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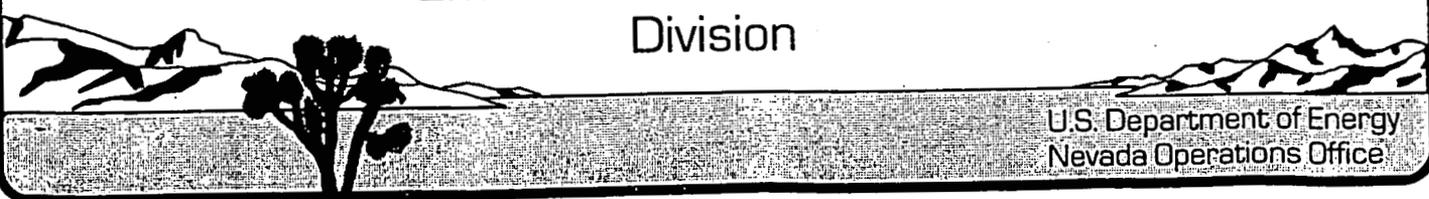


Rulison Site Groundwater Monitoring Report First and Second Quarters, 1996

November 1996

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**Rulison Site
Groundwater Monitoring Report
First and Second Quarters, 1996**

DOE Nevada Operations Office
Las Vegas, Nevada

November 1996

**RULISON SITE
GROUNDWATER MONITORING REPORT
FIRST and SECOND QUARTERS, 1996**

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List of Acronyms and Abbreviations

AEC	U.S. Atomic Energy Commission
Austral	Austral Oil Company
BTEX	Benzene, toluene, ethylbenzene, and xylenes
COPC	Constituent(s) of potential concern
DOE	U.S. Department of Energy
EPA ORIA RSL	U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, Radiation Sciences Laboratory
ft	Foot (feet)
H ₂ SO ₄	Sulfuric acid
HCl	Hydrochloric acid
HNO ₃	Nitric acid
km	Kilometer(s)
LTGMP	Long-Term Groundwater Monitoring Plan
m	Meter(s)
mL	Milliliter(s)
mi	Mile(s)
MS/MSD	Matrix spike and matrix spike duplicate
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RPD	Relative percent difference(s)
SGZ	Surface Ground Zero
TPH	Total petroleum hydrocarbons
TDS	Total dissolved solids
TSS	Total suspended solids
VOC	Volatile Organic Compound
°C	Degree(s) Celsius
µg/L	Microgram(s) per liter

1.0 Introduction

This report summarizes the results of the first and second quarter 1996 groundwater sampling events for the Rulison Site, which is located approximately 65 kilometers (km) (40 miles [mi]) northeast of Grand Junction, Colorado. The sampling events were performed as part of a quarterly groundwater monitoring program implemented by the U.S. Department of Energy (DOE) to monitor the effectiveness of remediation of a drilling effluent pond located at the site. The effluent pond was used for the storage of drilling mud during drilling of the emplacement hole for a 1969 gas stimulation test conducted by the U.S. Atomic Energy Commission (AEC), the predecessor agency to the DOE, and Austral Oil Company (Austral).

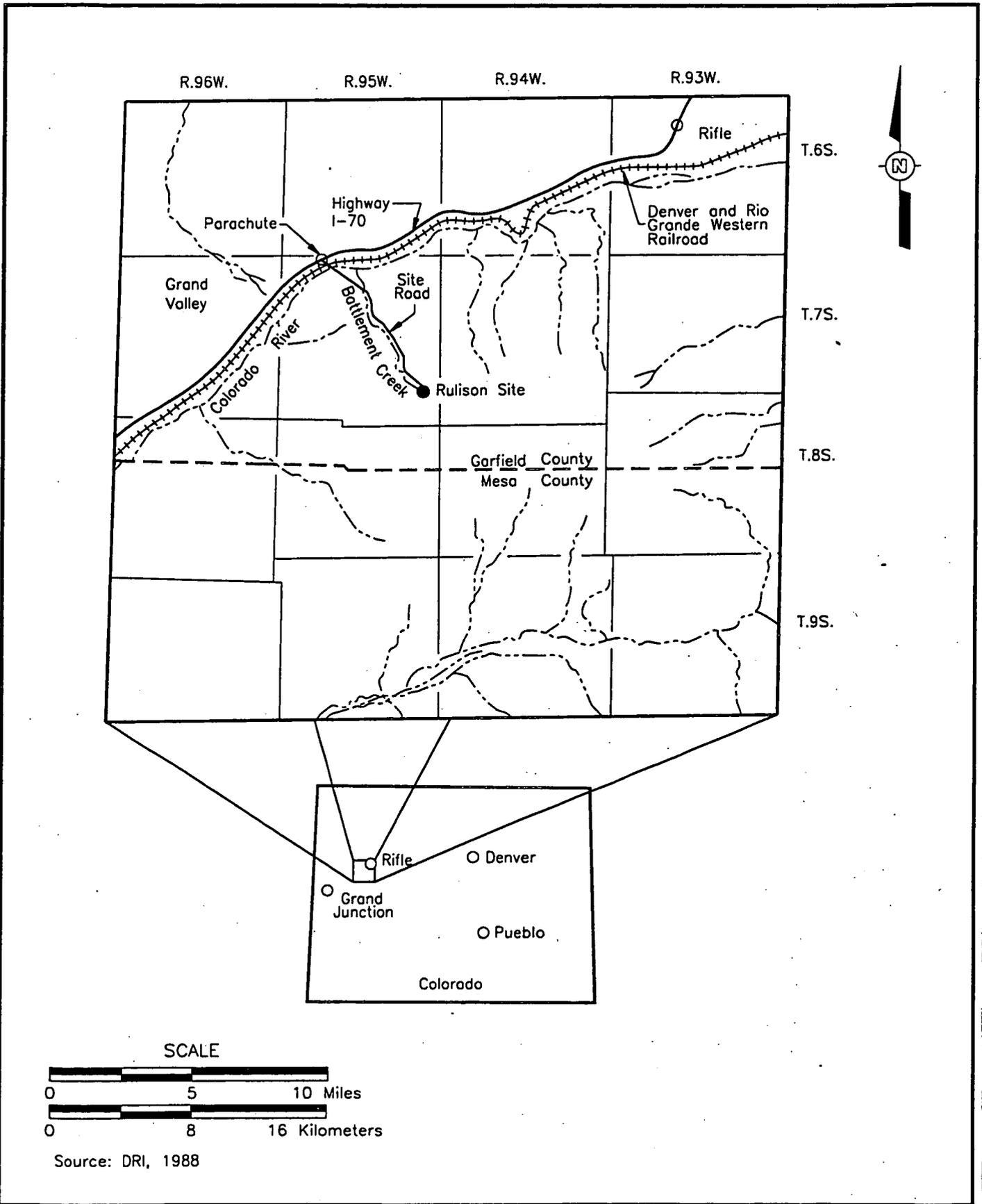
1.1 Site Location

The Rulison Site is located in the North $\frac{1}{2}$ of the Southwest $\frac{1}{4}$ of Section 25, Township 7 South, Range 95 West of the 6th Principal Meridian, Garfield County, Colorado, approximately 19 km (12 mi) southwest of Rifle, Colorado, and approximately 65 km (40 mi) northeast of Grand Junction, Colorado (Figure 1-1). The site is situated on the north slope of Battlement Mesa on the upper reaches of Battlement Creek, at an elevation of approximately 2,500 meters (m) (8,200 feet [ft]). The valley is open to the north-northwest and is bounded on the other three sides by steep mountain slopes that rise to elevations above 2,927 m (9,600 ft).

1.2 Project Description and Background

Project Rulison was a joint AEC and Austral experiment, conducted under the AEC's Plowshare Program, to evaluate the feasibility of using a nuclear device to stimulate natural gas production in low-permeability gas-producing geologic formations. The experiment was conducted on September 10, 1969, and consisted of detonating a 40-kiloton nuclear device at a depth of 2,568 m (8,426 ft) below ground surface. Natural gas production testing was conducted in 1970 and 1971.

The site was deactivated by the AEC and Austral in 1972, and abandoned in 1976. Cleanup associated with site abandonment consisted of removing all remaining equipment and materials, plugging the emplacement (Well R-E) and reentry (Well R-EX) wells (Figure 1-2), backfilling the mud pits adjacent to Well R-EX, removing the tritium-contaminated soils, and conducting extensive surface soil sampling and analysis to characterize the radiological condition of the site.



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**Figure 1-1
Rulison Site Location Map**

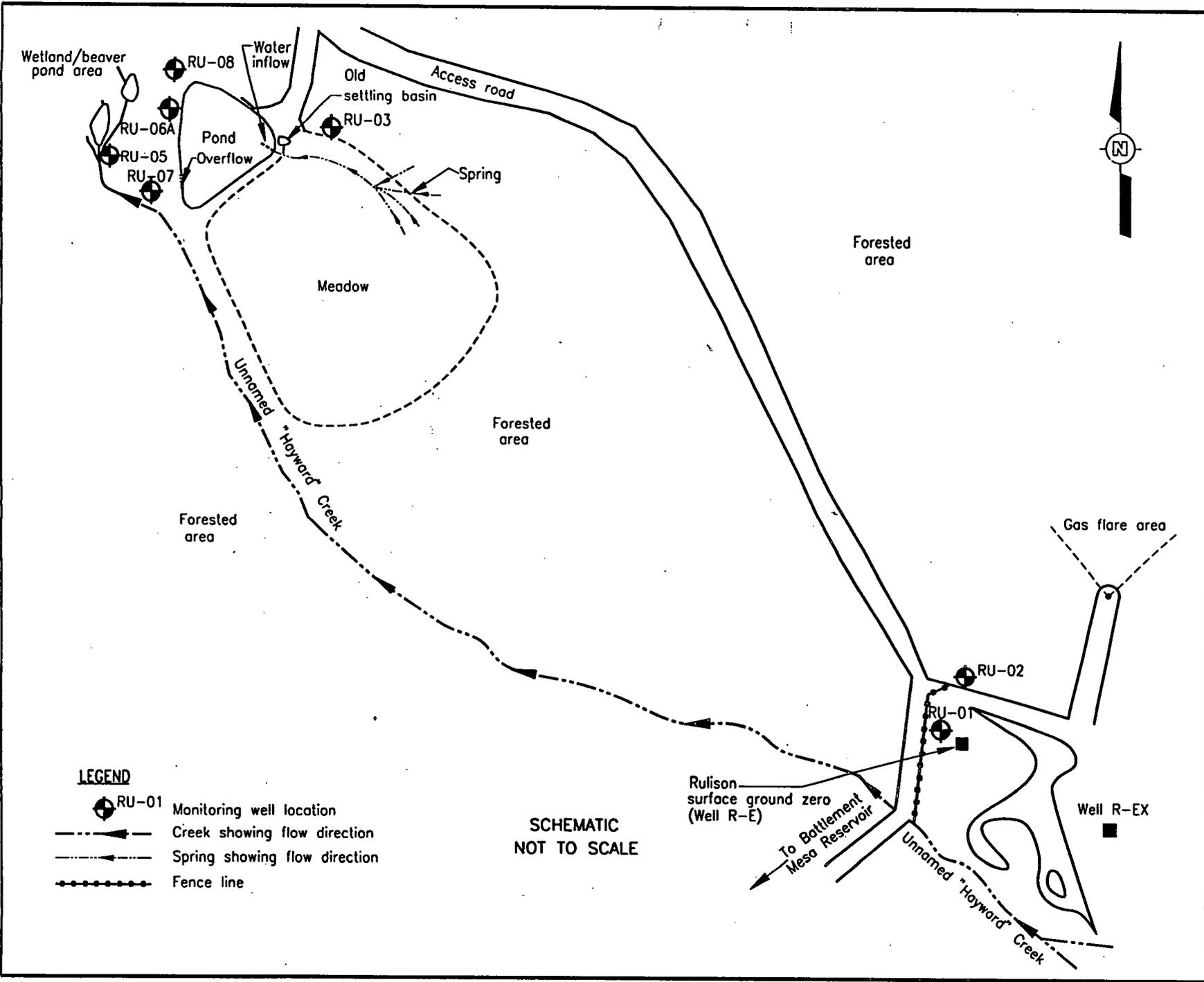


Figure 1-2
Monitoring Well Locations

Detailed descriptions of the site deactivation and abandonment activities and radiological characterizations are presented in the *Rulison Site Cleanup Report* (AEC, 1973), the *Project Rulison Well Plugging and Site Abandonment Final Report* (ERDA, 1977), and the *Rulison Radiation Contamination Clearance Report* (Eberline, 1977).

The drilling effluent pond is an engineered structure located approximately 400 m (1,312 ft) north-northwest of the surface ground zero (SGZ) emplacement well (Well R-E) (Figure 1-2). The pond covers approximately 0.5 hectare (1.2 acre) as measured at the top of the berm, is triangular in shape, and is approximately 6 m (20 ft) deep from the top of the berm to the pond bottom. The drilling effluent pond was used to store nonradioactive drilling fluids generated during drilling of the device emplacement Well R-E. The drilling fluids consisted of bentonite drilling mud that contained various additives, such as diesel fuel and chrome lignosulfonate, used to improve drilling characteristics. Most of the drilling wastes were removed from the pond when the site was cleaned up and decommissioned in 1976; however, some drilling fluid was left in the pond. At the request of the property owner, the pond structure was left in place following completion of site decommissioning and was subsequently converted by the property owner to a freshwater holding pond containing aquatic vegetation, amphibians, and stocked rainbow trout.

In 1994 and 1995, four pond sediment sampling events were conducted to evaluate the extent of residual contamination from drilling wastes remaining in the pond. Concentrations of diesel-range total petroleum hydrocarbons (TPH); benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds); barium; chromium; and lead were found in pond sediment samples and soil samples taken from an old settling basin located adjacent to the pond. Based on the results of the 1994 and 1995 sampling events, the DOE decided to conduct a voluntary cleanup action at the pond to reduce the levels of TPH and chromium in pond sediments and soils in and adjacent to the pond. The cleanup was completed in November 1995. One upgradient monitoring well (RU-3 on Figure 1-2) and four downgradient monitoring wells (RU-05, RU-06A, RU-07, and RU-08) were installed around the pond to monitor the effectiveness of the cleanup. A detailed description of pond cleanup and well installation is presented in the *Rulison Site Corrective Action Report* (DOE, 1996a).

1.3 Summary of Site Activities

1.3.1 First Quarter Sampling Event

The first quarter 1996 groundwater sampling event was conducted on April 10-11, 1996 by representatives from the DOE and the U.S. Environmental Protection Agency, Office of Radiation and Indoor Air, Radiation Sciences Laboratory (EPA ORIA RSL). The weather was mostly cloudy with occasional snow, and access to the site was difficult due to snow and mud on the road.

Upon arrival at the site, it was found that the locks on Wells RU-03 and RU-08 were not locked, and there was a plastic bag as a well cap for Well RU-08 instead of the polyvinyl chloride (PVC) cap originally installed. In addition, Well RU-07 was dry, and therefore was not sampled. No other unusual observations were made, and no problems were experienced during the sampling event. All well locks were replaced following completion of the sampling event.

1.3.2 Second Quarter Sampling Event

The second quarter 1996 groundwater sampling event was conducted on June 4-5, 1996 by representatives from EPA ORIA RSL. The weather was sunny and dry. Well RU-07 was dry, and therefore was not sampled. No other unusual observations were made, and no problems were experienced during the sampling event.

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2.0 Sampling and Analysis Procedures

The first and second quarter 1996 groundwater sampling events were conducted in general accordance with the *Rulison Drilling Effluent Pond Site Long-Term Groundwater Monitoring Plan* (LTGMP) (DOE, 1996b) and the *Rulison Site Quality Assurance Project Plan, Rulison Site, Colorado* (QAPP) (DOE, 1996c).

2.1 Groundwater Level Measurement

Before purging and sampling activity at each well, the depth to groundwater and total depth of the well were measured. This information was used to calculate the appropriate purge volume and to allow evaluation of any potential changes to groundwater flow direction since the previous sampling event.

2.2 Well Purging

Monitoring wells were purged of stagnant groundwater using a bailer. The purge water was discharged to the ground under Colorado Wastewater Discharge Permit No. COG-310084 as approved by the Colorado Department of Public Health and Environment, Water Quality Control Division (see Appendix A).

2.3 Sample Collection and Handling

Groundwater samples were collected from wells RU-03, RU-05, RU-06A, and RU-08 with a disposable bottom-emptying bailer. For quality control (QC) purposes, one duplicate sample, one matrix spike and matrix spike duplicate sample (MS/MSD), and one equipment rinse sample were collected during each sampling event. In addition, a trip blank accompanied all volatile organic samples in their shipping container. Samples were containerized and preserved as specified in Table 2-1. All containers were certified clean by the laboratory and remained sealed until ready for use.

2.4 Sample Analysis

The groundwater samples from both sampling events were analyzed for the parameters listed in Table 2-1. These parameters included the constituents of potential concern (COPC) identified for the drilling effluent pond sediments (TPH, BTEX, barium, chromium, and lead). The samples collected during both sampling events for metals analyses were preserved in the field and filtered in the laboratory before analysis, rather than analyzed for total constituent

concentrations as specified in the Rulison LTGMP (DOE, 1996b) and QAPP (DOE, 1996c). In addition, samples were not collected during either sampling event for total suspended solids (TSS) and total dissolved solids (TDS) analyses, as specified in the Rulison LTGMP and QAPP.

**Table 2-1
Rulison Site Groundwater Monitoring Program
Sample Container, Preservation, and Analytical Requirements**

Parameter	Analytical Method	Sample Container	Minimum Amount of Sample Required	Holding Time	Preservative ^a
BTEX	SW-846 ^b 8020	Glass with Teflon™- lined cap	2 x 40 mL	14 days	pH <2 with HCl Cool to 4°C
TPH (diesel fraction)	SW-846 8015M ^c	Glass	1 Liter	14 days	pH <2 with H ₂ SO ₄ Cool to 4°C
RCRA ^d Metals	SW-846 6010/ 7470	Glass or Polyethylene	1 Liter	180 days	HNO ₃ to pH <2 Cool to 4°C
pH	Field	Glass or Polyethylene	25 mL	Analyze Immediately	None

^aHolding time calculated from verified time of sample collection. Holding time for mercury is 28 days.

^bU.S. Environmental Protection Agency, SW-846 *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods*, 3rd Edition (EPA, 1990)

^cEPA SW-846, modified according to the California State Water Resources Control Board, *Leaking Underground Fuel Tank Field Manual, Guidelines for Site Assessment, Cleanup, and Underground Storage Tank Closure*, Appendix B (1989)

^dResource Conservation and Recovery Act

mL = Milliliter

HCl = Hydrochloric acid

H₂SO₄ = Sulfuric acid

HNO₃ = Nitric acid

°C = Degrees Celcius

3.0 Analytical Results

The analytical results for the COPC for the pond cleanup (diesel-range TPH, BTEX, barium, chromium, and lead) are presented in Table 3-1. The results for all analytes for the first quarter sampling event are included as Appendix B, and they are included for the second quarter sampling event as Appendix C. The analytical data have not been formally validated, although a limited review of the analytical raw data for laboratory method blanks was performed to ensure that the COPC concentrations reported for the groundwater samples were representative of groundwater quality rather than laboratory contamination. The following sections provide a discussion of the first and second quarter 1996 groundwater sampling results.

3.1 BTEX

Benzene, toluene, ethylbenzene, and total xylenes (BTEX compounds) were not detected in any of the groundwater samples from the first or second quarter sampling events.

3.2 Diesel-Range TPH

The first quarter samples from Wells RU-05 and RU-08 appeared to contain diesel-range TPH. However, the laboratory indicated that they had intermittent problems with laboratory contamination in diesel-range TPH analyses, and that the substance detected in the groundwater samples was similar to the laboratory contaminant. As described in the laboratory report included in Appendix B, the samples from Wells RU-05 and RU-08 were reextracted and reanalyzed to confirm the initial results. Diesel-range TPH was not detected in either of the reanalyzed samples, which supports the presence of laboratory contamination in the initial samples. Table 3-1 contains the results of the reanalyses, which have been qualified with a "J" to indicate that the results are estimates due to the exceedance of holding times. Diesel-range TPH was not detected in any of the other samples from the first quarter sampling event.

Diesel-range TPH was detected in the second quarter sample from Well RU-06A at a concentration of 71 micrograms per liter ($\mu\text{g/L}$), which was below the laboratory's reporting limit of 94 $\mu\text{g/L}$. The field duplicate from Well RU-06A also appeared to contain diesel-range TPH. However, the substance detected in the sample duplicate strongly resembled the laboratory contamination detected in the first quarter samples from Wells RU-05 and RU-08. In addition, as discussed in Section 4.1, the relative percent difference (RPD) in diesel-range TPH concentrations from the RU-06A sample and sample duplicate was significantly outside of the

Table 3-1
Rulison Site Groundwater Analytical Results:
First and Second Quarters, 1996
 (All results in µg/L)
 (Page 1 of 2)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
TPH - Diesel								
RU-03	100U	94U						
RU-05	100UJ ¹	94U						
RU-06A	100U	71R						
RU-07	NS	NS						
RU-08	100UJ ¹	94U						
Benzene								
RU-03	0.5U	0.5U						
RU-05	0.5U	0.5U						
RU-06A	0.5U	0.5U						
RU-07	NS	NS						
RU-08	0.5U	0.5U						
Toluene								
RU-03	0.5U	0.5U						
RU-05	0.5U	0.5U						
RU-06A	0.5U	0.5U						
RU-07	NS	NS						
RU-08	0.5U	0.5U						
Ethylbenzene								
RU-03	0.5U	0.5U						
RU-05	0.5U	0.5U						
RU-06A	0.5U	0.5U						
RU-07	NS	NS						
RU-08	0.5U	0.5U						
Xylenes (total)								
RU-03	0.5U	0.5U						
RU-05	0.5U	0.5U						
RU-06A	0.5U	0.5U						
RU-07	NS	NS						
RU-08	0.5U	0.5U						

3-2

Table 3-1
Rulison Site Groundwater Analytical Results:
First and Second Quarters, 1996
 (All results in µg/L)
 (Page 2 of 2)

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
Barium								
RU-03	120	110						
RU-05	360	120						
RU-06A	120	120						
RU-07	NS	NS						
RU-08	350	140						
Chromium								
RU-03	10U	10U						
RU-05	24	10U						
RU-06A	10U	10U						
RU-07	NS	NS						
RU-08	10U	10U						
Lead								
RU-03	5.6U	3U						
RU-05	13U	3U						
RU-06A	3U	3U						
RU-07	NS	NS						
RU-08	12U	3U						
Selenium								
RU-03	16	14						
RU-05	7.2	6						
RU-06A	12	20						
RU-07	NS	NS						
RU-08	12	22						

NS = Well dry - no sample collected

U = Analyte not detected above the specified value

R = Quality control indicates that the data are unusable (compound may or may not be present)

J = Reported value is estimated:

¹ Sample analysis exceeded holding time

acceptance criterion. Due to the apparent presence of laboratory contamination in the RU-06A sample duplicate and the significant exceedance of the RPD criterion for diesel-range TPH between the sample and the sample duplicate, the RU-06A sample result has been qualified with an "R" to indicate that the result is not usable for detection monitoring purposes. Diesel-range TPH was not detected in any of the other samples from the second quarter sampling event.

3.3 Inorganics

The first quarter samples from all wells contained dissolved barium and selenium. In addition, the sample from Well RU-05 contained dissolved chromium. The laboratory also reported positive dissolved lead concentration values for the samples from all wells. However, lead was also present in the laboratory method blanks analyzed with the samples. None of the sample results for dissolved lead were greater than five times the highest blank concentration, so the lead results have been qualified with a "U" (not detected at the specified value) at the reported value in accordance with the procedures set forth in the *USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA, 1994). No other inorganic constituents were detected in the samples.

The second quarter samples from all wells contained dissolved barium and dissolved selenium. No other inorganic constituents were detected in the samples.

There currently are insufficient data to establish concentration trends or to determine whether dissolved barium and selenium concentrations in the downgradient wells are significantly elevated above the upgradient concentration. Statistical trends will be calculated as data are acquired from additional quarterly sampling events. Selenium was not identified as a COPC for pond cleanup, and its presence in the upgradient well at concentrations similar to those reported for the downgradient wells suggests that it is of local natural origin rather than leached from the pond sediments. However, selenium concentrations will be included in the statistical evaluation to verify that its presence is due solely to natural sources.

3.4 Groundwater Flow

Groundwater depth and elevation data from the two sampling events are presented in Table 3-2. Based on the groundwater elevation data, it appears that groundwater flow during both quarterly sampling events was generally towards the northwest. Under these flow conditions, Well RU-03 is upgradient from the pond, and Wells RU-05, RU-06A, and RU-08 are downgradient from the pond.

**Table 3-2
Rulison Site Groundwater Elevations:
First and Second Quarters, 1996**

Well	First Quarter 1996	Second Quarter 1996	Third Quarter 1996	Fourth Quarter 1996	First Quarter 1997	Second Quarter 1997	Third Quarter 1997	Fourth Quarter 1997
Depth to Water								
RU-03	10.56m (34.65 ft)	6.81m (22.33 ft)						
RU-05	2.35m (7.71ft)	1.96m (6.42ft)						
RU-06A	4.74m (15.56ft)	4.38m (14.38ft)						
RU-07	Dry	Dry						
RU-08	1.78m (5.85ft)	1.70m (5.58ft)						
Groundwater Elevation								
RU-03	2444.29m (8019.33ft)	2448.05m (8031.65ft)						
RU-05	2433.95m (7985.41ft)	2434.35m (7986.70ft)						
RU-06A	2430.10m (7972.78ft)	2430.46m (7973.96ft)						
RU-07	< 2438.91m (< 8001.67ft)	< 2438.91m (< 8001.67ft)						
RU-08	2429.05m (7969.33ft)	2429.13m (7969.60ft)						

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4.0 Quality Control Results

Field and laboratory quality control (QC) sample requirements and acceptance criteria are specified in the Rulison QAPP (DOE, 1996c). The laboratory narratives for the first and second sampling round analytical results included in Appendices B and C provide a summary of the results for laboratory QC samples required under the various analytical methods used for the project. The following sections describe the results for field QC samples that are not covered by the laboratory narratives because they are not explicit requirements under the analytical methods used, but are required for field sampling under the Rulison QAPP (DOE, 1996c).

4.1 Field Duplicate Samples

Field duplicate samples are used to monitor the variability associated with sample collection procedures and to provide estimates of the total sampling and analytical precision. A duplicate sample was collected from Well RU-06A during each sampling event. The relative percent differences (RPDs) between analytes detected in the original samples and the same analytes detected in the associated field duplicate samples were calculated and compared against the precision acceptance criteria specified in the Rulison QAPP (DOE, 1996c). The sample and sample duplicate results, calculated RPDs, and precision acceptance criteria are presented in Table 4-1.

Barium and selenium were the only analytes detected in the first quarter RU-06A sample and sample duplicate. The RPD for barium (0 percent) was within the precision acceptance criterion of ± 20 percent specified in the Rulison QAPP (DOE, 1996c). The RPD for selenium (-2 percent) was slightly outside of the precision acceptance criterion of ± 20 percent. Although the RPD for selenium exceeded its acceptance criterion, the exceedance was not great enough to significantly affect the quality of the data.

Diesel-range TPH, barium, and selenium were the only analytes detected in the second quarter RU-06A sample and sample duplicate. The RPDs for barium and selenium (9 and 11 percent, respectively) were within the precision acceptance criteria of ± 20 percent specified in the Rulison QAPP (DOE, 1996c). The RPD for diesel-range TPH (-114 percent) was significantly outside of the precision acceptance criterion of ± 40 percent. However, as discussed in Section 3.2, the substance detected in the sample duplicate strongly resembled the laboratory

Table 4-1
Rulison Site Groundwater Monitoring Program
Duplicate Sample Comparison:
First and Second Quarters, 1996
 (All results in µg/L)

Analyte	First Quarter 1996			Second Quarter 1996			RPD Acceptance Criterion
	Sample	Sample Duplicate	RPD ¹	Sample	Sample Duplicate	RPD ¹	
TPH	100U	100U	ND	71	260	-114	± 40
Benzene	0.5U	0.5U	ND	0.5U	0.5U	ND	± 11 to 24
Toluene	0.5U	0.5U	ND	0.5U	0.5U	ND	± 11 to 24
Ethylbenzene	0.5U	0.5U	ND	0.5U	0.5U	ND	± 11 to 24
Xylenes	0.5U	0.5U	ND	0.5U	0.5U	ND	± 11 to 24
Arsenic	17U	18U	ND	24U	27U	ND	± 20
Barium	120	120	0	120	110	9	± 20
Cadmium	5U	5U	ND	5U	5U	ND	± 20
Chromium	10U	10U	ND	10U	10U	ND	± 20
Lead	3U	3U	ND	3U	3U	ND	± 20
Mercury	0.2U	0.2U	ND	0.2U	0.2U	ND	± 20
Selenium	12	15	-22	20	18	11	± 20
Silver	10U	10U	ND	10U	10U	ND	± 20

¹ Relative percent difference

U = Analyte not detected above the specified value

ND = Not determined

contamination detected in the first quarter samples from Wells RU-05 and RU-08. Because of the large RPD and the apparent presence of laboratory contamination in the Well RU-06A sample duplicate, it is not clear whether the diesel-range TPH concentration of 71 µg/L reported for the sample from Well RU-06A is representative of groundwater quality or is an artifact reflecting laboratory contamination.

4.2 Equipment Rinsate Blank Samples

Equipment rinsate blanks are used to monitor potential cross-contamination associated with inadequate equipment decontamination procedures. An equipment rinsate blank was collected at the end of each sampling event. The laboratory reported a positive concentration value for lead in the rinsate sample from the first quarter sampling event. However, the reported concentration was less than five times the concentration of lead found in the associated laboratory method blanks, so it is likely that the lead found in the rinsate blank was the result of laboratory contamination rather than inadequate sampling equipment decontamination. No other analytes were detected in the rinsate blank from the first quarter sampling event.

The laboratory reported a positive concentration for diesel-range TPH in the rinsate sample from the second quarter sampling event. However, the substance detected in the rinsate sample strongly resembled the laboratory contamination detected in the first quarter groundwater samples from Wells RU-05 and RU-08, so it is likely that the diesel-range TPH found in the rinsate blank was the result of laboratory contamination rather than inadequate sampling equipment decontamination. No other analytes were detected in the rinsate blank from the second quarter sampling event.

4.3 Trip Blank Samples

Trip blanks are used to monitor potential volatile organic compound (VOC) cross-contamination introduced into VOC sample containers through diffusion during sample shipment and storage. Trip blank samples were placed in each shipping container used for shipping BTEX samples. BTEX compounds were not detected in the trip blank from the first quarter sampling event. Toluene was detected in the trip blank from the second quarter sampling event; however since toluene was not detected in any monitoring well sample from the second quarter, its presence in the trip blank does not affect the quality of the data.

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5.0 Summary and Conclusions

The analytical data from the first and second quarter 1996 groundwater sampling events indicate that migration of contaminants from the drilling effluent pond sediments currently does not appear to be occurring. The following is a summary of the first and second quarter 1996 groundwater sample results:

BTEX Compounds: BTEX compounds were not detected in any of the first or second round groundwater samples.

Diesel-Range TPH: Diesel-range TPH, other than that suspected to represent laboratory contamination, was not detected in any of the first or second round groundwater samples.

Inorganics: Dissolved barium and dissolved selenium were the only inorganic constituents detected in both the first and second round groundwater samples. Dissolved chromium was detected in the first round sample from one monitoring well (RU-05), but the second round sample from the same well did not contain a detectable concentration of chromium. As discussed in Section 3.3, there currently are insufficient data to establish concentration trends or to determine whether dissolved barium and selenium concentrations in the downgradient wells are significantly elevated above the upgradient concentration. Statistical trends will be calculated as data are acquired from additional quarterly sampling events

As discussed in Section 2.4, the samples collected during both sampling events for metals analyses were preserved in the field and filtered in the laboratory before analysis, rather than being analyzed for total constituent concentrations as specified in the Rulison LTGMP (DOE, 1996b) and QAPP (DOE, 1996c). In addition, samples were not collected during either sampling event for TSS and TDS analyses, as specified in the Rulison LTGMP and QAPP. Beginning with the fourth quarter 1996 sampling event, samples will be analyzed for total metals and for TSS and TDS as specified in the plans.

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6.0 References

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Appendix A

Purge Water Discharge Permit

03-19-1996 17:39 702 2951113
03/19/1996 16:35 303-782-0390

DCE/ERO
CUH WOOD WOOD

P. 03
PAGE 02

STATE OF COLORADO

Roy Romo, Governor
Paul Shweydet, Acting Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80222-1530
Phone (303) 692-7000

Laboratory Building
4210 E. 11th Avenue
Denver, Colorado 80220-3716
(303) 691-4700



Colorado Department
of Public Health
and Environment

March 19, 1996

Mr. Kevin D. Leary
DOE

Subject: Reply to request for addition of source to permit COG-310084.

Dear Mr. Leary:

The Division has received and reviewed your fax of 3/19/96. Since the wells described in your fax are in such close proximity to the pond that the permit was designed to provide dewatering conditions for, the Division will allow the wells to be dewatered using the same discharge point as described in the permit. Please follow the same conditions and monitoring schedule as described in the permit. The Division realizes that due to the small amount of water in question, the water might not be of sufficient flow to reach the discharge point. Any future purgings of the water from these wells are covered by this letter and the permit noted above as long as the permit remains active and conditions, monitoring schedule and reporting procedure are followed.

Please feel free to call me at (303)+692-3593 with questions or comments.

Sincerely,

A handwritten signature in black ink, appearing to read "Tom Boyce".

Tom Boyce
Environmental Protection Specialist
Permits and Enforcement
WATER QUALITY CONTROL DIVISION

cc:file

Appendix B

First Quarter Analytical Results

Quanterra Incorporated
4955 Yarrow Street
Arvada, Colorado 80002

303 421-6611 Telephone
303 431-7171 Fax

EXECUTIVE SUMMARY
FOR
ENVIRONMENTAL PROTECTION AGENCY - LAS VEGAS
QUANTERRA NO. 048293

MAY 10, 1996

Prepared by:



Lisa L. Anderson

Reviewed by:



Ellen LaRiviere

I. EXECUTIVE OVERVIEW

On April 12, 1996, Quanterra Environmental Services, Denver received seven aqueous samples from the Environmental Protection Agency - Las Vegas.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

Overview

Sample Description Information/Analytical Test Requests

Analytical Results

Quality Control Report

Volatile Organics by Chromatography

Samples 048293-0001 through -0006 were analyzed for Gasoline Range Organics (GROs) by Method 8020.

Semivolatile Organics by Gas Chromatography

Samples 048293-0001 through -0005 were analyzed for extractable petroleum hydrocarbons by Method GC/FID.

Because the laboratory has seen some intermittent laboratory contamination in the Diesel Range Organic analyses, laboratory contamination was suspected in samples 048293-0004 and -0005, and the associated Laboratory Control Sample (LCS). Peaks similar to those observed in other known contaminated samples were seen in the chromatograms for samples -0004-SA and -0005-SA and resulted in positive extractable petroleum hydrocarbon results for these samples. The client was notified on May 6, 1996 and advised the laboratory to re-extract and analyze the samples outside of holding time to confirm the results. The samples extracted outside of holding time, reported as samples 048293-0004-RE and -0005-RE, contained no extractable petroleum hydrocarbons, indicating that contamination had, in fact, occurred in the original preparation of the samples.

Metals

Samples 048293-0001 through -0005, and -0007 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470. The samples were preserved in the field and filtered in the laboratory prior to analysis. The results for these samples may be biased high due to potential metals leaching from particulate matter present in the samples.

Reporting limits were raised for Arsenic by Trace-ICP for samples 048293-0001 through -0004 due to matrix interference.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.



Environmental
Services

SAMPLE DESCRIPTION INFORMATION
for
EPA L.V. Nevada

Lab ID	Client ID	Matrix	Sampled Date	Time	Received Date
048293-0001-SA	WELL RU-03	AQUEOUS	11 APR 96	14:40	12 APR 96
048293-0002-SA	WELL RU-6A	AQUEOUS	11 APR 96	15:35	12 APR 96
048293-0003-SA	WELL RU-4A	AQUEOUS	11 APR 96	15:50	12 APR 96
048293-0004-SA	WELL RU-8	AQUEOUS	11 APR 96	16:25	12 APR 96
048293-0005-SA	WELL RU-5	AQUEOUS	11 APR 96	17:00	12 APR 96
048293-0006-TB	TRIP BLANK	AQUEOUS	11 APR 96	16:25	12 APR 96
048293-0007-EB	EQUIPMENT RINSEATE	AQUEOUS	11 APR 96	17:10	12 APR 96



Environmental
Services

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
Client ID: WELL RU-03
Lab ID: 048293-0001-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Prepared: See Below

Received: 12 APR 96
Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.017	mg/L	6010	NA	23 APR 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.0056		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.016		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban.

Approved By: Richard Persichitte

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: WELL RU-5
 Lab ID: 048293-0005-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 96

Sampled: 11 APR 96
 Prepared: See Below

Received: 12 APR 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.010	mg/L	6010	NA	23 APR 96
Barium	0.36		1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	0.024		1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.013		1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.0072		1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND		1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND		1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: WELL RU-6A
 Lab ID: 048293-0002-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 96

Sampled: 11 APR 96
 Prepared: See Below

Received: 12 APR 96
 Analyzed: See Below

Parameter	Result Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND	1.0	0.017	mg/L	6010	NA	23 APR 96
Barium	0.12	1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND	1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	ND	1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.012	1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND	1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: WELL RU-4A
 Lab ID: 048293-0003-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 96

Sampled: 11 APR 96
 Prepared: See Below

Received: 12 APR 96
 Analyzed: See Below

Parameter	Result Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND	1.0	0.018	mg/L	6010	NA	23 APR 96
Barium	0.12	1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND	1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	ND	1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.015	1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND	1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: WELL RU-8
 Lab ID: 048293-0004-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 96

Sampled: 11 APR 96
 Prepared: See Below

Received: 12 APR 96
 Analyzed: See Below

Parameter	Result Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND	1.0	0.011	mg/L	6010	NA	23 APR 96
Barium	0.35	1.0	0.010	mg/L	6010	NA	22 APR 96
Cadmium	ND	1.0	0.0050	mg/L	6010	NA	22 APR 96
Chromium	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Lead	0.012	1.0	0.0030	mg/L	6010	NA	23 APR 96
Selenium	0.012	1.0	0.0050	mg/L	6010	NA	23 APR 96
Silver	ND	1.0	0.010	mg/L	6010	NA	22 APR 96
Mercury	ND	1.0	0.00020	mg/L	7470	25 APR 96	25 APR 96

ND = Not Detected

Reported By: Adam Alban

Approved By: Richard Persichitte

Gasoline Range Organics and Selected Components
Method API GRO



Environmental
Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-03
Lab ID: 048293-0001-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO



Environmental
Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-6A
Lab ID: 048293-0002-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO



Client Name: EPA L.V. Nevada
 Client ID: WELL RU-5
 Lab ID: 048293-0005-SA
 Matrix: AQUEOUS
 Authorized: 12 APR 96

Sampled: 11 APR 96
 Received: 12 APR 96

Prepared: NA
 Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO



Client Name: EPA L.V. Nevada
Client ID: WELL RU-4A
Lab ID: 048293-0003-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	105	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

Gasoline Range Organics and Selected Components
Method API GRO



Environmental
Services

Client Name: EPA L.V. Nevada
Client ID: WELL RU-8
Lab ID: 048293-0004-SA
Matrix: AQUEOUS
Authorized: 12 APR 96

Sampled: 11 APR 96
Received: 12 APR 96

Prepared: NA
Analyzed: 16 APR 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a, a, a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Tina Carroll

Approved By: Audrey Cornell

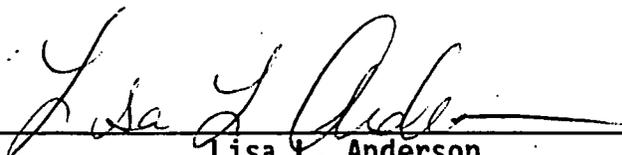
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Appendix C

Second Quarter Analytical Results

EXECUTIVE SUMMARY
FOR
ENVIRONMENTAL PROTECTION AGENCY - LAS VEGAS
QUANTERRA NO. 049429
JUNE 20, 1996

Prepared by:



Lisa L. Anderson

Reviewed by:



Ellen LaRiviere

I. OVERVIEW

On June 6, 1996, Quanterra Environmental Services, Denver received seven aqueous samples from the Environmental Protection Agency - Las Vegas.

This report presents the analytical results as well as supporting information to aid in the evaluation and interpretation of the data and is arranged in the following order:

Overview

Sample Description Information/Analytical Test Requests

Analytical Results

Quality Control Report

Metals

Samples 049429-0001 through -0006 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470.

The samples were preserved in the field and filtered in the laboratory prior to analysis. The results for these samples may be biased high due to potential metals leaching from particulate matter present in the samples.

Reporting limits were raised for Arsenic by Trace-ICP for samples 049429-0001, and -0003 through -0005 due to matrix interference (no dilution required).

Percent recoveries for dissolved Selenium and Thallium were above historical control limits in the Matrix Spike/Matrix Spike Duplicate (MS/MSD). Because these metals were within control limits in the Duplicate Control Samples (DCSs), no further action was required.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

Metals

Samples 048293-0001 through -0005, and -0006 were analyzed for dissolved metals by Method 6010 and for dissolved mercury by Method 7470.

Reporting limits were raised for Arsenic by Trace-ICP for samples 048293-0001 through -0004 due to matrix interference.

With the exceptions listed above or on the data sheets, standard analytical protocols were followed in the analyses of the samples and no problems were encountered or anomalies observed. All laboratory QC samples analyzed in conjunction with the samples in this project were within established control limits.

SAMPLE DESCRIPTION INFORMATION
for
EPA L.V. Nevada

Lab ID	Client ID	Matrix	Sampled		Received
			Date	Time	
049429-0001-SA	RU-3 WELL	AQUEOUS	05 JUN 96	09:00	06 JUN 96
049429-0002-SA	RU-5 WELL	AQUEOUS	05 JUN 96	10:30	06 JUN 96
049429-0002-MS	MS/MSD	AQUEOUS	05 JUN 96	10:45	06 JUN 96
049429-0002-SD	MS/MSD	AQUEOUS	05 JUN 96	10:45	06 JUN 96
049429-0003-SA	RU-6A WELL	AQUEOUS	05 JUN 96	09:30	06 JUN 96
049429-0004-SA	RU-8 WELL	AQUEOUS	05 JUN 96	10:00	06 JUN 96
049429-0005-SA	RU-6A(DUP)	AQUEOUS	05 JUN 96	09:45	06 JUN 96
049429-0006-SA	RINSATE SAMPLE	AQUEOUS	05 JUN 96	11:00	06 JUN 96
049429-0007-TB	TRIP BLANK	AQUEOUS	05 JUN 96	11:00	06 JUN 96



Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-3 WELL
Lab ID: 049429-0001-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	103	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID



Client Name: EPA L.V. Nevada
Client ID: RU-3 WELL
Lab ID: 049429-0001-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	109	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Karen Kuiken

**Metals
Dissolved Metals**

Client Name: EPA L.V. Nevada
 Client ID: RU-3 WELL
 Lab ID: 049429-0001-SA
 Matrix: AQUEOUS
 Authorized: 06 JUN 96

Sampled: 05 JUN 96
 Prepared: See Below

Received: 06 JUN 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.019	mg/L	6010	NA	12 JUN 96
Barium	0.11		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.014		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

D = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte



Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-5 WELL
Lab ID: 049429-0002-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	105	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID



Client Name: EPA L.V. Nevada
Client ID: RU-5 WELL
Lab ID: 049429-0002-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	103	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Audrey Cornell

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: RU-5 WELL
 Lab ID: 049429-0002-SA
 Matrix: AQUEOUS
 Authorized: 06 JUN 96

Sampled: 05 JUN 96
 Prepared: See Below

Received: 06 JUN 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.010	mg/L	6010	NA	12 JUN 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.0060		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte

Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-6A WELL
Lab ID: 049429-0003-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	104	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID



Client Name: EPA L.V. Nevada
Client ID: RU-6A WELL
Lab ID: 049429-0003-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit	
Diesel Range Organics	0.071	mg/L	0.094	J
Surrogate	Recovery		Limits	
o-Terphenyl	112	%	47-137	

Dilution factor is 0.94. All results and limits are corrected for dilution.

J = Result is detected below the reporting limit or is an estimated concentration.

Reported By: Don Vieaux

Approved By: Karen Kuiken



Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: RU-6A WELL
 Lab ID: 049429-0003-SA
 Matrix: AQUEOUS
 Authorized: 06 JUN 96

Sampled: 05 JUN 96
 Prepared: See Below

Received: 06 JUN 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.024	mg/L	6010	NA	12 JUN 96
Barium	0.12		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.020		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte



Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-6A(DUP)
Lab ID: 049429-0005-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a, a, a-Trifluorotoluene	103	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID



Client Name: EPA L.V. Nevada
Client ID: RU-6A(DUP)
Lab ID: 049429-0005-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit	
Diesel Range Organics	0.26	mg/L	0.094	q1
Surrogate	Recovery		Limits	
o-Terphenyl	96	%	47-137	

Dilution factor is 0.94. All results and limits are corrected for dilution.

1 = Sample resembles a hydrocarbon product occurring within the n-alkane range of C12-C28.
q = This sample has GC/FID characteristics for which reliable identification of a product could not be achieved.

Reported By: Don Vieaux

Approved By: Karen Kuiken

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: RU-6A(DUP)
 Lab ID: 049429-0005-SA
 Matrix: AQUEOUS
 Authorized: 06 JUN 96

Sampled: 05 JUN 96
 Prepared: See Below

Received: 06 JUN 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.027	mg/L	6010	NA	12 JUN 96
Barium	0.11		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.018		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte



Gasoline Range Organics and Selected Components
Method API GRO

Client Name: EPA L.V. Nevada
Client ID: RU-8 WELL
Lab ID: 049429-0004-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: NA
Analyzed: 10 JUN 96

Parameter	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Toluene	ND	ug/L	0.50
Ethylbenzene	ND	ug/L	0.50
Xylenes (total)	ND	ug/L	0.50
Gasoline Range Organics	ND	ug/L	10
Surrogate	Recovery		Limits
a,a,a-Trifluorotoluene	100	%	75-125

Dilution factor is 1.0. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Corey Crooks

Approved By: Audrey Cornell

Extractable Petroleum Hydrocarbons
Method GC/FID



Client Name: EPA L.V. Nevada
Client ID: RU-8 WELL
Lab ID: 049429-0004-SA
Matrix: AQUEOUS
Authorized: 06 JUN 96

Sampled: 05 JUN 96
Received: 06 JUN 96

Prepared: 11 JUN 96
Analyzed: 13 JUN 96

Parameter	Result	Units	Reporting Limit
Diesel Range Organics	ND	mg/L	0.094
Surrogate	Recovery		Limits
o-Terphenyl	88	%	47-137

Dilution factor is 0.94. All results and limits are corrected for dilution.

ND = Not Detected

Reported By: Don Vieaux

Approved By: Karen Kuiken

Metals
Dissolved Metals

Client Name: EPA L.V. Nevada
 Client ID: RU-8 WELL
 Lab ID: 049429-0004-SA
 Matrix: AQUEOUS
 Authorized: 06 JUN 96

Sampled: 05 JUN 96
 Prepared: See Below

Received: 06 JUN 96
 Analyzed: See Below

Parameter	Result	Qual	Dil	RL	Units	Test Method	Prepared Date	Analyzed Date
Arsenic	ND		1.0	0.024	mg/L	6010	NA	12 JUN 96
Barium	0.14		1.0	0.010	mg/L	6010	NA	17 JUN 96
Cadmium	ND		1.0	0.0050	mg/L	6010	NA	17 JUN 96
Chromium	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Lead	ND		1.0	0.0030	mg/L	6010	NA	12 JUN 96
Selenium	0.022		1.0	0.0050	mg/L	6010	NA	12 JUN 96
Silver	ND		1.0	0.010	mg/L	6010	NA	17 JUN 96
Mercury	ND		1.0	0.00020	mg/L	7470	17 JUN 96	18 JUN 96

ND = Not Detected

Reported By: Matt Hall

Approved By: Richard Persichitte