ☐ Stainless-steel Kemmerer

☐ Other

Water Volume Calculation

Initial Depth of Well (feet)	13.38'
1	13.38'
2	13.38'
3	13.38'
4	13.38'
5	13.38'
6	13.38'
7	13.38'
8	13.38'
9	13.38'
10	13.38'
11	13.38'
12	13.38'
13	13.38'
14	13.38'
15	13.38'
16	13.38'
17	13.38'
18	13.38'
19	13.38'
20	13.38'
21	13.38'
22	13.38'
23	13.38'
24	13.38'
25	13.38'
26	13.38'
27	13.38'
28	13.38'
29	13.38'
30	13.38'
31	13.38'
32	13.38'
33	13.38'
34	13.38'
35	13.38'
36	13.38'
37	13.38'
38	13.38'
39	13.38'
40	13.38'
41	13.38'
42	13.38'
43	13.38'
44	13.38'
45	13.38'
46	13.38'
47	13.38'
48	13.38'
49	13.38'
50	13.38'
51	13.38'
52	13.38'
53	13.38'
54	13.38'
55	13.38'
56	13.38'
57	13.38'
58	13.38'
59	13.38'
60	13.38'
61	13.38'
62	13.38'
63	13.38'
64	13.38'
65	13.38'
66	13.38'
67	13.38'
68	13.38'
69	13.38'
70	13.38'
71	13.38'
72	13.38'
73	13.38'
74	13.38'
75	13.38'
76	13.38'
77	13.38'
78	13.38'
79	13.38'
80	13.38'
81	13.38'
82	13.38'
83	13.38'
84	13.38'
85	13.38'
86	13.38'
87	13.38'
88	13.38'
89	13.38'
90	13.38'
91	13.38'
92	13.38'
93	13.38'
94	13.38'
95	13.38'
96	13.38'
97	13.38'
98	13.38'
99	13.38'
100	13.38'

Initial Depth to Water (feet) 13.58'

Height of Water Column in Well (feet)

Diameter (inches): Well 4 Gravel Pack

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing		2	66
Gravel Pack			
Drilling Fluids			
Total			

Instruments

☐ pH Meter☐ DO Monitor☐ Conductivity Meter☐ Temperature Meter☐ Other:

Serial No. (If applicable)

Water Disposal

Water Removal Data

[illegible]

Circle the date and time that the development criteria are met.

Comments	Well contained, 3 FEET OF WATER
----------	---------------------------------

Developer's Signature(s) C. Cullcott & D. Doolittle Date 9/30/99

Reviewer _____ Date _____

Date _____



Water Sampling Data

Location No. MW-1Serial No. WSD-Group List Number Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other Date 9/30/99Project Name GIANT BLOOMFIELDProject No. 028000Project Manager R. THOMPSONPhase/Task No. Site Name GIANT BLOOMFIELD CRUDE STATION

Sampling Specifications

Initial Measurements

Requested Sampling

Depth Interval (feet) Time Elapsed From Final Development/Purging (hours)

Requested Wait Following

Initial Water Depth (feet) Development/Purging (hours) Nonaqueous Liquids Present (Describe)

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	

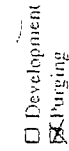
Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)

Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
TPH, BTEX	~~1~~	VOA				X HCL	X		
metals	1	plastic				X HNO ₃	X		1/4 FULL

Filter Type Chain-of-Custody Form Number Comments WELL CONTAINED . 3 FEET OF WATER. WELL WAS NOT PUGGED THE WATER IN THE WELL WAS SAMPLEDSignature Cathy CulicattiDate 9/30/99Reviewer Date



WELL DEVELOPMENT AND PURGING DATA

Page 1 of 1

Project No. 628000

Phase.Task No.

Site Address
BLANCO & 5th BLOOMFIELD, NM

Instruments

- ☐ pH Meter
☐ DO Monitor

Pump

- ☐ Centrifugal
- ☐ Submersible
- ☐ Peristaltic
- ☐ Other

Bailer

- ☐ Bottom Valve
- ☒ Double Check Valve
- ☐ Stainless-steel Kemmerer

Item	Water Volume In Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing			
Gravel Pack			
Drilling Fluids			
Total			

Water Disposal

[illegible]

Circle the date and time that the development criteria are met.

202 SAMPLE TAKEN

Developer's Signature(s) C. Collicott & D. Adella Date 09/30/99 Reviewer _____ Date _____

Product Recovery

Meter/Line #:

Location/Line Name:

Date:

MW:

Depth to Product:

Depth to Water:

Product Thickness:

Volume Removed:

Comments:

BLOOMFIELD CLUDE STATION

9/30/99

2

15.00

17.48

2.48'

2.75 gal

product is
this color



☐ Development
☒ Purging

Serial No. WDPD-

Project Name GIANT BLOOMFIELD

Client Company GIANT

Site Name GIANT BLOOM FIELD CLEVER

Development Criteria

~~2~~ 3 5 Casing Volumes of Water Removal

☒ Stabilization of Indicator Parameters

☐ Other

Methods of Development

Pump

☐ Centrifugal ☐ Bottom Valve☐ Submersible ~~Double~~ Double Check Valve☐ Peristaltic ☒ Stainless-steel Kemmerer

□

Water Volume Calculation

Initial Depth of Well (feet) 19.2

Initial Depth to Water (feet) 15.8

Height of Water Column in Well (feet)

Diameter (inches): Well 4 Gravel

Item	Water Volume in Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing	4	2.95	9.0
Gravel Pack			
Drilling Fluids			
Total			9.0

Water Disposal

Discontinued

Water Removal Data

[illegible]

Circle the date and time that the development criteria are met.

Comments: DTW Lam 17.46

Developer's Signature(s) E. Culicotta D. MADILLA Date 09/30/99

Reviewer _____ Date _____



Water Sampling Data

Location No. MW-3
Group List Number _____
Date 9/30/99

Serial No. WSD-
Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other _____

Project Name GIANT BLOOMFIELD Project No. _____

Project Manager _____ Phase Task No. _____

Site Name GIANT BLOOMFIELD CRUDE

Sampling Specifications

Requested Sampling
Depth Interval (feet) _____
Requested Wait Following
Development/Purging (hours) _____

Initial Measurements

Time Elapsed From Final Development/Purging (hours) _____
Initial Water Depth (feet) _____
Nonaqueous Liquids Present (Describe) _____

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	

Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
~~IONS~~	1	PLASTIC	1000		X	NO	X		
METALS	1	"	250		X	HNO ₃	X		
TPH, BTEX	2	VOA			X	HCl	X		

Filter Type _____ Chain-of-Custody Form Number 61582

Comments WELL RECOVERED VERY SLOWLY - SA SAMPLED AFTER FIRST BAILING

Signature RECOVERY FROM Date 9/30/99 Reviewer _____ Date _____

Cathy Cellucci



Water Sampling Data

Location No. _____

Serial No. WSD- _____

Group List Number _____

Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other _____Date 10/4/99Project Name GIANT BLOOMFIELDProject No. 02800075Project Manager R. THOMPSONPhase/Task No. 0301Site Name BLOOMFIELD CRUDE STATION

Sampling Specifications

Requested Sampling
Depth Interval (feet) _____
Requested Wait Following
Development/Purging (hours) _____

Initial Measurements

Time Elapsed From Final Development/Purging (hours) _____
Initial Water Depth (feet) _____
Nonaqueous Liquids Present (Describe) _____

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	

Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
TPH	1	GLASS	1000		X	HCL	X		SAMPLED 5/15pm
BTEX	2	VOA			X	HCL	X		
METALS	1	PLASTIC	250ml		X	HNO ₃	X		
GENERAL CHEM	1	PLASTIC	1000ml		X	NO	X		

Filter Type _____ Chain-of-Custody Form Number _____

Comments _____

Signature Carthy Cullicott Date 10/4/99 Reviewer _____ Date _____

Project Name	Giant Bloomfield	Project Manager	R. Thompson	Project No.	628006
--------------	------------------	-----------------	-------------	-------------	--------

Client Company CLIAUT Phase Task No. _____

Site Name GIANT BLOOM FIELD CRUAG Site Address 8 BLANCO BLVD 5th ST, BLOOMFIELD, NM

Development Criteria

~~3~~ 5 Casing Volumes of Water Removal

Stabilization of Indicator Parameters

☐ Other

Methods of Development

Pump
Bailer

☐ Centrifugal ☐ Bottom Valve

☐ Submersible ☒ Double Check Valve

☐ Peristaltic ☐ Stainless-steel Kemmerer

☐ Other _____

Water Removal Data

[illegible]

Circle the date and time that the development criteria are met.

Comments	AFTER 10 BALLONS BAILED, WELLSTATED BAILING DOWN,
----------	---

WATER GOT CLOUDIER & HAD SLIGHT DROD

Developer's Signature(s) C. CULLICOTT + O. PADILLA Date 9/30/99 Reviewer _____ Date _____



Water Sampling Data

Location No. MW-5

Serial No. WSD-

Group List Number

Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other Date 9/30/99

Project Name GIANT BLOOMFIELD Project No. 628000

Project Manager R. THOMPSON Phase Task No.

Site Name GIANT BLOOMFIELD CRUDE STATION

Sampling Specifications

Requested Sampling
Depth Interval (feet)
Requested Wait Following
Development/Purging (hours)

Initial Measurements

Time Elapsed From Final Development/Purging (hours)
Initial Water Depth (feet)
Nonaqueous Liquids Present (Describe)

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)	

Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
METALS	1	PL.	250		X	HNO ₃	X		SAMPLED 12:15 pm
IONS	1	PLASTIC	1000		X	NO	X		"
BTEX/TPH	2	VOA			X	HCl	Y		"

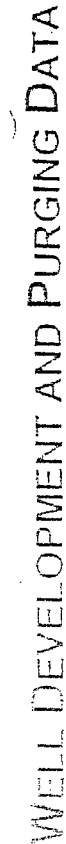
Filter Type Chain-of-Custody Form Number 61582

Comments

Signature Cathy Culbertson Date 9/30/99 Reviewer Date

Product Recovery

Meter/Line #:	
Location/Line Name:	BLOOMFIELD CRUDE STATION
Date:	11/16/99
MW:	2
Depth to Product:	14.65
Depth to Water:	17.00
Product Thickness:	2.35'
Volume Removed:	2.0 gallons
Comments:	

☒ Packaging

Serial No. WDPD-

Page _____ of _____

Project Name Graft Bloomfield Corridor ST.

Project Manager R Thompson

Project No. 62800075

Client Company Giant Industries Arizona

Site Address Bloomfield NM

Phase, Task No. 0301

Development Criteria

- ☒ 3 to 5 Casing Volumes of Water Removal
☐ Stabilization of Indicator Parameters
☐ Other

Water Volume Calculation

Initial Depth of Well (feet) 13.86
Initial Depth to Water (feet) 13.71
Height of Water Column in Well (feet)
Diameter (inches): Well 4 Gravel Pack

Methods of Development

- Pump**
☐ Centrifugal
☐ Submersible
☐ Peristaltic
☐ Other
- Bailer**
☐ Bottom Valve
☒ Double Check Valve
☐ Stainless-steel Kemmerer

Item	Water Volume in Well Cubic feet	Gallons	Gallons to be Removed
Well Casing	987X	6.5X2	19.5
Gravel Pack			
Drilling Fluids			
Total			

Water Removal Data

[illegible]

Circle the dole and line that the development cannot are met

Condensation only in well / no condensation

This well does not intercept any water

Developer's Signature(s) Cecil F.

Code 12-14-99

Reviewer

Date _____

MW-3



Water Sampling Data

Location No. MW-3

Serial No. WSD- _____

Group List Number _____

Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other _____ Date 12-14-99

Project Name Giant Bloomfield Crude ST Project No. 628 00075

Project Manager R Thompson Phase/Task No. 0301

Site Name Giant Bloomfield Crude ST

Sampling Specifications

Requested Sampling
Depth Interval (feet) TOP 3'
Requested Wait Following
Development/Purging (hours) NONE

Initial Measurements

Time Elapsed From Final Development/Purging (hours) _____
Initial Water Depth (feet) 15.25
Nonaqueous Liquids Present (Describe) NONE

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data				Notes (Explain in Comments Below	
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail		Final Water Depth (feet)
			See Well Development Sheet									

Sample Containers

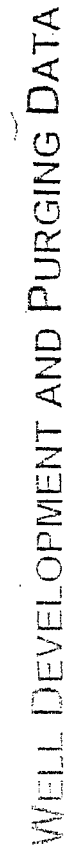
Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
TR PH	2	A	500		X		✓		
Diss Metals	1	P	400		X		✓		
DRO	1	A	500		X		✓		
GRO	2	V	40		X		✓		
BTEX	2	V	40		X		✓		
Gen Chem	1	P			X		✓		

Filter Type NONE Chain-of-Custody Form Number _____

Comments _____

Signature Cecil G. Date 12-14-99 Reviewer _____ Date _____



☒ **Excluded**

Well Number 4

Serial No. WDPD-

Page 1 of 1

Project Name 6127- Bloomfield Crudest Project Manager R Thompson Project No. 62800075

Client Company GREAT INDUSTRIES ARIZONA

Site Name Giant - Bloomfield Crude Station

Development Criteria

- ☒ 3 to 5 Casing Volumes of Water Removal
☐ Stabilization of Indicator Parameters
☐ Other

Methods of Development

- Pump
- ☐ Centrifugal
- ☐ Submersible
- ☐ Peristaltic
- ☐ Other
- Bailer
- ☐ Bottom Valve
- ☒ Double Check Valve
- ☐ Stainless-steel Kemmerer

Molar Volume Calculation

26.2
26.2

1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1041 1042 1043 1044 1045 1046 1047 1048 1049 1050 1051 1052 1053 1054 1055 1056 1057 1058 1059 1060 1061 1062 1063 1064 1065 1066 1067 1068 1069 1070 1071 1072 1073 1074 1075 1076 1077 1078 1079 1080 1081 1082 1083 1084 1085 1086 1087 1088 1089 1090 1091 1092 1093 1094 1095 1096 1097 1098 1099 1100 1101 1102 1103 1104 1105 1106 1107 1108 1109 1110 1111 1112 1113 1114 1115 1116 1117 1118 1119 1120 1121 1122 1123 1124 1125 1126 1127 1128 1129 1130 1131 1132 1133 1134 1135 1136 1137 1138 1139 1140 1141 1142 1143 1144 1145 1146 1147 1148 1149 1150 1151 1152 1153 1154 1155 1156 1157 1158 1159 1160 1161 1162 1163 1164 1165 1166 1167 1168 1169 1170 1171 1172 1173 1174 1175 1176 1177 1178 1179 1180 1181 1182 1183 1184 1185 1186 1187 1188 1189 1190 1191 1192 1193 1194 1195 1196 1197 1198 1199 1200 1201 1202 1203 1204 1205 1206 1207 1208 1209 1210 1211 1212 1213 1214 1215 1216 1217 1218 1219 1220 1221 1222 1223 1224 1225 1226 1227 1228 1229 1230 1231 1232 1233 1234 1235 1236 1237 1238 1239 1240 1241 1242 1243 1244 1245 1246 1247 1248 1249 1250 1251 1252 1253 1254 1255 1256 1257 1258 1259 1260 1261 1262 1263 1264 1265 1266 1267 1268 1269 1270 1271 1272 1273 1274 1275 1276 1277 1278 1279 1280 1281 1282 1283 1284 1285 1286 1287 1288 1289 1290 1291 1292 1293 1294 1295 1296 1297 1298 1299 1300 1301 1302 1303 1304 1305 1306 1307 1308 1309 1310 1311 1312 1313 1314 1315 1316 1317 1318 1319 1320 1321 1322 1323 1324 1325 1326 1327 1328 1329 1330 1331 1332 1333 1334 1335 1336 1337 1338 1339 1340 1341 1342 1343 1344 1345 1346 1347 1348 1349 1350 1351 1352 1353 1354 1355 1356 1357 1358 1359 1360 1361 1362 1363 1364 1365 1366 1367 1368 1369 1370 1371 1372 1373 1374 1375 1376 1377 1378 1379 1380 1381 1382 1383 1384 1385 1386 1387 1388 1389 1390 1391 1392 1393 1394 1395 1396 1397 1398 1399 1400 1401 1402 1403 1404 1405 1406 1407 1408 1409 1410 1411 1412 1413 1414 1415 1416 1417 1418 1419 1420 1421 1422 1423 1424 1425 1426 1427 1428 1429 1430 1431 1432 1433 1434 1435 1436 1437 1438 1439 1440 1441 1442 1443 1444 1445 1446 1447 1448 1449 1450 1451 1452 1453 1454 1455 1456 1457 1458 1459 1460 1461 1462 1463 1464 1465 1466 1467 1468 1469 1470 1471 1472 1473 1474 1475 1476 1477 1478 1479 1480 1481 1482 1483 1484 1485 1486 1487 1488 1489 1490 1491 1492 1493 1494 1495 1496 1497 1498 1499 1500 1501 1502 1503 1504 1505 1506 1507 1508 1509 1510 1511 1512 1513 1514 1515 1516 1517 1518 1519 1520 1521 1522 1523 1524 1525 1526 1527 1528 1529 1530 1531 1532 1533 1534 1535 1536 1537 1538 1539 1540 1541 1542 1543 1544 1545 1546 1547 1548 1549 1550 1551 1552 1553 1554 1555 1556 1557 1558 1559 1560 1561 1562 1563 1564 1565 1566 1567 1568 1569 1570 1571 1572 1573 1574 1575 1576 1577 1578 1579 1580 1581 1582 1583 1584 1585 1586 1587 1588 1589 1590 1591 1592 1593 1594 1595 1596 1597 1598 1599 1600 1601 1602 1603 1604 1605 1606 1607 1608 1609 1610 1611 1612 1613 1614 1615 1616 1617 1618 1619 1620 1621 1622 1623 1624 1625 1626 1627 1628 1629 1630 1631 1632 1633 1634 1635 1636 1637 1638 1639 1640 1641 1642 1643 1644 1645 1646 1647 1648 1649 1650 1651 1652 1653 1654 1655 1656 1657 1658 1659 1660 1661 1662 1663 1664 1665 1666 1667 1668 1669 1670 1671 1672 1673 1674 1675 1676 1677 1678 1679 1680 1681 1682 1683 1684 1685 1686 1687 1688 1689 1690 1691 1692 1693 1694 1695 1696 1697 1698 1699 1700 1701 1702 1703 1704 1705 1706 1707 1708 1709 1710 1711 1712 1713 1714 1715 1716 1717 1718 1719 1720 1721 1722 1723 1724 1725 1726 1727 1728 1729 1730 1731 1732 1733 1734 1735 1736 1737 1738 1739 1740 1741 1742 1743 1744 1745 1746 1747 1748 1749 1750 1751 1752 1753 1754 1755 1756 1757 1758 1759 1760 1761 1762 1763 1764 1765 1766 1767 1768 1769 1770 1771 1772 1773 1774 1775 1776 1777 1778 1779 1780 1781 1782 1783 1784 1785 1786 1787 1788 1789 1790 1791 1792 1793 1794 1795 1796 1797 1798 1799 1800 1801 1802 1803 1804 1805 1806 1807 1808 1809 1810 1811 1812 1813 1814 1815 1816 1817 1818 1819

Height of Water Column in Well (feet) 10

Diameter (inches): Well **4** Gravel Pack

Item	Water Volume in Well Cubic Feet	Galcons to be Removed
Well Casing	- 870	
Gravel Pack		
Grilling Plugs		
Total		

Instruments

- ☒ pH Meter
☐ DO Monitor
☒ Conductivity Meter
☒ Temperature Meter
☐ Other

Water Disposal

ON GROUND ON SITE

Notes: Removal Date

[illegible][illegible]

Comments Note - Coc marked wrong. MW-1 samples should all say MW-4.

Developer's Signature(s) Cecil Title 12-14-93 Reviewer _____ Date _____

MW-4



Water Sampling Data

Location No. MW-4

Serial No. WSD-

Group List Number

Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other Date 12-14-99

Project Name Giant Bloomfield Crude ST Project No. 628 00075

Project Manager R Thompson Phase/Task No. 0301

Site Name Giant Bloomfield Crude ST

Sampling Specifications

Requested Sampling
Depth Interval (feet) TOP 3'
Requested Wait Following
Development/Purging (hours) NONE

Initial Measurements

Time Elapsed From Final Development/Purging (hours)
Initial Water Depth (feet) 16.00
Nonaqueous Liquids Present (Describe) NONE

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data				Notes (Explain in Comments Below)	
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail Final Water Depth (feet)		
			See Well Development Sheet									

Sample Containers

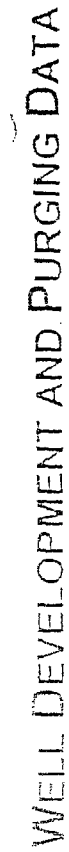
Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
TR PM	2	A	500		X		✓		
Diss Metals	1	P	400		X		✓		
DRO	1	A	500		X		✓		
GRO	2	V	40		X		✓		
BTEX	2	V	40		X		✓		
Gen Chem	1	P			X		✓		

Filter Type NONE Chain-of-Custody Form Number

Comments

Signature Cecil Giff Date 12-14-99 Reviewer Date



☒ ☐ Deleted

Page 1 of 1

Serial No. WDPD-

Project Name Grant Bloggsfield Creek ST

Project Manager R Thompson

Project No. 6280075

Client Company GIGAT INDUSTRIES ARIZONA

Phase, Task No. 0301

Site Name Giant Bloom Field Cont. 57 Site Address Bloom Field

Development Criteria

☒ 3 to 5 Casing Volumes of Water Removal
☒ Stabilization of Indicator Parameters
☐ Other

Water Volume Calculation

Initial Depth of Well (feet)	24.7
Initial Depth to Water (feet)	19.63
Height of Water Column in Well (feet)	

Methods of Development

Pump

☐ Centrifugal

☐ Submersible

☐ Peristaltic

☐ Other

Bailer

☐ Bottom Valve

☒ Double Check Valve

☐ Stainless-steel Kemmerer

Item	Water Volume In Well		Gallons to be Removed
	Cubic Feet	Gallons	
Well Casing	0.07	1.913	6
Gravel Pack			
Drilling Fluids			
Total			

Water Removal Data

[illegible]

Circle the date and time that the development criteria are met.

Comments

Developer's Signature(s) Carl J. J.

Date 11/29 Reviewer _____ Date _____

Reviewer _____ Date _____

MW-5



Water Sampling Data

Location No. MW-5

Serial No. WSD-

Group List Number

Sample Type: ☒ Groundwater ☐ Surface Water ☐ Other Date 12-14-99

Project Name Giant Bloomfield Crude ST Project No. 628 00075

Project Manager R Thompson Phase/Task No. 0301

Site Name Giant Bloomfield Crude ST

Sampling Specifications

Requested Sampling
Depth Interval (feet) TOP 3'
Requested Wait Following
Development/Purging (hours) NONE

Initial Measurements

Time Elapsed From Final Development/Purging (hours)
Initial Water Depth (feet) 16.63'
Nonaqueous Liquids Present (Describe) NONE

Water Quality/Water Collection

DO = Dissolved Oxygen; Cond. = Conductivity

Date	Time	Sampler Initials	Water Quality Readings				Water Collection Data					Notes (Explain in Comments Below)	
			Temp. (°C)	pH	DO (mg/L)	Cond. (µmhos/ cm)	Volume Removed (gallons)	Removal Rate (gal/min)	Pump Intake Depth (feet)	Bail	Final Water Depth (feet)		
			See Well Development Sheet										

Sample Containers

Container Type: G = Clear Glass; A = Amber Glass; P = Plastic; V = VOA Vial (Glass); O = Other (Specify)
Preservatives: H = HCl; N = HNO₃; S = H₂SO₄; A = NaOH; O = Other (Specify); - = None

Analytical Parameter List	Container			Field Filtered		Preserved	Cooled During Collection		Comments
	Number	Type	Volume (mL)	Yes	No		Yes	No	
TR PH	2	A	500		X		✓		
DISS METALS	1	P	400		X		✓		
DRO	1	A	500		X		✓		
GRO	2	V	40		X		✓		
BTEX	2	V	40		X		✓		
Gen Chem	1	P			X		✓		

Filter Type NONE Chain-of-Custody Form Number

Comments

Signature Cecil Giff Date 12-14-99 Reviewer Date

Appendix C

Reviewed By:



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW 4

Lab ID: 0399W04980

Matrix: Water

Condition: Cool/Intact

Date Reported: 10/21/99

Date Sampled: 10/04/99

Date Received: 10/05/99

Date Analyzed: 10/06/99

Parameter	Analytical Result	PQL	Units
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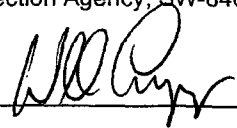
BTEX - Method 8021B

Benzene	<1	1	µg/L
Toluene	<1	1	µg/L
Ethylbenzene	<1	1	µg/L
Xylenes (total)	<2	2	µg/L

Quality Control - Surrogate Recovery	%	QC Limits
--------------------------------------	---	-----------

4-Bromofluorobenzene(SUR-8020)	108	70 - 130
a,a,a-Trifluorotoluene(SUR-602)	81	70 - 130

Reference: Method 8021, Volatile Organic Compounds, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, United States Environmental Protection Agency, SW-846, Volume IB, December 1987.

Reviewed By: 



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW 4

Lab ID: 0399W04980

Matrix: Water

Condition: Cool/Intact

Date Received: 10/05/99

Date Reported: 10/21/99

Date Sampled: 10/04/99

Time Sampled: 1700

Parameter	Analytical		Units	Units	PQL	Method	Analysis		
	Result						Date	Time	Init.
TPH - EPA Method 418.1									
Total Petroleum Hydrocarbons	<1	mg/L			1	EPA 418.1	10/06/99		SW

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

Reviewed By:



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW 4

Lab ID: 0399W04980

Matrix: Water

Condition: Cool/Intact

Date Received: 10/05/99

Date Reported: 10/21/99

Date Sampled: 10/04/99

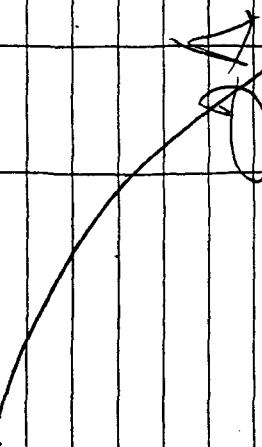
Time Sampled: 1700

Parameter	Analytical						Analysis		
	Result	Units		Units	PQL	Method	Date	Time	Init.
GENERAL PARAMETERS									
PH	7.1	s.u.			0.1	EPA 150.1	10/18/99	0730	JP
Electrical Conductivity	5,530	µmhos/cm			10	EPA 120.1	10/18/99	0908	JP
Solids - Total Dissolved	4,200	mg/L			10	EPA 160.1	10/18/99	0830	JP
Alkalinity (CaCO3)	551	mg/L			1	EPA 310.1	10/18/99	0730	BJ
Hardness (CaCO3)	1,360	mg/L			0.2	Calculation	10/19/99	1520	BJ
Major Anions									
Bicarbonate (HCO3)	672	mg/L	11.02	meq/L	1	EPA 310.1	10/18/99	0730	BJ
Carbonate (CO3)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/18/99	0730	BJ
Chloride	190	mg/L	5.35	meq/L	1	EPA 300.0	10/19/99	1000	BJ
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/18/99	0730	BJ
Sulfate	2,420	mg/L	50.42	meq/L	5	EPA 300.0	10/19/99	0800	BJ
Major Cations									
Calcium	464	mg/L	23.15	meq/L	0.2	EPA 200.7	10/18/99	1223	WL
Magnesium	48.8	mg/L	4.02	meq/L	0.2	EPA 200.7	10/18/99	1223	WL
Potassium	3.8	mg/L	0.10	meq/L	0.2	EPA 200.7	10/18/99	1223	WL
Sodium	860	mg/L	37.40	meq/L	0.2	EPA 200.7	10/18/99	1223	WL
Anion/Cation Balance QC Information									
Anion Sum			66.76	meq/L	0.1	Calculation	10/19/99	1600	BJ
Cation Sum			64.67	meq/L	0.1	Calculation	10/19/99	1600	BJ
Cation/Anion Balance			1.59	%	N/A	N/A	10/19/99	1600	BJ

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 

Client/Project Name		Project Location		ANALYSES / PARAMETERS																			
Philip Services		GIANT BLOOMFIELD																					
Sampler: (Signature) Cathy Culicott		Chain of Custody Tape No.																					
Sample No./ Identification	Date	Time	Lab Number	Matrix	No. of Containers	BTEX	TPH	GENERAL CHEM	DISSOLVED METALS	Remarks													
MW4	10/14/99	5 PM	0399004980	AQ	5	X	X	X	X	Bill Giant Directly													
 Cathy Culicott Analyst-104																							
Relinquished by: (Signature) Cathy Culicott		Date	10/15/99	Time	7:15am	Received by: (Signature) Debbie Hambert		Date	10/15/99	Time	7:56 AM												
Relinquished by: (Signature) Debbie Hambert		Date	10/15/99	Time	8:15	Received by: (Signature) Debbie Hambert		Date	10/15/99	Time	8:15												
Relinquished by: (Signature)		Date		Time		Received by: (Signature)		Date		Time													

Inter-Mountain Laboratories, Inc.

☐ 555 Absaraka Sheridan, Wyoming 82801 Telephone (307) 674-7506	☐ 1633 Terra Avenue Sheridan, Wyoming 82801 Telephone (307) 672-8945	☐ 1701 Phillips Circle Gillette, Wyoming 82718 Telephone (307) 682-8945	☐ 2506 West Main Street Farmingington, NM 87401 Telephone (505) 326-4737	☐ 11183 State Hwy. 30 College Station, TX 77845 Telephone (409) 776-8945
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61591



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-3

Lab ID: 0399W04934

Matrix: Water

Condition: Cool/Intact

Date Received: 09/30/99

Date Reported: 10/18/99

Date Sampled: 09/29/99

Time Sampled: 1100

Parameter	Analytical		Units	Units	PQL	Method	Analysis		
	Result						Date	Time	Init.
DISSOLVED METALS									
Antimony	0.020		mg/L		0.005	EPA 200.9	10/05/99	1514	WL
Arsenic	<0.005		mg/L		0.005	SM 3114B	10/13/99	1020	HR
Beryllium	<0.002		mg/L		0.002	EPA 200.7	10/05/99	1514	WL
Cadmium	<0.001		mg/L		0.001	EPA 200.9	10/08/99	0840	SW
Chromium	<0.01		mg/L		0.01	EPA 200.7	10/05/99	1514	WL
Copper	0.01		mg/L		0.01	EPA 200.7	10/05/99	1514	WL
Lead	<0.005		mg/L		0.005	EPA 200.9	10/11/99	1142	SW
Mercury	<0.001		mg/L		0.001	EPA 245.1	10/12/99	1450	HR
Nickel	<0.01		mg/L		0.01	EPA 200.7	10/05/99	1514	WL
Selenium	<0.005		mg/L		0.005	SM 3114B	10/14/99	1145	HR
Silver	<0.01		mg/L		0.01	EPA 200.7	10/05/99	1514	WL
Thallium	0.275		mg/L		0.002	EPA 200.9	10/05/99	1514	WL
Zinc	0.125		mg/L		0.025	EPA 200.7	10/05/99	1514	WL

Reference: EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.
SM - "Standard Methods for the Examination of Water and Wastewater", APHA-AWWA-WEF, 19th Edition, 1995.

Reviewed By:



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-3

Lab ID: 0399W04934

Matrix: Water

Condition: Cool/Intact

Date Reported: 10/12/99

Date Sampled: 09/29/99

Date Received: 09/30/99

Date Analyzed: 10/06/99

Parameter	Analytical Result	PQL	Units
-----------	-------------------	-----	-------

BTEX - Method 8021B

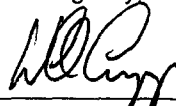
Benzene	<1	1	µg/L
Toluene	<1	1	µg/L
Ethylbenzene	<1	1	µg/L
Xylenes (total)	<2	2	µg/L

Quality Control - Surrogate Recovery	%	QC Limits
--------------------------------------	---	-----------

4-Bromofluorobenzene(SUR-8020)	111	70 - 130
a,a,a-Trifluorotoluene(SUR-602)	90	70 - 130

Reference: Method 8021, Volatile Organic Compounds, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, United States Environmental Protection Agency, SW-846, Volume IB, December 1987.

Reviewed By:


William Lipps



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services
Project: Giant Ref. Bloomfield
Sample ID: MW-3
Lab ID: 0399W04934
Matrix: Water
Condition: Cool/Intact

Date Reported: 10/12/99
Date Sampled: 09/29/99
Date Received: 09/30/99
Date Analyzed: 10/06/99

Parameter	Analytical Result	PQL	Units
TPH - EPA Method 418.1			
Total Petroleum Hydrocarbons	<1	1	mg/L

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

Reviewed By: _____

William Lipps



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-3

Lab ID: 0399W04934

Matrix: Water

Condition: Cool/Intact

Date Received: 09/30/99

Date Reported: 10/18/99

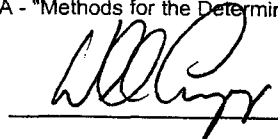
Date Sampled: 09/29/99

Time Sampled: 1100

Parameter	Analytical		Analysis						
	Result	Units	Units	PQL	Method	Date	Time	Init.	
GENERAL PARAMETERS									
PH	7.2	s.u.		0.1	EPA 150.1	09/30/99	1700	BJ	
Electrical Conductivity	4,790	µmhos/cm		10	EPA 120.1	09/30/99	1700	BJ	
Solids - Total Dissolved	4,210	mg/L		10	EPA 160.1	10/06/99	1214	JP	
Alkalinity (CaCO3)	551	mg/L		1	EPA 310.1	10/04/99	0900	JP	
Hardness (CaCO3)	1,270	mg/L		0.2	Calculation	10/14/99	1600	BJ	
Major Anions									
Bicarbonate (HCO3)	672	mg/L	11.02	meq/L	1	EPA 310.1	10/04/99	0900	JP
Carbonate (CO3)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/04/99	0900	JP
Chloride	54	mg/L	1.54	meq/L	1	EPA 300.0	10/13/99	0800	BJ
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/04/99	0900	JP
Sulfate	2,420	mg/L	50.43	meq/L	5	EPA 300.0	10/13/99	0800	BJ
Major Cations									
Calcium	445	mg/L	22.19	meq/L	0.2	EPA 200.7	10/05/99	1514	WL
Magnesium	39.7	mg/L	3.27	meq/L	0.2	EPA 200.7	10/05/99	1514	WL
Potassium	1.9	mg/L	0.05	meq/L	0.2	EPA 200.7	10/05/99	1514	WL
Sodium	777	mg/L	33.78	meq/L	0.2	EPA 200.7	10/05/99	1514	WL
Anion/Cation Balance QC Information									
Anion Sum			62.96	meq/L	0.1	Calculation	10/14/99	1550	BJ
Cation Sum			59.29	meq/L	0.1	Calculation	10/14/99	1550	BJ
Cation/Anion Balance			3.00	%	N/A	N/A	10/14/99	1550	BJ

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-5

Lab ID: 0399W04935

Matrix: Water

Condition: Cool/Intact

Date Received: 09/30/99

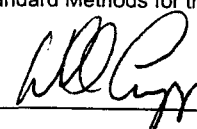
Date Reported: 10/18/99

Date Sampled: 09/29/99

Time Sampled: 1215

Parameter	Analytical		Analysis					
	Result	Units	Units	PQL	Method	Date	Time	Init.
DISSOLVED METALS								
Antimony	0.022	mg/L		0.005	EPA 200.9	10/05/99	1517	WL
Arsenic	<0.005	mg/L		0.005	SM 3114B	10/13/99	1020	HR
Beryllium	<0.002	mg/L		0.002	EPA 200.7	10/05/99	1517	WL
Cadmium	<0.001	mg/L		0.001	EPA 200.9	10/08/99	0840	SW
Chromium	<0.01	mg/L		0.01	EPA 200.7	10/05/99	1517	WL
Copper	<0.01	mg/L		0.01	EPA 200.7	10/05/99	1517	WL
Lead	<0.005	mg/L		0.005	EPA 200.9	10/11/99	1142	SW
Mercury	<0.001	mg/L		0.001	EPA 245.1	10/12/99	1450	HR
Nickel	0.02	mg/L		0.01	EPA 200.7	10/05/99	1517	WL
Selenium	<0.005	mg/L		0.005	SM 3114B	10/14/99	1145	HR
Silver	<0.01	mg/L		0.01	EPA 200.7	10/05/99	1517	WL
Thallium	0.382	mg/L		0.002	EPA 200.9	10/05/99	1517	WL
Zinc	0.079	mg/L		0.025	EPA 200.7	10/05/99	1517	WL

Reference: EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.
SM - "Standard Methods for the Examination of Water and Wastewater", APHA-AWWA-WEF, 19th Edition, 1995.

Reviewed By: 



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services
Project: Giant Ref. Bloomfield
Sample ID: MW-5
Lab ID: 0399W04935
Matrix: Water
Condition: Cool/Intact

Date Reported: 10/12/99

Date Sampled: 09/29/99

Date Received: 09/30/99

Date Analyzed: 10/06/99

Parameter	Analytical Result	PQL	Units
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BTEX - Method 8021B

Benzene	<1	1	µg/L
Toluene	<1	1	µg/L
Ethylbenzene	<1	1	µg/L
Xylenes (total)	<2	2	µg/L

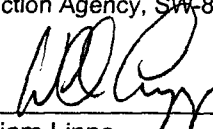
Quality Control - Surrogate Recovery	%	QC Limits
--------------------------------------	---	-----------

4-Bromofluorobenzene(SUR-8020)	80	70 - 130
a,a,a-Trifluorotoluene(SUR-602)	65 **	70 - 130

** - Surrogate Recovery failed QC Limits due to matrix interference.

Reference: Method 8021, Volatile Organic Compounds, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, United States Environmental Protection Agency, SW-846, Volume IB, December 1987.

Reviewed By:


William Lipps



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-5

Lab ID: 0399W04935

Matrix: Water

Condition: Cool/Intact

Date Reported: 10/12/99

Date Sampled: 09/29/99

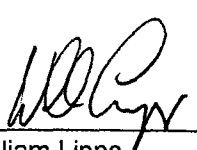
Date Received: 09/30/99

Date Analyzed: 10/06/99

Parameter	Analytical Result	PQL	Units
TPH - EPA Method 418.1			
Total Petroleum Hydrocarbons	<1	1	mg/L

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

Reviewed By:


William Lipps



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: Philip Environmental Services

Project: Giant Ref. Bloomfield

Sample ID: MW-5

Lab ID: 0399W04935

Matrix: Water

Condition: Cool/Intact

Date Received: 09/30/99

Date Reported: 10/18/99

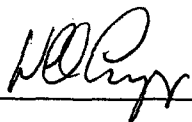
Date Sampled: 09/29/99

Time Sampled: 1215

Parameter	Analytical						Analysis		
	Result	Units	Units	PQL	Method		Date	Time	Init.
GENERAL PARAMETERS									
PH	6.9	s.u.		0.1	EPA 150.1		09/30/99	1700	BJ
Electrical Conductivity	6,870	µmhos/cm		10	EPA 120.1		09/30/99	1700	BJ
Solids - Total Dissolved	4,920	mg/L		10	EPA 160.1		10/06/99	1214	JP
Alkalinity (CaCO ₃)	713	mg/L		1	EPA 310.1		10/04/99	0900	JP
Hardness (CaCO ₃)	2,000	mg/L		0.2	Calculation		10/14/99	1600	BJ
Major Anions									
Bicarbonate (HCO ₃)	869	mg/L	14.25	meq/L	1	EPA 310.1	10/04/99	0900	JP
Carbonate (CO ₃)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/04/99	0900	JP
Chloride	1,470	mg/L	41.34	meq/L	1	EPA 300.0	10/13/99	0800	BJ
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	10/04/99	0900	JP
Sulfate	1,200	mg/L	25.03	meq/L	5	EPA 300.0	10/13/99	0800	BJ
Major Cations									
Calcium	704	mg/L	35.13	meq/L	0.2	EPA 200.7	10/05/99	1517	WL
Magnesium	60.2	mg/L	4.95	meq/L	0.2	EPA 200.7	10/05/99	1517	WL
Potassium	5.2	mg/L	0.13	meq/L	0.2	EPA 200.7	10/05/99	1517	WL
Sodium	869	mg/L	37.80	meq/L	0.2	EPA 200.7	10/05/99	1517	WL
Anion/Cation Balance QC Information									
Anion Sum			80.61	meq/L	0.1	Calculation	10/14/99	1550	BJ
Cation Sum			78.01	meq/L	0.1	Calculation	10/14/99	1550	BJ
Cation/Anion Balance			1.64	%	N/A	N/A	10/14/99	1550	BJ

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 

Sampler: (Signature)

Chain of Custody Tape No.

BLOOMFIELD

ANALYSES / PARAMETERS

—

418

Remarks

Sample No./
Identification

Date _____

Time

Lab Number

Matrix

$$m(1) = 3$$

5/24	11:00
------	-------

1969

100 3.25

$$m(u) = 5$$

9/24 12:15 AM

4925

AC 310

TPH Tiner

Relinquished by: (Signature)

Relinquished by: (Signature)
Anthony Culicenti

Relinquished by: (Signature)

Relinquished by: (Signature)

☐

555 Absaraka
Sheridan, Wyoming 82801
Telephone (307) 674-7506



1633 Terra Avenue
Sheridan, Wyoming 82801
Telephone (307) 672-8945

1701 Phillips Circle
Gillette, Wyoming 82718
Telephone (307) 682-8945

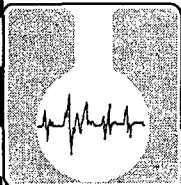
✱

2506 West Main Street
Farmington, NM 87401
Telephone (505) 326-4737

11183 State Hwy. 30
College Station, TX 77845
Telephone (409) 776-8945

61582

Inter-Mountain Laboratories, Inc.



ASSAIGAI ANALYTICAL LABORATORIES, INC.

7300 Jefferson, NE • Albuquerque, New Mexico 87109 • (505) 345-8964 • FAX (505) 345-7259

3332 Wedgewood Dr., Suite N • El Paso, Texas 79925 • (915) 593-6000 • FAX (915) 593-7820

127 Eastgate Drive, 212-C • Los Alamos, New Mexico 87544 • (505) 662-2555

REVISED
1/12/00 W

GIANT INDUSTRIES

attn: JEANY OVERMAN/ R. THOMPSON

111 COUNTY ROAD 4990

BLOOMFIELD, NM 87413

Explanation of codes	
B	analyte detected in Method Blank
E	result is estimated
H	analyzed out of hold time
N	tentatively identified compound
S	subcontracted
1-9	see footnote

Assaigai Analytical Laboratories, Inc.

Certificate of Analysis

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

William P. Biava
William P. Biava: President of Assaigai Analytical Laboratories, Inc.

Client Sample ID **MW-4** Sample Matrix **GW** Sample Collected **12/14/99 12:10:00**

IC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
9912144-01A EPA 418.1									
	99409	MW.1999.1548-4	TRPH	ND	mg / L	1	1		12/22/99
9912144-01B EPA 200.8 ICP-MS									
	991461	MW.1999.1586-6	7440-36-0 Antimony, dissolved	ND	mg / L	1	0.001		12/28/99
	991461	MW.1999.1586-6	7440-38-2 Arsenic, dissolved	ND	mg / L	1	0.0005	1	12/28/99
	M991461	MW.1999.1587-6	7440-41-7 Beryllium, dissolved	ND	mg / L	1	0.0005	1	12/29/99
	991461	MW.1999.1586-6	7440-43-9 Cadmium, dissolved	ND	mg / L	1	0.0005	1	12/28/99
	991461	MW.1999.1586-6	7440-47-3 Chromium, dissolved	ND	mg / L	1	0.001		12/28/99
	M991461	MW.1999.1586-6	7440-50-8 Copper, dissolved	0.0673	mg / L	1	0.0005		12/28/99
	MT.1999.3312	MT.1999.3312-2	Gallium, dissolved	ND	mg/L	1	0.001		12/30/99
	991461	MW.1999.1587-6	7439-92-1 Lead, dissolved	ND	mg / L	1	0.0005	1	12/29/99
	991461	MW.1999.1586-6	7440-02-0 Nickel, dissolved	0.0081	mg / L	1	0.0005		12/28/99
	M991461	MW.1999.1586-6	7782-49-2 Selenium, dissolved	ND	mg / L	1	0.0005	1	12/28/99
	991461	MW.1999.1586-6	7440-22-4 Silver, dissolved	ND	mg / L	1	0.0005		12/28/99
	991461	MW.1999.1586-6	7440-66-6 Zinc, dissolved	ND	mg / L	1	0.005	1	12/28/99
9912144-01B EPA 245.1 CVAA									
	991474	MT.1999.3261-4	7439-97-6 Mercury, dissolved	ND	mg / L	1	0.0002	1	12/23/99
9912144-01C SW846 ME/8015A Diesel Range Organics by GC/FID									
	999413	XG.1999.1096-4	Diesel Range Organics	ND	mg / L	1	25	H	12/23/99



Assagai Analytical Laboratories, Inc.
Certificate of Analysis

Client: **GIANT INDUSTRIES**

Project: **9912144 GIANT-BLOOMFIELD**

9912144-01D		SW846 5030A/8015A GRO by GC/FID						
X99404	XG.1999.1091-8	Gasoline Range Organics	ND	mg / L	1	0.05		12/23/99

9912144-01D		SW846 5030A/8021B Purgeable VOCs by GC/PID						
X99404	XG.1999.1079-2	71-43-2 Benzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-2	100-41-4 Ethylbenzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-2	95-47-6 o-Xylene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-2	p/m-Xylenes	ND	ug / L	1	2		12/21/99
X99404	XG.1999.1079-2	108-88-3 Toluene	ND	ug / L	1	1		12/21/99

Client Sample ID MW-3	Sample Matrix GW	Sample Collected 12/14/99	
		13:15:00	

C Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
9912144-02A		EPA 418.1							
X99409	MW.1999.1548-5		TRPH	ND	mg / L	1	1		12/22/99

9912144-02B		EPA 200.8 ICP-MS							
M991461	MW.1999.1586-9	7440-36-0	Antimony, dissolved	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-9	7440-38-2	Arsenic, dissolved	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1587-9	7440-41-7	Beryllium, dissolved	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-9	7440-43-9	Cadmium, dissolved	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-9	7440-47-3	Chromium, dissolved	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-9	7440-50-8	Copper, dissolved	0.0573	mg / L	1	0.0005		12/28/99
MT.1999.3312	MT.1999.3312-3		Gallium, dissolved	ND	mg/L	1	0.001		12/30/99
M991461	MW.1999.1587-9	7439-92-1	Lead, dissolved	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-9	7440-02-0	Nickel, dissolved	0.0048	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-9	7782-49-2	Selenium, dissolved	0.0027	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-9	7440-22-4	Silver, dissolved	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-9	7440-66-6	Zinc, dissolved	ND	mg / L	1	0.005		12/28/99

9912144-02B		EPA 245.1 CVAA							
M991474	MT.1999.3261-7	7439-97-6	Mercury, dissolved	ND	mg / L	1	0.0002		12/23/99

9912144-02C		SW846 ME/8015A Diesel Range Organics by GC/FID							
X99413	XG.1999.1096-7	Diesel Range Organics	ND	mg / L	1	25	H		12/23/99

9912144-02D		SW846 5030A/8015A GRO by GC/FID							
X99404	XG.1999.1091-9	Gasoline Range Organics	ND	mg / L	1	0.05			12/23/99

9912144-02D		SW846 5030A/8021B Purgeable VOCs by GC/PID							
X99404	XG.1999.1079-3	71-43-2 Benzene	ND	ug / L	1	1			12/21/99
X99404	XG.1999.1079-3	100-41-4 Ethylbenzene	ND	ug / L	1	1			12/21/99
X99404	XG.1999.1079-3	95-47-6 o-Xylene	ND	ug / L	1	1			12/21/99
X99404	XG.1999.1079-3	p/m-Xylenes	ND	ug / L	1	2			12/21/99
X99404	XG.1999.1079-3	108-88-3 Toluene	ND	ug / L	1	1			12/21/99

Assaigai Analytical Laboratories, Inc.
Certificate of Analysis

Client: **GIANT INDUSTRIES**

Project: **9912144 GIANT-BLOOMFIELD**

Client Sample ID MW-5	Sample Matrix GW	Sample Collected 12/14/99 14:30:00
------------------------------	-------------------------	---

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
9912144-03A EPA 418.1									
X99409	MW.1999.1548-6		TRPH	ND	mg / L	1	1		12/22/99
9912144-03B EPA 200.8 ICP-MS									
M991461	MW.1999.1586-10	7440-36-0	Antimony, dissolved	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-10	7440-38-2	Arsenic, dissolved	0.0012	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1587-10	7440-41-7	Beryllium, dissolved	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-10	7440-43-9	Cadmium, dissolved	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-10	7440-47-3	Chromium, dissolved	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-10	7440-50-8	Copper, dissolved	0.0870	mg / L	1	0.0005		12/28/99
MT.1999.3312	MT.1999.3312-4		Gallium, dissolved	0.001	mg/L	1	0.001		12/30/99
M991461	MW.1999.1587-10	7439-92-1	Lead, dissolved	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-10	7440-02-0	Nickel, dissolved	0.0234	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-10	7782-49-2	Selenium, dissolved	0.0029	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-10	7440-22-4	Silver, dissolved	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-10	7440-66-6	Zinc, dissolved	ND	mg / L	1	0.005		12/28/99
9912144-03B EPA 245.1 CVAA									
M991474	MT.1999.3261-8	7439-97-6	Mercury, dissolved	0.0003	mg / L	1	0.0002		12/23/99
9912144-03C SW846 ME/8015A Diesel Range Organics by GC/FID									
X99413	XG.1999.1096-8		Diesel Range Organics	ND	mg / L	1	25		12/23/99
9912144-03D SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1091-10		Gasoline Range Organics	ND	mg / L	1	0.05		12/23/99
9912144-03D SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1079-4	71-43-2	Benzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-4	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-4	95-47-6	o-Xylene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-4		p/m-Xylenes	ND	ug / L	1	2		12/21/99
X99404	XG.1999.1079-4	108-88-3	Toluene	ND	ug / L	1	1		12/21/99

Assaigai Analytical Laboratories, Inc.
Certificate of Analysis

Client: **GIANT INDUSTRIES**
Project: **9912144** **GIANT-BLOOMFIELD**

*** Sample specific Detection Limit is determined by multiplying the sample Dilution Factor by the listed Reporting Detection Limit. ***

*** ND = Not detected; less than the sample specific Detection Limit. Results relate only to the items tested. ***

footnote ¹ This sample was utilized for the matrix spike and duplicate. Please note that the recoveries were outside of QC criteria, suggesting matrix interference problems. This should be taken into account when reviewing the data.

Quality Control Summary

Client: **GIANT INDUSTRIES**
Project: **9912144** **GIANT-BLOOMFIELD**

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC
Type**MB: Method Blank**QC
Matrix**OTHER**

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
T.1999.3312-3312-1			EPA 200.8 ICP-MS						
T.1999.3312	MT.1999.3312-1		Gallium	ND	mg/L	1	0.001		12/30/99

Quality Control Summary

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

LCS: Lab Control Spike

QC
Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
M991461-002									
EPA 200.8 ICP-MS									
M991461	MW.1999.1586-4	7440-36-0	Antimony	90	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7440-38-2	Arsenic	86	% Recovery	1	NA		12/28/99
M991461	MW.1999.1587-4	7440-41-7	Beryllium	86	% Recovery	1	NA		12/29/99
M991461	MW.1999.1586-4	7440-43-9	Cadmium	91	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7440-47-3	Chromium	95	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7440-50-8	Copper	92	% Recovery	1	NA		12/28/99
M991461	MW.1999.1587-4	7439-92-1	Lead	90	% Recovery	1	NA		12/29/99
M991461	MW.1999.1586-4	7440-02-0	Nickel	95	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7782-49-2	Selenium	83	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7440-22-4	Silver	103	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-4	7440-66-6	Zinc	87	% Recovery	1	NA		12/28/99
M991474-3261-2									
EPA 245.1 CVAA									
M991474	MT.1999.3261-2	7439-97-6	Mercury	102	% Recovery	1	NA		12/23/99
99404-001									
SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1057-1		Gasoline Range Organics	95	% Recovery	1	NA		12/13/99
99404-001									
SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1057-1	71-43-2	Benzene	104	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-1	100-41-4	Ethylbenzene	92	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-1	95-47-6	o-Xylene	79	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-1		p/m-Xylenes	84	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-1	108-88-3	Toluene	86	% Recovery	1	NA		12/13/99
99409-002									
EPA 418.1									
X99409	MW.1999.1536-3		TRPH	89	(%) Recov	1	NA		12/20/99
X99409-009									
EPA 418.1									
X99409	MW.1999.1548-3		TRPH	92	(%) Recov	1	NA		12/22/99
99409-015									
EPA 418.1									
X99409	MW.2000.38-3		TRPH	106	(%) Recov	1	NA		01/10/00
99413-002									
SW846 ME/8015A Diesel Range Organics by GC/FID									
X99413	XG.1999.1096-2		Diesel Range Organics	106	% Recovery	1	NA		12/23/99

LCSD: Lab Control Spike Duplicate Accuracy

QC
Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
M991461-003									
EPA 200.8 ICP-MS									
M991461	MW.1999.1586-5	7440-36-0	Antimony	89	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-38-2	Arsenic	85	% Recovery	1	NA		12/28/99
M991461	MW.1999.1587-5	7440-41-7	Beryllium	85	% Recovery	1	NA		12/29/99

Quality Control Summary

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

M991461	MW.1999.1586-5	7440-43-9	Cadmium	90	% Recovery	1	NA	12/28/99
M991461	MW.1999.1586-5	7440-47-3	Chromium	97	% Recovery	1	NA	12/28/99
M991461	MW.1999.1586-5	7440-50-8	Copper	95	% Recovery	1	NA	12/28/99
M991461	MW.1999.1587-5	7439-92-1	Lead	89	% Recovery	1	NA	12/29/99
M991461	MW.1999.1586-5	7440-02-0	Nickel	97	% Recovery	1	NA	12/28/99
M991461	MW.1999.1586-5	7782-49-2	Selenium	83	% Recovery	1	NA	12/28/99
M991461	MW.1999.1586-5	7440-22-4	Silver	102	% Recovery	1	NA	12/28/99
M991461	MW.1999.1586-5	7440-66-6	Zinc	91	% Recovery	1	NA	12/28/99

M991474-3261-3

EPA 245.1 CVAA

M991474	MT.1999.3261-3	7439-97-6	Mercury	98	% Recovery	1	NA	12/23/99
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X99404-002

SW846 5030A/8015A GRO by GC/FID

X99404	XG.1999.1057-2		Gasoline Range Organics	91	% Recovery	1	NA	12/13/99
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X99404-002

SW846 5030A/8021B Purgeable VOCs by GC/PID

X99404	XG.1999.1057-2	71-43-2	Benzene	106	% Recovery	1	NA	12/13/99
X99404	XG.1999.1057-2	100-41-4	Ethylbenzene	97	% Recovery	1	NA	12/13/99
X99404	XG.1999.1057-2	95-47-6	o-Xylene	82	% Recovery	1	NA	12/13/99
X99404	XG.1999.1057-2		p/m-Xylenes	87	% Recovery	1	NA	12/13/99
X99404	XG.1999.1057-2	108-88-3	Toluene	88	% Recovery	1	NA	12/13/99

X99409-003

EPA 418.1

X99409	MW.1999.1536-4		TRPH	90	(%) Recov	1	NA	12/20/99
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X99413-003

SW846 ME/8015A Diesel Range Organics by GC/FID

X99413	XG.1999.1096-3		Diesel Range Organics	104	% Recovery	1	NA	12/23/99
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LCSD: Lab Control Spike Duplicate Precision

QC
Matrix

WATER

C Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
M991461-003 EPA 200.8 ICP-MS									
M991461	MW.1999.1586-5	7440-36-0	Antimony	2	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-38-2	Arsenic	1	RPD	1	NA		12/28/99
M991461	MW.1999.1587-5	7440-41-7	Beryllium	< 1	RPD	1	NA		12/29/99
M991461	MW.1999.1586-5	7440-43-9	Cadmium	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-47-3	Chromium	2	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-50-8	Copper	4	RPD	1	NA		12/28/99
M991461	MW.1999.1587-5	7439-92-1	Lead	< 1	RPD	1	NA		12/29/99
M991461	MW.1999.1586-5	7440-02-0	Nickel	2	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7782-49-2	Selenium	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-22-4	Silver	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-5	7440-66-6	Zinc	4	RPD	1	NA		12/28/99
M991474-3261-3 EPA 245.1 CVAA									
M991474	MT.1999.3261-3	7439-97-6	Mercury	4	RPD	1	NA		12/23/99
X99404-002 SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1057-2		Gasoline Range Organics	4	RPD	1	NA		12/13/99
X99404-002 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1057-2	71-43-2	Benzene	2	RPD	1	NA		12/13/99

Quality Control Summary

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

X99404	XG.1999.1057-2	100-41-4	Ethylbenzene	4	RPD	1	NA		12/13/99
X99404	XG.1999.1057-2	95-47-6	o-Xylene	4	RPD	1	NA		12/13/99
X99404	XG.1999.1057-2		p/m-Xylenes	3	RPD	1	NA		12/13/99
X99404	XG.1999.1057-2	108-88-3	Toluene	2	RPD	1	NA		12/13/99
X99409-003 EPA 418.1									
X99409	MW.1999.1536-4		TRPH	1	(%) RPD	1	NA		12/20/99
X99413-003 SW846 ME/8015A Diesel Range Organics by GC/FID									
X99413	XG.1999.1096-3		Diesel Range Organics	2	RPD	1	NA		12/23/99

QC
Type

MB: Method Blank

QC
Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
M991461-001 EPA 200.8 ICP-MS									
M991461	MW.1999.1586-3	7440-36-0	Antimony	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-3	7440-38-2	Arsenic	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1587-3	7440-41-7	Beryllium	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-3	7440-43-9	Cadmium	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-3	7440-47-3	Chromium	ND	mg / L	1	0.001		12/28/99
M991461	MW.1999.1586-3	7440-50-8	Copper	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1587-3	7439-92-1	Lead	ND	mg / L	1	0.0005		12/29/99
M991461	MW.1999.1586-3	7440-02-0	Nickel	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-3	7782-49-2	Selenium	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-3	7440-22-4	Silver	ND	mg / L	1	0.0005		12/28/99
M991461	MW.1999.1586-3	7440-66-6	Zinc	ND	mg / L	1	0.005		12/28/99
M991474-3261-1 EPA 245.1 CVAA									
M991474	MT.1999.3261-1	7439-97-6	Mercury	ND	mg / L	1	0.0002		12/23/99
X99404-006 SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1057-5		Gasoline Range Organics	0.15	mg / L	1	0.05		12/13/99
X99404-006 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1057-5	71-43-2	Benzene	ND	ug / L	1	1		12/13/99
X99404	XG.1999.1057-5	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/13/99
X99404	XG.1999.1057-5	95-47-6	o-Xylene	93	ug / L	1	1		12/13/99
X99404	XG.1999.1057-5		p/m-Xylenes	ND	ug / L	1	2		12/13/99
X99404	XG.1999.1057-5	108-88-3	Toluene	ND	ug / L	1	1		12/13/99
X99404-011 SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1057-10		Gasoline Range Organics	ND	mg / L	1	0.05		12/14/99
X99404-011 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1057-10	71-43-2	Benzene	ND	ug / L	1	1		12/14/99
X99404	XG.1999.1057-10	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/14/99
X99404	XG.1999.1057-10	95-47-6	o-Xylene	ND	ug / L	1	1		12/14/99
X99404	XG.1999.1057-10		p/m-Xylenes	ND	ug / L	1	2		12/14/99
X99404	XG.1999.1057-10	108-88-3	Toluene	ND	ug / L	1	1		12/14/99
X99404-014 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1067-1	71-43-2	Benzene	ND	ug / L	1	1		12/16/99

Quality Control Summary

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

X99404	XG.1999.1067-1	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/16/99
X99404	XG.1999.1067-1	95-47-6	o-Xylene	ND	ug / L	1	1		12/16/99
X99404	XG.1999.1067-1		p/m-Xylenes	ND	ug / L	1	2		12/16/99
X99404	XG.1999.1067-1	108-88-3	Toluene	ND	ug / L	1	1		12/16/99

X99404-020 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1079-1	71-43-2	Benzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-1	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-1	95-47-6	o-Xylene	ND	ug / L	1	1		12/21/99
X99404	XG.1999.1079-1		p/m-Xylenes	ND	ug / L	1	2		12/21/99
X99404	XG.1999.1079-1	108-88-3	Toluene	ND	ug / L	1	1		12/21/99

X99404-024 SW846 5030A/8015A GRO by GC/FID									
X99404	XG.1999.1091-7		Gasoline Range Organics	ND	mg / L	1	0.05		12/23/99

X99404-029 SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1093-1	71-43-2	Benzene	ND	ug / L	1	1		12/28/99
X99404	XG.1999.1093-1	100-41-4	Ethylbenzene	ND	ug / L	1	1		12/28/99
X99404	XG.1999.1093-1	95-47-6	o-Xylene	ND	ug / L	1	1		12/28/99
X99404	XG.1999.1093-1		p/m-Xylenes	ND	ug / L	1	2		12/28/99
X99404	XG.1999.1093-1	108-88-3	Toluene	ND	ug / L	1	1		12/28/99

X99409-001 EPA 418.1									
X99409	MW.1999.1536-2		TRPH	ND	mg / L	1	1		12/20/99

X99409-008 EPA 418.1									
X99409	MW.1999.1548-2		TRPH	ND	mg / L	1	1		12/22/99

X99409-014 EPA 418.1									
X99409	MW.2000.38-2		TRPH	ND	mg / L	1	1		01/10/00

X99413-001 SW846 ME/8015A Diesel Range Organics by GC/FID									
X99413	XG.1999.1096-1		Diesel Range Organics	ND	mg / L	1	25		12/23/99

C
Type

MS: Matrix Spike

QC
Matrix

WATER

C Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
M991461-005 EPA 200.8 ICP-MS									
M991461	MW.1999.1586-7	7440-36-0	Antimony	87	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7440-38-2	Arsenic	74	% Recovery	1	NA		12/28/99
M991461	MW.1999.1587-7	7440-41-7	Beryllium	21	% Recovery	1	NA		12/29/99
M991461	MW.1999.1586-7	7440-43-9	Cadmium	76	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7440-47-3	Chromium	91	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7440-50-8	Copper	82	% Recovery	1	NA		12/28/99
M991461	MW.1999.1587-7	7439-92-1	Lead	20	% Recovery	1	NA		12/29/99
M991461	MW.1999.1586-7	7440-02-0	Nickel	80	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7782-49-2	Selenium	64	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7440-22-4	Silver	89	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-7	7440-66-6	Zinc	58	% Recovery	1	NA		12/28/99
M991474-3261-5 EPA 245.1 CVAA									
M991474	MT.1999.3261-5	7439-97-6	Mercury	68	% Recovery	1	NA		12/23/99

Quality Control Summary

Client: GIANT INDUSTRIES
 Project: 9912144 GIANT-BLOOMFIELD

Explanation of codes	
D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

99404-003	SW846 5030A/8015A GRO by GC/FID								
X99404	XG.1999.1057-3	Gasoline Range Organics	94	% Recovery	1	NA			12/13/99

99404-003	SW846 5030A/8021B Purgeable VOCs by GC/PID								
X99404	XG.1999.1057-3	71-43-2 Benzene	109	% Recovery	1	NA			12/13/99
X99404	XG.1999.1057-3	100-41-4 Ethylbenzene	94	% Recovery	1	NA			12/13/99
99404	XG.1999.1057-3	95-47-6 o-Xylene	79	% Recovery	1	NA			12/13/99
99404	XG.1999.1057-3	p/m-Xylenes	86	% Recovery	1	NA			12/13/99
X99404	XG.1999.1057-3	108-88-3 Toluene	88	% Recovery	1	NA			12/13/99

99409-005	EPA 418.1								
99409	MW.1999.1536-6	TRPH	997	(%) Recov	10	NA			12/20/99

X99409-007	EPA 418.1								
99409	MW.1999.1536-8	TRPH	187	(%) Recov	5	NA			12/20/99

X99413-005	SW846 ME/8015A Diesel Range Organics by GC/FID								
X99413	XG.1999.1096-5	Diesel Range Organics	93	% Recovery	1	NA			12/23/99

QC Type MSD: Matrix Spike Duplicate Accuracy

QC Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
991461-006	EPA 200.8 ICP-MS								
991461	MW.1999.1586-8	7440-36-0	Antimony	87	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-38-2	Arsenic	74	% Recovery	1	NA		12/28/99
991461	MW.1999.1587-8	7440-41-7	Beryllium	23	% Recovery	1	NA		12/29/99
991461	MW.1999.1586-8	7440-43-9	Cadmium	76	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-47-3	Chromium	89	% Recovery	1	NA		12/28/99
991461	MW.1999.1586-8	7440-50-8	Copper	84	% Recovery	1	NA		12/28/99
991461	MW.1999.1587-8	7439-92-1	Lead	21	% Recovery	1	NA		12/29/99
M991461	MW.1999.1586-8	7440-02-0	Nickel	80	% Recovery	1	NA		12/28/99
M991461	MW.1999.1586-8	7782-49-2	Selenium	63	% Recovery	1	NA		12/28/99
991461	MW.1999.1586-8	7440-22-4	Silver	88	% Recovery	1	NA		12/28/99
991461	MW.1999.1586-8	7440-66-6	Zinc	57	% Recovery	1	NA		12/28/99

M991474-3261-6	EPA 245.1 CVAA								
991474	MT.1999.3261-6	7439-97-6	Mercury	68	% Recovery	1	NA		12/23/99

X99404-004	SW846 5030A/8015A GRO by GC/FID								
X99404	XG.1999.1057-4	Gasoline Range Organics	92	% Recovery	1	NA			12/13/99

99404-004	SW846 5030A/8021B Purgeable VOCs by GC/PID								
X99404	XG.1999.1057-4	71-43-2 Benzene	109	% Recovery	1	NA			12/13/99
X99404	XG.1999.1057-4	100-41-4 Ethylbenzene	97	% Recovery	1	NA			12/13/99
99404	XG.1999.1057-4	95-47-6 o-Xylene	82	% Recovery	1	NA			12/13/99
99404	XG.1999.1057-4	p/m-Xylenes	87	% Recovery	1	NA			12/13/99
X99404	XG.1999.1057-4	108-88-3 Toluene	88	% Recovery	1	NA			12/13/99

99413-006	SW846 ME/8015A Diesel Range Organics by GC/FID								
X99413	XG.1999.1096-6	Diesel Range Organics	106	% Recovery	1	NA			12/23/99

Quality Control Summary

Client: GIANT INDUSTRIES
 Project: 9912144 GIANT-BLOOMFIELD

Explanation of codes

D	Not applicable due to sample dilution
L	Not applicable due to MDL proximity

QC Type MSD: Matrix Spike Duplicate Precision

QC Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
EPA 200.8 ICP-MS									
M991461-006	MW.1999.1586-8	7440-36-0	Antimony	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-38-2	Arsenic	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1587-8	7440-41-7	Beryllium	8	RPD	1	NA		12/29/99
M991461	MW.1999.1586-8	7440-43-9	Cadmium	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-47-3	Chromium	2	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-50-8	Copper	3	RPD	1	NA		12/28/99
M991461	MW.1999.1587-8	7439-92-1	Lead	4	RPD	1	NA		12/29/99
M991461	MW.1999.1586-8	7440-02-0	Nickel	< 1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7782-49-2	Selenium	1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-22-4	Silver	1	RPD	1	NA		12/28/99
M991461	MW.1999.1586-8	7440-66-6	Zinc	1	RPD	1	NA		12/28/99
EPA 245.1 CVAA									
M991474-3261-6	MT.1999.3261-6	7439-97-6	Mercury	< 1	RPD	1	NA		12/23/99
SW846 5030A/8015A GRO by GC/FID									
X99404-004	XG.1999.1057-4		Gasoline Range Organics	1	RPD	1	NA		12/13/99
SW846 5030A/8021B Purgeable VOCs by GC/PID									
X99404	XG.1999.1057-4	71-43-2	Benzene	< 1	RPD	1	NA		12/13/99
X99404	XG.1999.1057-4	100-41-4	Ethylbenzene	3	RPD	1	NA		12/13/99
X99404	XG.1999.1057-4	95-47-6	o-Xylene	3	RPD	1	NA		12/13/99
X99404	XG.1999.1057-4		p/m-Xylenes	2	RPD	1	NA		12/13/99
X99404	XG.1999.1057-4	108-88-3	Toluene	< 1	RPD	1	NA		12/13/99
SW846 ME/8015A Diesel Range Organics by GC/FID									
X99413-006	XG.1999.1096-6		Diesel Range Organics	12	RPD	1	NA		12/23/99

Assaigai Analytical Laboratories, Inc.
Surrogate Summary: QC

Client: **GIANT INDUSTRIES**
Project: **9912144** **GIANT-BLOOMFIELD**

QC Type		LCS		QC Matrix		WATER				
QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date	
X99404-001		GRO								
X99404	XG.1999.1057-1	NA	4-Bromofluorobenzene-FID	108	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-1	NA	4-Bromofluorobenzene-PID	97	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-1	NA	aaa-Trifluorotoluene-FID	114	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-1	NA	aaa-Trifluorotoluene-PID	105	% Recovery	1	NA		12/13/99	
X99413-002		DRO								
X99413	XG.1999.1096-2	NA	O-terphenyl	104	% Recovery	1	NA		12/23/99	

QC Type		LCSD		QC Matrix		WATER				
QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date	
X99404-002		GRO								
X99404	XG.1999.1057-2	NA	4-Bromofluorobenzene-FID	107	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-2	NA	4-Bromofluorobenzene-PID	97	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-2	NA	aaa-Trifluorotoluene-FID	112	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-2	NA	aaa-Trifluorotoluene-PID	106	% Recovery	1	NA		12/13/99	
X99413-003		DRO								
X99413	XG.1999.1096-3	NA	O-terphenyl	103	% Recovery	1	NA		12/23/99	

QC Type		MB		QC Matrix		WATER				
QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date	
X99404-006		GRO								
X99404	XG.1999.1057-5	NA	4-Bromofluorobenzene-FID	105	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-5	NA	4-Bromofluorobenzene-PID	98	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-5	NA	aaa-Trifluorotoluene-FID	111	% Recovery	1	NA		12/13/99	
X99404	XG.1999.1057-5	NA	aaa-Trifluorotoluene-PID	105	% Recovery	1	NA		12/13/99	
X99404-011		GRO								
X99404	XG.1999.1057-10	NA	4-Bromofluorobenzene-FID	105	% Recovery	1	NA		12/14/99	
X99404	XG.1999.1057-10	NA	4-Bromofluorobenzene-PID	97	% Recovery	1	NA		12/14/99	
X99404	XG.1999.1057-10	NA	aaa-Trifluorotoluene-FID	107	% Recovery	1	NA		12/14/99	
X99404	XG.1999.1057-10	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/14/99	
X99404-014		GRO								
X99404	XG.1999.1067-1	NA	4-Bromofluorobenzene-FID	105	% Recovery	1	NA		12/16/99	
X99404	XG.1999.1067-1	NA	4-Bromofluorobenzene-PID	98	% Recovery	1	NA		12/16/99	
X99404	XG.1999.1067-1	NA	aaa-Trifluorotoluene-FID	107	% Recovery	1	NA		12/16/99	

Assaigai Analytical Laboratories, Inc.
Surrogate Summary: QC

Client: **GIANT INDUSTRIES**
Project: **9912144** **GIANT-BLOOMFIELD**

99404	XG.1999.1067-1	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/16/99
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X99404-020

GRO

X99404	XG.1999.1079-1	NA	4-Bromofluorobenzene-FID	99	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-1	NA	4-Bromofluorobenzene-PID	100	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-1	NA	aaa-Trifluorotoluene-FID	99	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-1	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/21/99

X99404-024

GRO

X99404	XG.1999.1091-7	NA	4-Bromofluorobenzene-FID	98	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-7	NA	4-Bromofluorobenzene-PID	100	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-7	NA	aaa-Trifluorotoluene-FID	101	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-7	NA	aaa-Trifluorotoluene-PID	99	% Recovery	1	NA		12/23/99

X99404-029

GRO

X99404	XG.1999.1093-1	NA	4-Bromofluorobenzene-FID	98	% Recovery	1	NA		12/28/99
X99404	XG.1999.1093-1	NA	4-Bromofluorobenzene-PID	99	% Recovery	1	NA		12/28/99
X99404	XG.1999.1093-1	NA	aaa-Trifluorotoluene-FID	100	% Recovery	1	NA		12/28/99
X99404	XG.1999.1093-1	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/28/99

X99413-001

DRO

X99413	XG.1999.1096-1	NA	O-terphenyl	77	% Recovery	1	NA		12/23/99
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QC
Type

MS

QC
Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
X99404-003									
			GRO						
X99404	XG.1999.1057-3	NA	4-Bromofluorobenzene-FID	107	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-3	NA	4-Bromofluorobenzene-PID	97	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-3	NA	aaa-Trifluorotoluene-FID	113	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-3	NA	aaa-Trifluorotoluene-PID	105	% Recovery	1	NA		12/13/99

X99413-005

DRO

X99413	XG.1999.1096-5	NA	O-terphenyl	97	% Recovery	1	NA		12/23/99
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QC
Type

MSD

QC
Matrix

WATER

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Code	Run Date
X99404-004									
			GRO						
X99404	XG.1999.1057-4	NA	4-Bromofluorobenzene-FID	109	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-4	NA	4-Bromofluorobenzene-PID	98	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-4	NA	aaa-Trifluorotoluene-FID	115	% Recovery	1	NA		12/13/99
X99404	XG.1999.1057-4	NA	aaa-Trifluorotoluene-PID	106	% Recovery	1	NA		12/13/99

X99413-006

DRO

X99413	XG.1999.1096-6	NA	O-terphenyl	105	% Recovery	1	NA		12/23/99
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Surrogate Summary: Fraction

Client: GIANT INDUSTRIES

Project: 9912144 GIANT-BLOOMFIELD

Client
Sample ID MW-4Sample
Matrix GW

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
9912144-01C									
DRO									
X99413	XG.1999.1096-4	NA	O-terphenyl	97	% Recovery	1	NA		12/23/99
9912144-01D									
GRO									
X99404	XG.1999.1079-2	NA	4-Bromofluorobenzene-FID	98	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-2	NA	4-Bromofluorobenzene-PID	99	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-2	NA	aaa-Trifluorotoluene-FID	100	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-2	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/21/99
9912144-01D									
GRO									
X99404	XG.1999.1091-8	NA	4-Bromofluorobenzene-FID	99	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-8	NA	4-Bromofluorobenzene-PID	100	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-8	NA	aaa-Trifluorotoluene-FID	100	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-8	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/23/99

Client
Sample ID MW-3Sample
Matrix GW

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
9912144-02C									
DRO									
X99413	XG.1999.1096-7	NA	O-terphenyl	95	% Recovery	1	NA		12/23/99
9912144-02D									
GRO									
X99404	XG.1999.1079-3	NA	4-Bromofluorobenzene-FID	100	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-3	NA	4-Bromofluorobenzene-PID	102	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-3	NA	aaa-Trifluorotoluene-FID	99	% Recovery	1	NA		12/21/99
X99404	XG.1999.1079-3	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/21/99
9912144-02D									
GRO									
X99404	XG.1999.1091-9	NA	4-Bromofluorobenzene-FID	99	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-9	NA	4-Bromofluorobenzene-PID	100	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-9	NA	aaa-Trifluorotoluene-FID	101	% Recovery	1	NA		12/23/99
X99404	XG.1999.1091-9	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA		12/23/99

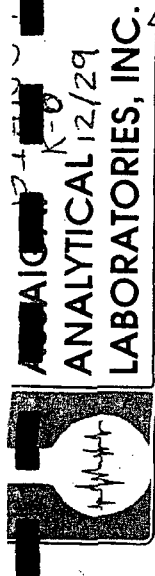
Client
Sample ID MW-5Sample
Matrix GW

QC Group	Run Sequence	CAS #	Analyte	Result	Units	Dilution Factor	Detection Limit	Run Code	Run Date
9912144-03C									
DRO									
X99413	XG.1999.1096-8	NA	O-terphenyl	94	% Recovery	1	NA		12/23/99
9912144-03D									
GRO									
X99404	XG.1999.1079-4	NA	4-Bromofluorobenzene-FID	100	% Recovery	1	NA		12/21/99

Surrogate Summary: FractionClient: **GIANT INDUSTRIES**Project: **9912144** **GIANT-BLOOMFIELD**

99404	XG.1999.1079-4	NA	4-Bromofluorobenzene-PID	101	% Recovery	1	NA	12/21/99
99404	XG.1999.1079-4	NA	aaa-Trifluorotoluene-FID	99	% Recovery	1	NA	12/21/99
X99404	XG.1999.1079-4	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA	12/21/99

912144-03D		GRO						X99404-027
99404	XG.1999.1091-10	NA	4-Bromofluorobenzene-FID	99	% Recovery	1	NA	12/23/99
X99404	XG.1999.1091-10	NA	4-Bromofluorobenzene-PID	100	% Recovery	1	NA	12/23/99
99404	XG.1999.1091-10	NA	aaa-Trifluorotoluene-FID	101	% Recovery	1	NA	12/23/99
99404	XG.1999.1091-10	NA	aaa-Trifluorotoluene-PID	98	% Recovery	1	NA	12/23/99



ASSAIGAI PROJECT FILE

ASSAIGAI PROJECT FILE

ANALYTICAL 12/29
LABORATORIES, INC.

Lab job no.: 99121441 Date 12/15/79

Page _____ of _____ Results TO

Client Giant Project Manager / Contact Robert Thompson

Address 111 County Rd 4490 Telephone No. (505) 326-2262

City / State / Zip Farmington, NM Fax No. (505) 326-2388

Project Name / Number Giant - Bloomfield Samplers: (Signature) Cecil

Contract / Purchase Order / Quote _____

3332 WEDGEWOOD
EL PASO, TEXAS 79925
(915) 593-6000

127 EASTGATE DRIVE, 212-C
LOS ALAMOS, NEW MEXICO 87544
(505) 662-2558

ALL FRACTION NUMBER	Field Sample Number / Location	Date	Time	Sample Type	Type / Size of Container	Preservation Temp.	Chemical	No. of Containers	Analysis Required	Remarks
1A, B, C, D	MW-1	12-14-79	1210	GW				2	1 1 2 2	
2A, B, C, D	MW-3	12-14-79	1315	GW				2	1 1 2 2	
3A, B, C, D	MW-5	12-14-79	1430	GW				2	1 1 2 2	No Diss
4A, B, C, D										
5A, B, C, D										
6A, B, C, D										
7A, B, C, D										
8A, B, C, D										
9A, B, C, D										
10A, B, C, D										
11A, B, C, D										
12A, B, C, D										
13A, B, C, D										
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96A, B, C, D										
97A, B, C, D										
98A, B, C, D										
99A, B, C, D										
100A, B, C, D										

Relinquished by: Signature <u>Cecil</u> Printed <u>Cecil T. By</u> Company <u>Philip Env. Services</u> Reason <u>Shipping</u>	Date 12-14-79 Time 16:15	Received by: Signature _____ Printed _____ Company _____ Reason _____	Date 12/17/79 Time 1150	Received by: Signature <u>W. W. W.</u> Printed <u>W. W. W.</u> Company <u>AAU</u> Reason <u>analysis</u>
Comments: <u>USE Jeanne Overman</u> <u>client code per</u> <u>Sh Elvin</u>		After analysis, samples are to be: ☐ Disposed of (additional fee) ☐ Stored (30 days max) ☐ Stored over 30 days (additional fee) ☐ Returned to customer		
Method of Shipment: _____ Shipment No. _____ Special Instructions: _____		per Robert A. As. Be. Cd. Cr. Cu. Ph. Hg. V. Se, Ag, Ba, Zn		



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

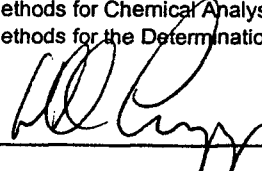
2506 West Main Street, Farmington, NM 87401

Client: Giant Industries
Project: Cation/anion Balance
Sample ID: MW-4
Lab ID: 0399W06035
Matrix: Water
Condition: Cool/Intact

Date Received: 12/14/99
Date Reported: 12/28/99
Date Sampled: 12/14/99
Time Sampled: 1210

Parameter	Analytical						Analysis		
	Result	Units		Units	PQL	Method	Date	Time	Init.
GENERAL PARAMETERS									
pH	7.3	s.u.			0.1	EPA 150.1	12/14/99	1600	JP
Electrical Conductivity	5,410	µmhos/cm			10	EPA 120.1	12/14/99	1600	JP
Solids - Total Dissolved	4,410	mg/L			10	EPA 160.1	12/17/99	1140	HR
Alkalinity as CaCO3	523	mg/L			1	EPA 310.1	12/20/99	0930	BJ
Hardness as CaCO3	1,380	mg/L			0.2	Calculation	12/27/99	1321	BJ
MAJOR ANIONS									
Bicarbonate (HCO3)	638	mg/L	10.5	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Carbonate (CO3)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Chloride	88	mg/L	2.49	meq/L	1	EPA 300.0	12/20/99	0800	BJ
Sulfate	2,840	mg/L	59.2	meq/L	5	EPA 300.0	12/20/99	0800	BJ
MAJOR CATIONS									
Calcium	468	mg/L	23.4	meq/L	0.2	EPA 200.7	12/21/99	1431	WL
Magnesium	50.8	mg/L	4.18	meq/L	0.2	EPA 200.7	12/21/99	1431	WL
Potassium	3.6	mg/L	0.09	meq/L	0.2	EPA 200.7	12/21/99	1431	WL
Sodium	897	mg/L	39.0	meq/L	0.2	EPA 200.7	12/21/99	1431	WL
CATION / ANION BALANCE QC INFORMATION									
Cation Sum			66.64	meq/L	0.1	Calculation	12/27/99	1300	BJ
Anion Sum			72.14	meq/L	0.1	Calculation	12/27/99	1300	BJ
Cation/Anion Balance			3.96	%	N/A	N/A			

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.
EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

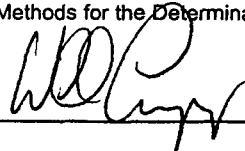
2506 West Main Street, Farmington, NM 87401

Client: Giant Industries
Project: Cation/anion Balance
Sample ID: MW-3
Lab ID: 0399W06036
Matrix: Water
Condition: Cool/Intact

Date Received: 12/14/99
Date Reported: 12/28/99
Date Sampled: 12/14/99
Time Sampled: 1315

Parameter	Analytical		Analysis						
	Result	Units	Units	PQL	Method	Date	Time	Init.	
GENERAL PARAMETERS									
pH	7.3	s.u.		0.1	EPA 150.1	12/14/99	1600	JP	
Electrical Conductivity	5,010	µmhos/cm		10	EPA 120.1	12/14/99	1600	JP	
Solids - Total Dissolved	4,080	mg/L		10	EPA 160.1	12/17/99	1140	HR	
Alkalinity as CaCO3	570	mg/L		1	EPA 310.1	12/20/99	0930	BJ	
Hardness as CaCO3	1,320	mg/L		0.2	Calculation	12/27/99	1321	BJ	
MAJOR ANIONS									
Bicarbonate (HCO3)	695	mg/L	11.4	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Carbonate (CO3)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ
Chloride	72	mg/L	2.02	meq/L	1	EPA 300.0	12/20/99	0800	BJ
Sulfate	2,530	mg/L	52.7	meq/L	5	EPA 300.0	12/20/99	0800	BJ
MAJOR CATIONS									
Calcium	460	mg/L	23.0	meq/L	0.2	EPA 200.7	12/21/99	1433	WL
Magnesium	42.4	mg/L	3.49	meq/L	0.2	EPA 200.7	12/21/99	1433	WL
Potassium	2.5	mg/L	0.06	meq/L	0.2	EPA 200.7	12/21/99	1433	WL
Sodium	804	mg/L	35.0	meq/L	0.2	EPA 200.7	12/21/99	1433	WL
CATION / ANION BALANCE QC INFORMATION									
Cation Sum			61.47	meq/L	0.1	Calculation	12/27/99	1300	BJ
Anion Sum			66.09	meq/L	0.1	Calculation	12/27/99	1300	BJ
Cation/Anion Balance			3.62	%	N/A	N/A			

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.
EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 



Inter-Mountain Laboratories, Inc.

Phone (505) 326-4737 Fax (505) 325-4182

2506 West Main Street, Farmington, NM 87401

Client: **Giant Industries**

Project: **Cation/anion Balance**

Sample ID: **MW-5**

Lab ID: **0399W06037**

Matrix: **Water**

Condition: **Cool/Intact**

Date Received: 12/14/99

Date Reported: 12/28/99

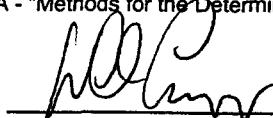
Date Sampled: 12/14/99

Time Sampled: 1430

Parameter	Analytical					PQL	Method	Analysis		
	Result	Units	Units		Date			Time	Init.	
GENERAL PARAMETERS										
pH	6.8	s.u.			0.1	EPA 150.1	12/14/99	1600	JP	
Electrical Conductivity	7,280	µmhos/cm			10	EPA 120.1	12/14/99	1600	JP	
Solids - Total Dissolved	4,880	mg/L			10	EPA 160.1	12/17/99	1140	HR	
Alkalinity as CaCO3	827	mg/L			1	EPA 310.1	12/20/99	0930	BJ	
Hardness as CaCO3	2,110	mg/L			0.2	Calculation	12/27/99	1321	BJ	
MAJOR ANIONS										
Bicarbonate (HCO3)	1,010	mg/L	16.5	meq/L	1	EPA 310.1	12/20/99	0930	BJ	
Carbonate (CO3)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ	
Hydroxide (OH)	<1	mg/L	<0.01	meq/L	1	EPA 310.1	12/20/99	0930	BJ	
Chloride	1,530	mg/L	43.0	meq/L	1	EPA 300.0	12/20/99	0800	BJ	
Sulfate	1,230	mg/L	25.7	meq/L	5	EPA 300.0	12/20/99	0800	BJ	
MAJOR CATIONS										
Calcium	739	mg/L	36.9	meq/L	0.2	EPA 200.7	12/21/99	1436	WL	
Magnesium	64.3	mg/L	5.29	meq/L	0.2	EPA 200.7	12/21/99	1436	WL	
Potassium	5.1	mg/L	0.13	meq/L	0.2	EPA 200.7	12/21/99	1436	WL	
Sodium	960	mg/L	41.8	meq/L	0.2	EPA 200.7	12/21/99	1436	WL	
CATION / ANION BALANCE QC INFORMATION										
Cation Sum			84.06	meq/L	0.1	Calculation	12/27/99	1300	BJ	
Anion Sum			85.26	meq/L	0.1	Calculation	12/27/99	1300	BJ	
Cation/Anion Balance			0.71	%	N/A	N/A				

Reference: EPA - "Methods for Chemical Analysis of Water and Wastes (MCAWW)" - EPA/600/4-79-020 - March, 1983.

EPA - "Methods for the Determination of Metals in Environmental Samples" - Supplement I - 600/R-94-111 - May, 1994.

Reviewed By: 

Chain of Custody Record

(505) 326-2262 Phone
(505) 326-2388 FAX

COC Serial No. C 2408

Relinquished by:		Received By:	
Signature	Date	Time	Signature
Mary Ellen	12-14-99	6:32	[Signature]

Samples Iced: ☒ Yes ☐ No		Carrier:	Airbill No.
Preservatives (ONLY for Water Samples) ☐ Cyanide Sodium hydroxide (NaOH) ☐ Volatile Organic Analysis Hydrochloric acid (HCl) ☐ Metals Nitric acid (HNO ₃) ☐ TPH (418.1) Sulfuric acid (H ₂ SO ₄) ☐ Other (Specify) _____ ☐ Other (Specify) _____		Shipping and Lab Notes: INVOICE GIANT DIRECTLY. GIANT INDUSTRIES ARIZONA ATTN: TOM KINNEY 111 CR 4490 BLOOMFIELD, NM 87413	

