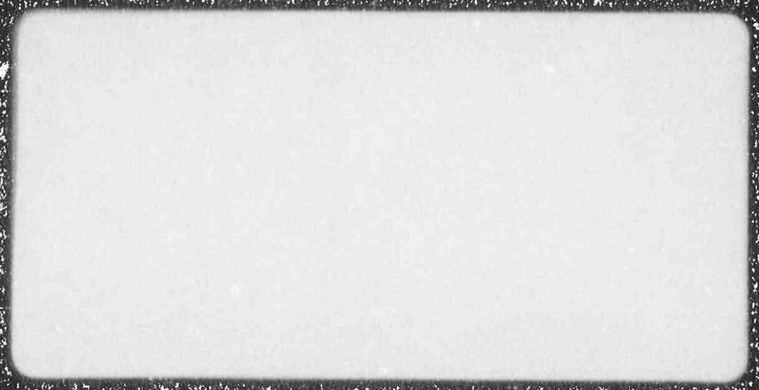


GERAGHTY & MILLER, INC.
Environmental Services

GERAGHTY & MILLER, INC.
Environmental Services

MAIN SAND BACKGROUND EVALUATION REPORT PETROTOMICS COMPANY SHIRLEY BASIN, WYOMING

April 1994

Prepared for
Petrotomics Company

Prepared by
Geraghty & Miller, Inc.
Environmental Services
1099 18th Street, Suite 2100
Denver, Colorado 80202

D. Randy Sipe
Project Scientist

V. Steve Reed
Vice President/Project Officer

CONTENTS

TABLES

FIGURES

APPENDICES

MAIN SAND BACKGROUND EVALUATION REPORT PETROTOMICS COMPANY SHIRLEY BASIN, WYOMING

INTRODUCTION

This document presents the results of a groundwater quality investigation at the Petrotomics Company site in Shirley Basin, Wyoming performed by Geraghty & Miller, Inc., on behalf of Petrotomics Company. This work was conducted to evaluate naturally existing groundwater quality in a sand unit of the Wind River Formation identified as the Main sand. This report is intended to provide information for establishing background monitoring points, a list of constituents to be monitored, and concentration limits for identified constituents for the Main sand as required by License Condition No. 47E, Amendment No. 41, Source Material License SUA-551 issued for the site by the Nuclear Regulatory Commission (NRC) on November 23, 1993.

The report includes a description of the field investigation and a discussion of findings. These sections are followed by a summary of recommendations concerning background monitoring points, constituents to be monitored, and concentration limits for these constituents.

HISTORY

The Petrotomics Company site is located approximately 60 miles southeast of Casper, Wyoming (Figure 1). Uranium ore was mined from several open pits and milled on site from the early 1960s until 1985. The tailings produced from the milling process were placed in an unlined impoundment in the west central portion of the site (Figure 2).

The uranium ore mined at the site was taken from the Tertiary (early Eocene) Wind River Formation that directly underlies most of the site. The Wind River Formation consists of interbedded, poorly consolidated sandstones, siltstones, and shales that were deposited in a fluvial environment. Thin lignite beds are also irregularly distributed throughout the

formation. In the vicinity of the Petrotomics site, the Wind River Formation contains three relatively continuous sandstone bodies separated by fine grained sediments and isolated sandstone lenses. The uppermost sandstone, identified as the Upper sand, is the most limited in thickness and lateral distribution. The middle sandstone, called the Main sand, and the lowermost sandstone, called the Lower sand, are relatively thicker and more laterally continuous. Figure 3 contains a cross-section, constructed using geophysical bore hole logs from exploration drill holes, showing the stratigraphic relationship of the three sand bodies in the Wind River Formation at the site.

Groundwater occurs in all three sand bodies in the Wind River Formation at the site. Groundwater flow in all three sands generally is northerly. The aerial extent of saturation at the site varies. Previous analyses of groundwater samples collected from a network of monitoring wells at the site indicate that in groundwater of acidic pH, higher concentrations of several metals and radionuclides are present in the Upper and Main sands, than in groundwater with pH values nearer to neutral. The presence of these constituent concentrations along with acidic groundwater pH, has been asserted to be related to seepage from the tailings pond. No impacts from the tailings pond are believed to extend to the Lower sand.

FIELD INVESTIGATION

To evaluate background groundwater conditions at the Petrotomics site three monitoring wells (14DC, 15DC, and 16DC) were installed, developed, and sampled between February 7 and March 2, 1994. The locations of the new wells are shown on Figure 2. The area where the wells were placed was chosen for the evaluation of Main sand background groundwater quality because of the following reasons.

- Migration of contaminants from the tailings pond to this area is not expected based on known groundwater flow conditions.

- This area has not been affected by past mining operations based on review of available records by Petrotomics Company. In other words, the area has never been mined or used to stockpile overburden or waste rock.

- The area contains both mineralized and non-mineralized sediments within the Main sand as determined from information from exploration drill holes. Wells 15DC and 16DC are located in areas of known mineralization. Well 14DC is in a non-mineralized area.

The area selected for the background study is sidegradient of the tailings pond based on groundwater flow mapping for the Main sand previously performed at the site. Normally, background conditions are determined in areas upgradient of potential contamination sources. At the Petrotomics site an upgradient well was not drilled and sampled because of the widespread area of past mining activities upgradient, and the limited saturation of the Main sand upgradient toward the outcrop (south) of the tailings. The area west of the tailings pond was not drilled because of the lack of saturation in the Main sand to the west. The area where the wells were placed, approximately 1800 feet east of the pond, contains groundwater indicative of background conditions in our opinion. It is also our opinion that these wells are located far enough from the pond to ensure that any lateral dispersion of contaminants from the pond has not affected groundwater quality. Results from the new wells along with results from existing well 10DC, located in an undisturbed area approximately 600 feet upgradient of the new wells (Figure 2), allows an evaluation that is representative of a broad spectrum of natural groundwater quality in the Main sand at the site before mining operations took place. Well 13DC (Figure 2) was considered for use in the background study but was not used because of its close proximity to Pit 4. The hydrologic conditions in Pit 4 may affect the groundwater quality at 13DC.

DRILLING AND MONITORING WELL COMPLETION

Drilling was performed using mud-rotary drilling equipment. Drilling equipment was decontaminated between wells using a pressure washer and potable water from the site's supply well screened in the Lower sand.

Grab samples of drill cuttings from all bore holes were collected every 5 feet, from the surface to the base of the bore hole for lithologic descriptions. This information is presented on the sample logs in Appendix A.

Drill cuttings indicate that the Main sand is composed of very fine to coarse, subround to subangular sand, light gray to light greenish gray in color. At well 15DC some lignitic material was observed near the base of the Main sand. The thickness of the Main sand ranges from approximately 60 to 55 feet in the three wells. The Main sand is separated from the overlying Upper sand in all three bore holes by shale and sandy shale, bluish gray to light gray in color. The thickness of this shale ranges from approximately 10 to 35 feet. The depths at which that the Upper and Main sands were encountered varied less than 5 feet from those estimated from bore hole geophysical logs from nearby mineral exploration holes.

The monitoring wells were constructed using 6-inch diameter polyvinyl chloride (PVC) casing and 40 feet of machine slotted PVC well screen. Clean silica sand was then placed in the annular space surrounding the well to a height of at least 3 feet above the top of the well screen. The sand pack was placed in all the wells so as not to intersect the Upper sand. The annular space above the sand pack was filled with hydrated bentonite chips or a bentonite slurry to a minimum depth of 20 feet below land surface to prevent downward seepage of groundwater from the Upper sand into the well screens. When the weather becomes warm enough, the remaining annular space will be grouted with portland cement to land surface, and a concrete pad surrounding the well casing at the surface will be placed. Well completion details are presented on the well completion logs in Appendix B.

Petrotomics personnel provided vertical and horizontal coordinates for the monitoring wells. A permanent measuring point of known elevation was established at the top rim of the PVC casing to facilitate the calculation of water-level elevations. Horizontal coordinates were also provided for all well locations. All elevations are relative to mean sea-level datum. Figure 2 shows the locations of the monitoring wells.

The monitoring wells were developed by first thinning the drilling mud with potable water during well completion. The wells were then jetted using compressed air and pumped using a submersible pump. Each well was then, at a minimum, pumped overnight at a flow rate of approximately 16 gallons per minute (GPM).

GROUNDWATER SAMPLING AND QUALITY CONTROL

Following drilling, completion, and development, the monitoring wells were sampled on March 1 and 2, 1994. Subsequent to measuring static water levels in the monitoring well, a minimum of three casing volumes of water were removed using a submersible pump prior to the collection of groundwater samples. The groundwater samples were then collected from the pump discharge for the constituents listed in Table 1. Samples were collected in clean, unused containers provided by Petrotomics. The pump discharge rate was regulated below 5 GPM during purging and sampling to minimize sample agitation and turbidity. Water sampling logs completed in conjunction with the groundwater sample collection from the wells are presented in Appendix C. The pumping equipment was decontaminated before sampling began and between wells by pressure washing the outside of the pump and discharge hose. Then, the interior of the pump was cleaned by first pumping a solution of potable water and laboratory grade, non-phosphate detergent followed by a potable water as a rinse. Each of these fluids were pumped through the equipment for a minimum of 5 minutes.

Immediately following collection, samples from the wells were filtered and preserved as appropriate for the analytical methods. As soon as possible after filtration and preservation, the samples were refrigerated and delivered by hand and relinquished with

standard chain-of-custody protocols to Core Laboratories, Inc. of Casper, Wyoming the same day of collection or the following day. An equipment rinsate blank and blind replicate sample were submitted for analysis to evaluate field sampling procedures and laboratory precision. A split sample was also sent to Accu-Labs Research, Inc. of Golden, Colorado to evaluate laboratory accuracy and precision. This sample was packed in ice and shipped via overnight courier using standard chain-of-custody protocols.

RESULTS

The analytical results for groundwater samples from the monitoring wells are summarized in Table 1. Laboratory reports along with chain-of-custody documentation for all groundwater quality data collected in conjunction with this investigation are presented in Appendix D. The quality of the analytical data from the newly installed wells was evaluated to ensure that it was usable for determination of potential hazardous constituents and concentration limits. The data were evaluated using the "Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses" provided by USEPA (USEPA 1988). The data were found to be of generally good quality with some minor exceptions. Core Laboratories experienced some slightly low recoveries for analysis of continuing calibration standards and matrix spikes for three constituents. The recoveries are only slightly outside control limits and we are of the opinion that the data are usable. Three constituents, fluoride, manganese, and zinc, were detected in the equipment rinsate at concentrations similar to those detected in the samples. Because these constituents are not hazardous constituents at the site, their detection in this sample is not considered relevant to the use of the data for determination of concentration limits. Comparison of primary, replicate and split analytical results for the sample from 14DC revealed variability between primary and replicate results for nickel and vanadium and between primary and split results for molybdenum and vanadium. The variability of these results are not considered great enough to cause these results to be unusable.

Core Laboratories initially analyzed the samples for lead using USEPA method 6010; however, matrix interferences caused by the high dissolved solids content of the samples appear to have affected the accuracy of the results. The analyses were reanalyzed within holding times using USEPA method 7421. The results of duplicate, calibration and matrix spike analyses performed in conjunction with the second analysis were all within control limits. The results of these analyses were used in determination of the concentration limit.

Water-level measurements for the Main sand were collected from the new wells and in the other existing wells at the site screened in the Main sand on March 1 through March 8, 1994. A potentiometric surface map developed from these measurements is shown on Figure 2. The contours on Figure 2 show groundwater flow in the Main sand is currently to the north-northwest, similar to the flow direction determined by previous mapping. The orientation of the potentiometric surface shown on Figure 2 suggests that no direct pathway exists for migration of contaminants from the tailings pond to the Main sand in the area of the new wells and 10DC. It is conceivable that water quality at the new wells could show effects from past mining operations in a now reclaimed pit south of the wells but the distribution of concentrations in the wells do not support this supposition. Constituent concentrations in the wells generally decrease to the south, which is opposite what would be expected if this pit was affecting groundwater quality in the wells. Also, concentrations in well 10DC, located closer to the old pit, have historically been low. The potential for southerly migration of constituents from Pit 4 is also low. The water elevation at the new wells is very similar to that in Pit 4 (Figure 2) indicating that little or no hydraulic gradient exists between the pit and the wells.

PROPOSED CONCENTRATION LIMITS

Groundwater concentration limits for the Main sand are being proposed based on the analytical results from the newly installed background wells and the most recent (November

1993) results from well 10DC. The constituents for which limits are being developed are listed below.

cadmium	selenium
chromium	radium
lead	thorium
nickel	uranium

These constituents were selected using the requirements stated in Criterion 5B(2) of Appendix A of 10 CFR Part 40. These requirements are:

- The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area (tailings pond).
- The constituent has been detected in the groundwater in the uppermost aquifer.
- The constituent is listed in Criterion 13 of Appendix A of 10 CFR Part 40.

The proposed concentration limits for these constituents are listed in Table 2. These standards were determined using generally accepted statistical principles. The values in Table 2 were determined by taking the arithmetic mean of the results for each constituent and adding two standard deviations. The arithmetic mean and standard deviation are two of the most common statistical measures used for evaluation of the distribution of data sets. Maximum background concentrations calculated in this manner are considered to be representative of 95 percent of the data distribution. Mean values were not calculated for constituents that did not have results above detection limits. In these cases the concentrations listed in Criterion 5C in Appendix A of 10 CFR Part 40 for the individual constituents were used in Table 2. When constituents had results both above and below detection limits, the mean was calculated using the values of half the detection limit to represent results below the detection limit. This method is recognized by USEPA for use in evaluating data including results below detection limits (USEPA 1989).

Wells 10DC, 14DC, 15DC and 16DC are proposed for use as background monitoring points. Analytical results from these wells should be representative of variations in background concentrations as determined by this study. The analytes proposed for monitoring are those determined to be hazardous constituents listed above and in Table 2.

odc055/back.rpt/wp

REFERENCES

U.S. Environmental Protection Agency, 1988. Laboratory Data Validation Functional Guidelines for Evaluating Inorganics Analyses. Hazardous Site Evaluation Division, July 1, 1988.

U.S. Environmental Protection Agency, 1989. Statistical Analysis of Ground-Water Data at RCRA Facilities, Interim Final Guidance. Office of Solid Waste Management Division, February 1989.

Table 1. Summary of Laboratory Analytical Results for Groundwater Samples Obtained from the Main Sand Background Monitoring Wells, Petrotomics Company Site, Shirley Basin, Wyoming.

	14DC	15DC	16DC	10DC	Arithmetic Mean	Two Standard Deviations
GENERAL MINERALS						
pH(units)	6.16	5.85	6.98	6.42		
Carbonate(mgCaCO3/L)	<1	<1	<1	0		
Bicarbonate(mgCaCO3/L)	439	146	358	221		
Chloride(mg/L)	342	318	59.0	63.3		
Sulfate(mg/L)	6640	11900	1530	1050		
Nitrate(mg/L)	<0.05	<0.05	<0.05	*		
Nitrite(mg/L)	<0.02	<0.02	<0.02	*		
Fluoride (mg/L)	0.1	7.1	0.2	0.15		
Specific Conductivity(umhos/cm)	8640	11800	2660	2143		
Total Dissolved Solids(mg/L)	10900	19200	2410	1881		
Alkalinity(total)	360	120	293	181		
Ammonia(mg/L)	1.2	17.5	0.8	1.9		
Hydroxide(mgCaCO3/L)	<1	<1	<1	*		
METALS(mg/L)						
Aluminum	0.8	7.5	0.5	0.1		
Arsenic	<0.002	<0.002	<.002	<0.001		
Barium	<0.05	<0.05	<0.05	<0.05		
Boron	<0.1	0.1	<0.1	<0.05		
Cadmium	**<0.05**	**<0.05**	**<0.05**	**0.01**	**0.02**	**0.02**
Calcium	535	373	359	308		
Chromium	**<0.05**	**<0.05**	**<0.05**	**<0.01**		
Copper	<0.05	<0.05	<0.05	<0.01		
Iron	523	3040	9.2	34.3		
Lead	**<0.002**	**0.013**	**<0.002**	**<0.05**	**0.01**	**0.02**
Magnesium	925	1240	120	104		
Manganese	40.5	114	0.63	1.1		
Mercury	<0.0002	<0.0002	<0.0002	<0.001		
Molybdenum	1.09	2.38	0.23	<0.1		
Nickel	**0.6**	**3.87**	**0.12**	**<0.03**	**1.15**	**3.66**
Potassium	22	28	12	11.4		
Selenium	**<0.001**	**<0.001**	**<0.001**	**<0.001**		
Sodium	414	366	71	70.7		
Vanadium	1.6	2.02	0.51	<0.1		
Zinc	0.08	2.4	0.01	0.03		
RADIONUCLIDES						
Radium 226(pCi/L)	**1230**	**847**	**159**	**22.3**	**564.58**	**1143.74**
Radium 228(pCi/L	**10.9**	**15.6**	**7**	**11.5**	**11.25**	**7.04**
Thorium 230(pCi/L)	**1.1**	**0.7**	**0.4**	**0**	**0.55**	**0.94**
Uranium(mg/L)	**0.032**	**0.003**	**0.082**	**0.011**	**0.03**	**0.08**

*Not Analyzed

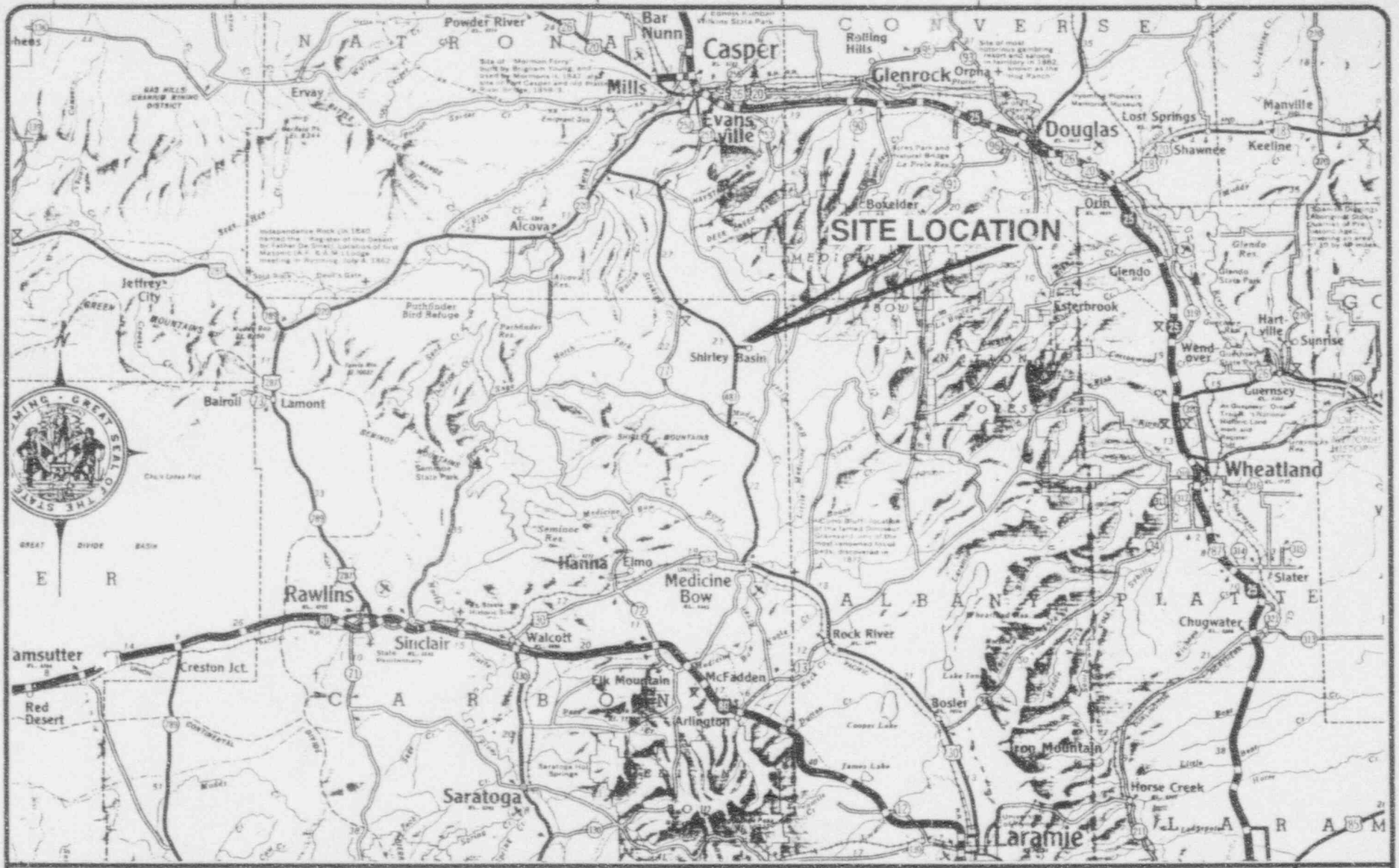
cdc055/bgnew2.xls/xl

Table 2. Proposed Groundwater Concentration Limits for the Main Sand, Petrotomics Company Site, Shirley Basin, Wyoming.

Constituent	Proposed Concentration Limits
Cadmium	0.04 mg/L
Cnromium	0.05 mg/L*
Lead	0.05 mg/L*
Nickel	4.81 mg/L
Selenium	0.01 mg/L*
Total Radium	1727 pCi/L
Thorium 230	1.49 pCi/L
Uranium	0.11 mg/L

*This standard is taken from Criterion 5C of Appendix A of 10 CFR Part 40.

DWG DATE: 29MAR94	PRJCT NO.: C00318.002	FILE:	DRAWING: NON CADD	CHECKED: RS	APPROVED: RS	DRAFTER: BD



GERAGHTY & MILLER, INC.
Environmental Services

SITE LOCATION MAP

PETROTOMICS COMPANY
SHIRLEY BASIN, WYOMING

FIGURE
1

APPENDIX A

SAMPLE LOGS

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well 14DC Project/No. C00318.002 Page 1 of 3

Site Location Petrotomics Drilling Started 2/7/94 Drilling Completed 2/9/94

Total Depth Drilled 250 feet Hole Diameter 10 1/2 inches Type of Sample/ Coring Device drill cuttings

Length and Diameter of Coring Device NONE Sampling Interval 5 feet

Land-Surface Elev. 7118.1 feet ☑ Surveyed ☐ Estimated Datum AMSL

Drilling Fluid Used Bentonite & native mud Drilling Method Rotary w/mud

Drilling Contractor Barnhart Driller JAY Helper LANCE

Prepared By DAVE KVASNICKA Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5			Soil - med bn/yel coarse grain - sand wl, rnd clay matrix, moist
5	10			Soil - a/a 85% sand 15% clay, moist
10	15			Sand - a/a - med bn, gummy inparts, moist
15	20			Sand - a/a 95% sand 5% Clay, loose, dry
20	25			Sand - fine grain, ang → subang, yellow, 5% clay
25	30			Sand - orange, fine to med gn, ang → subang some gravel (< 5%), well rndd → subrdd → ang
30	35			Sand - a/a, 10% gravel (Rock frags?) Ang, flakey, dull bn → bn/org.
35	40			Clay/Shale - med → dk brown, ang frags, soft, sli gummy
40	45			Clay - a/a
45	50			Shale - lt blue/gray, soft to firm
50	55			Shale - a/a, abnt sand (cavings from above)
55	60			Shale - a/a (w/ sand cavings)
60	65			Sand - fine to med, lt gray to clear, subang → subrnd trace lignite, sli trace of blue clay
65	70			Shale - blue/gray, firm, gummy
70	75			Shale - a/a
75	80			Shale - a/a

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 14 DC

Prepared By DAVE KUASNICKA

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
80	85			Shale- a/a
85	90			Shale - a/a
90	95			Shale- a/a
95	100			Shale - blue/gray, firm, gummy
100	105			Shale- a/a
105	110			Shale- a/a
110	115			Shale- a/a
115	120			Shale- a/a
120	125			Shale- a/a
125	130			Shale- a/a
130	135			Shale- a/a
135	140			Shale- a/a
140	145			Shale- a/a
145	150			Sand - dull yellow/green, med grn, ang -> subrndd, TR shale CVGS
150	155			Shale - blue/gray, firm, gummy
155	160			Shale- a/a
160	165			Shale- a/a
165	170			Shale- a/a
170	175			Shale- a/a
175	180			Shale- v. poor returns - possible sand
180	185			Sand- clear, lt gray, med grn, 20% shale
185	190			Sand- clear, lt. gray, med grn, uncons (?), subrndd
190	195			Sand- a/a

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 14DC

Prepared By DAVE KVASNICKA

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
195	200			Sand- a/a
200	205			Sand- a/a
205	210			Sand- a/a
210	215			Sand- clear, lt gray, med grn, subang→subrndd, loose
215	220			Sand - a/a
220	225			Sand - a/a
225	230			Sand- clear, lt. gray, vf grain, subang→sub rndd
230	235			Sand- clear lt. gray, vf grain, subang→subrndd
235	240			Sand- a/a
240	245			Shale- blue/gray, soft, gummy 30% sand a/a

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well 15 DC Project/No. Petrotomics CO #318.002 Page 1 of 3

Site Location Petrotomics Drilling Started 2/17/94 Drilling Completed 2/18/94

Total Depth Drilled 235 feet Hole Diameter 10½ inches Type of Sample/ Coring Device drill cuttings

Length and Diameter of Coring Device None Sampling Interval 5 feet

Land-Surface Elev. 7108.9 feet ☑ Surveyed ☐ Estimated Datum AMSL ✓

Drilling Fluid Used Polymer & native mud Drilling Method Rotary w/ mud

Drilling Contractor Barnhart Driller JAY Helper LANCE

Prepared By DAVE KVASNICKA Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5			Sand, tan, lt. brn, fg, loose (Wind River Fm)
5	10			Sand - a/a
10	15			Sand - pale orange/brn, f → med coarse gn, subang → subrndd
15	20			Sand - a/a @ 19' drilled into shale dk rd/brn
20	25			Sand - a/a
25	30			Sand - a/a w/ 15% shale dk rd/brn
30	35			Shale dk rd/brn, lt. blue/gray, soft to firm, gummy in pa
35	40			Shale - lt blue/gray, lt brn, med → dk brn, soft to firm, gummy i
40	45			Shale - lt. blue/gray, soft to firm, gummy in part
45	50			Shale - as above
50	55			Shale - as above
55	60			Shale - as above sm meal blu/gray
60	65			Shale - as above
65	70			Shale - as above
70	75			Shale - as above
75	80			Shale - a/a
80	85			Shale - a/a
85	90			Shale - a/a
90	95			Shale - a/a w/ 20% lignite
95	100			Shale - a/a w/ 10% lignite

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 15 DC

Prepared By DAVE KUASNICKA

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
100	105			Shale - a/a w/ 15% lignite
105	110			Shale - a/a w/ trace lignite
110	115			Shale - a/a w/ trace lignite
115	120			Shale - blue/gray, soft trace lignite
120	125			Shale - a/a
125	130			Shale - a/a
130	135			Shale - a/a w/ trace of fine sand
135	140			Shale - (prob. cavings) w/ trace of fine → med. sand
140	145			Sand, lt gn/gy, fine to med. grain, loose, sub ang to sub rndd
145	150			Sand - lt gn/gy, fine to coarse grn, loose " " some sub cvgs
150	155			Shale/Clay - pale blue/gray, gummy, some sand (cvgs)
155	160			Shale/Clay - as above
160	165			Shale/Clay - as above some sand (cavings)
165	170			Shale/Clay - as above, some sand
170	175			Sand - lt gn/gy, med to coarse grn, loose sub ang → sub rndd
175	180			Sand - as above
180	185			Sand - as above
185	190			Sand - as above
190	195			Sand - as above
195	200			Sand - as above
200	205			Sand - as above
205	210			Sand - as above
210	215			Sand - as above

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 15 PC

Prepared By DAVE KUASNICKA

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
215	220			Sand - as above
220	225			Sand - as above w/ 10% lignite
225	230			Clay/lignite - lt gy gummy clay, w ~15% lignite
230	235			Shale (70%) - lt → med blue/gray, firm to soft, blocky to gummy
				Sand (25%)
				Lignite (5%)

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG

Boring/Well 16 DC Project/No. Petrotomics Co 0318.002 Page 1 of 3

Site Location Petrotomics Drilling Started 2/21/94 Drilling Completed 2/23/94

Total Depth Drilled 235 feet Hole Diameter 10½ inches Type of Sample/ Coring Device drill cuttings

Length and Diameter of Coring Device none Sampling Interval 5 feet

Land-Surface Elev. 7100.5 feet ☒ Surveyed ☐ Estimated Datum AMSL

Drilling Fluid Used Polymer & native mud Drilling Method Rotary w/ mud

Drilling Contractor Barnhart Driller JAY Helper LANCE

Prepared By DAVE KWASNICKA Hammer Weight NA Hammer Drop NA inches

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
0	5			Clay - med. bn, firm to soft, trace sand
5	10			Sandy clay - a/a w/ ~20% fine sand, sub rndd to subang, loose
10	15			Sand - clear to dull bn, fine to med. grain, Ang to subrndd, some claystone clasts (broken)
15	20			Claystone/Shale - dull dk red/bn, firm, easily broken
20	25			Clay/Shale - lt bn/gy to buff, firm → soft, small gypsum xl
25	30			Clay/Shale - lt bn/gy, sm med gn/gy, firm to soft, small gyp xl
30	35			Shale - med bn/gy, sft to fm, gummy in part
35	40			Shale - med bn/gy sft to fm, gummy in part
40	45			Shale - as above limited cuttings (fine)
45	50			Shale - as above very limited cuttings (fine)
50	55			Shale - as above better sample returns
55	60			Shale - med blue/gray, soft to firm, gummy in part
60	65			Shale - " " " soft, gummy
65	70			Shale " ... " (poor sample)
70	75			Shale " ... " (poor sample)
75	80			Shale - med bn/gy, sm med blue/gray, soft to firm, gummy
80	85			Shale - " ", sm dk bn/gy, soft to firm, gummy
85	90			Shale - as above; w/ trace of lignite

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 16 DC

Prepared By DAVE KVASNICKA

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
90	95			Shale - med dk brn/gy, sm Lt. blue/gy (cvgs?) soft to firm
95	100			Shale - lt blue/gray, soft to firm, gummy
100	105			Shale - as above
105	110			Shale - as above
110	115			Shale - med blue/gray, soft, gummy
115	120			Shale - as above
120	125			Shale - as above
125	130			Shale - as above w/ trace vf. sand - Top upper sd 126' by drill
130	135			Sand - fine to med grn, clear, subang to subrndd, loose
135	140			Sand - as above
140	145			Sand - as above
145	150			Sand - as above w/ ~15% clay - lt gray, gummy
150	155			Shale - lt gray, soft to firm, gummy, w/ ~20% sand
155	160			Shale/Sand - shale as above, sand fine to coarse grn, subrndd → subang, loose grains
165	170			Shale - Prob. cavings / trace sand (v. poor spl.) Poss. top main sand @ 159'
170	175			Sand - vf → fg, clear, loose, subang → subrndd
175	180			Sand - as above
180	185			Sand - as above
185	190			Sand - as above
190	195			Sand - vf → med gr, clear, loose, subang → subrndd

GERAGHTY & MILLER, INC.
Environmental Services

SAMPLE/CORE LOG (Cont.d)

Boring/Well 16 DC

Prepared By DAVE KUASNICKA

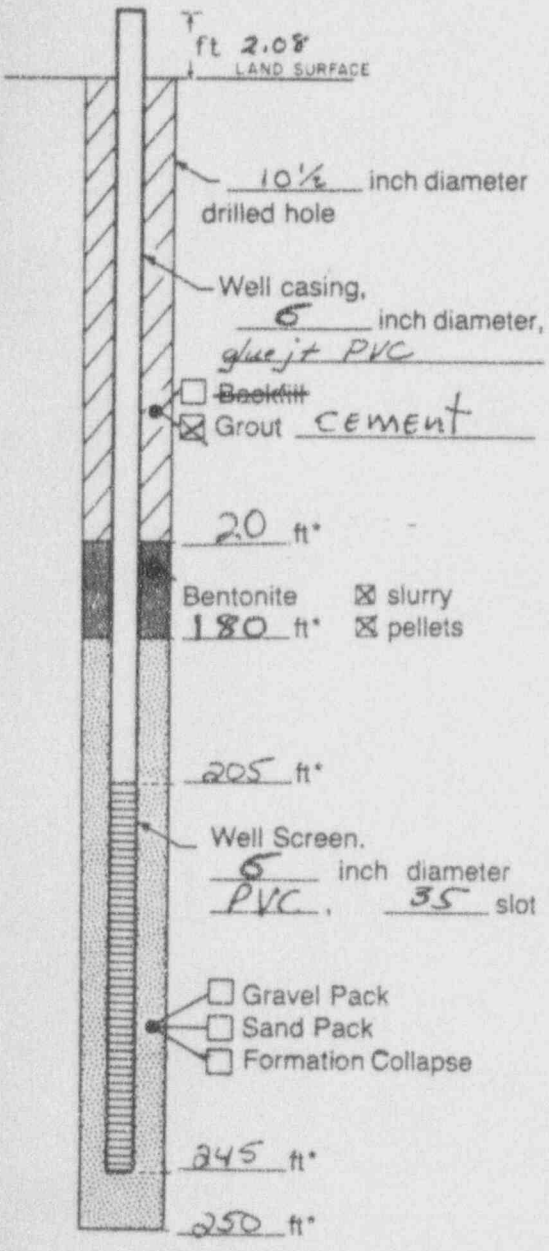
Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 inches	Sample/Core Description
195	200			Sand - uf → fg, clear loose, subang → subrndd
200	205			Sand - vf / as above
205	210			Sand - vf / as above
210	215			Sand - vf / as above
215	220			Sand - vf → med g, as above
220	225			Shale/Sand - v. little recovery (poor sample)
225	230			Shale/Lignite - med gy shale - dk gy lignite
230	235			Shale - med gy → med gy/bn soft to firm
				Total depth 235'
				Will instruct driller to ream only to 230'

APPENDIX B

WELL COMPLETION LOGS

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Petrotomics/Shirley Basin

Project CO0318.002 Well 14 DC

Town/City Shirley BASIN

County Carbon State Wyoming

Permit No. U.W. 94522

Land-Surface Elevation

and Datum 7118.1 feet ☒ Surveyed

AMSL ☐ Estimated

Installation Date(s) 2-7/9-94

Drilling Method rotary w/ mud

Drilling Contractor Barnhart

Drilling Fluid 9 lb mud (native clay w/ bentonite)

Development Technique(s) and Date(s)

submersible pump set at 242' (installed on 2-15-94) Pumps activated

Fluid Loss During Drilling not calc. gallons

Water Removed During Development 26,000 est gallons

Static Depth to Water 181.6 feet below M.P.

Pumping Depth to Water 200.12 feet below M.P.

Pumping Duration 48 hours

Yield est 16 gpm Date 2/18/94

Specific Capacity not calc. gpm/ft

Well Purpose ground water quality monitoring

Remarks Centralizers placed at 7' above bottom of casing & 30' above bottom of casing

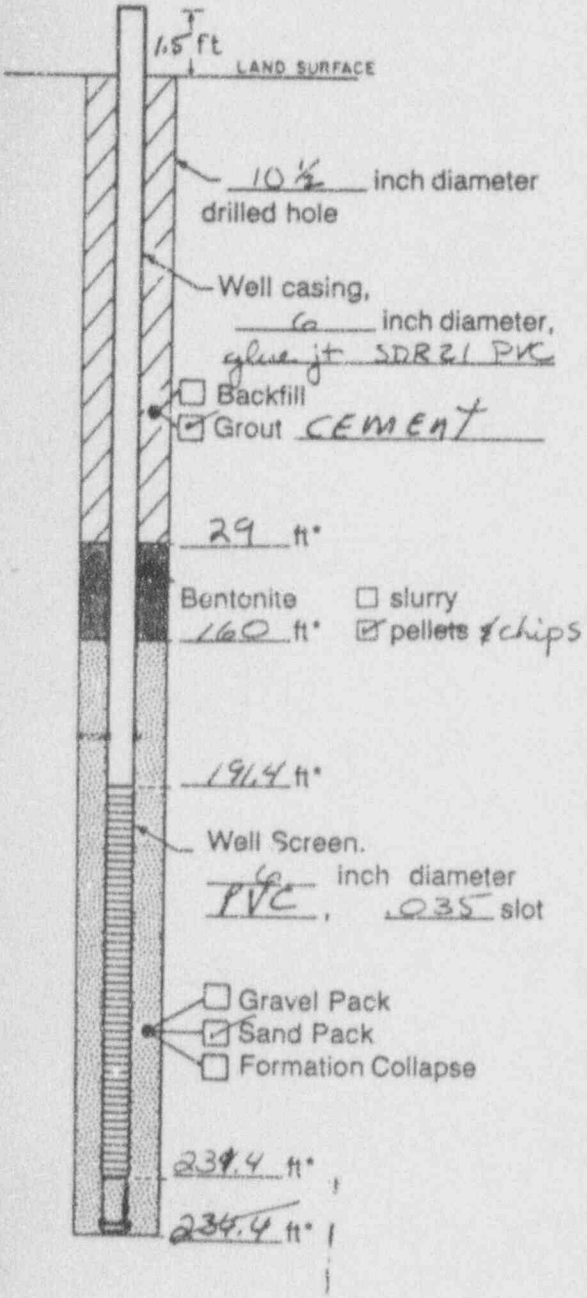
Prepared by David Kvasnicka

G&M Form 05 12-88

Southprint 89-0978

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is Top of Well Casing Unless Otherwise Noted.

*Depth Below Land Surface

Project Petrotomics / COP318.002 Well 15DC
Town/City Shirley Basin
County Carbon State Wyoming
Permit No. UW.94523
Land-Surface Elevation and Datum 7108.90 feet AMSL ☑ Surveyed ☐ Estimated
Installation Date(s) 2/18 - 2/21/94
Drilling Method Rotary w/ mud
Drilling Contractor Barnhart
Drilling Fluid polymer & native mud

Development Technique(s) and Date(s)
Air jetting 2-21-94
Pumping 2-23/24-94

Fluid Loss During Drilling not calc. gallons
Water Removed During Development 7200 gallons
Static Depth to Water 122.38 feet below M.P
Pumping Depth to Water 174.16 feet below M.P
Pumping Duration 24 hours
Yield 5 gpm Date 2-24-94
Specific Capacity not calc. gpm/ft
Well Purpose monitor ground water quality

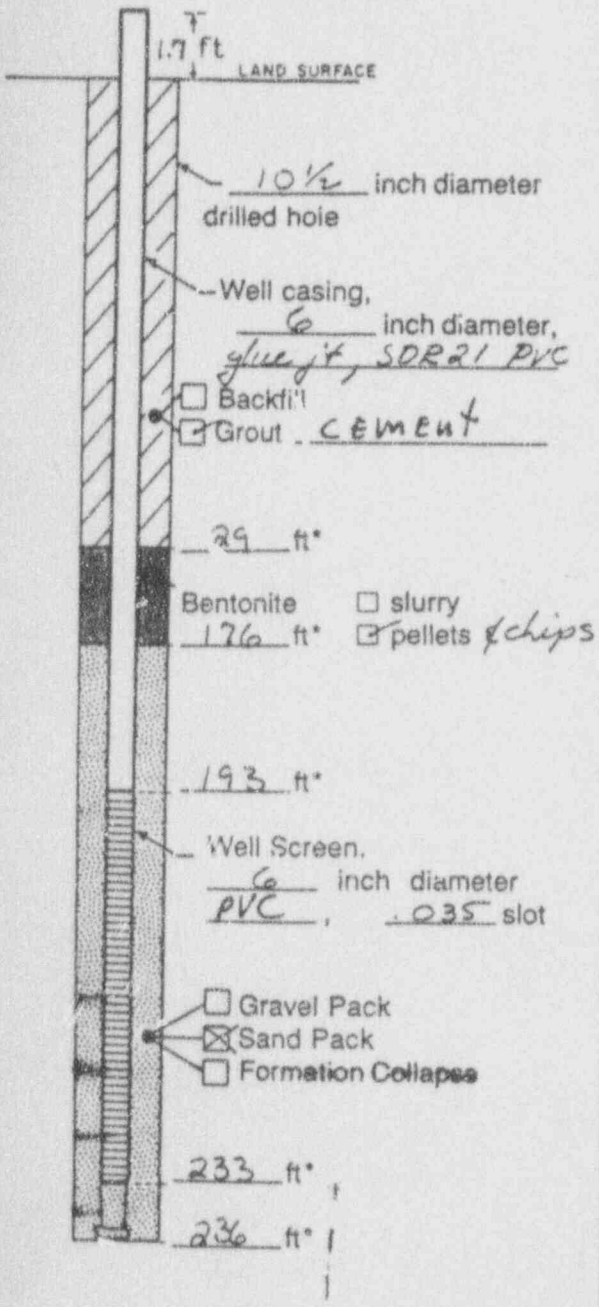
Remarks 3' blank (sand trap) added to bottom of casing string. Centralizers (2) placed at mid-point of each joint of screen.

Prepared by David Kvasnicka

Southprint 89-0[illegible]

GERAGHTY & MILLER, INC.
Environmental Services

WELL CONSTRUCTION LOG
(UNCONSOLIDATED)



Measuring Point is
Top of Well Casing
Unless Otherwise Noted.

*Depth Below Land Surface

Project Petrotomics/COD318.002 Well 16DC
Town/City Shirley Basin
County Carbon State Wyoming
Permit No. U.W. 74524
Land-Surface Elevation
and Datum 7100.5 feet AMSL
☒ Surveyed ☐ Estimated
Installation Date(s) 2/23/94
Drilling Method Rotary w/ mud
Drilling Contractor Baronhart
Drilling Fluid polymer & native mud

Development Technique(s) and Date(s)
Air jetting 2-23-94
Pumping 2-25/28-94

Fluid Loss During Drilling not meas. gallons
Water Removed During Development 30,000 (est.) gallons
Static Depth to Water 162.50 feet below M.P.
Pumping Depth to Water not. meas. feet below M.P.
Pumping Duration 48 hours
Yield 15 (est) gpm Date 2/28/94
Specific Capacity not calc. gpm/ft
Well Purpose monitor ground water quality

Remarks 3' blank (sand trap) added to bottom of casing string. Centralizers (2) placed at mid-point of each joint of screen.

Prepared by David Kinnicken

Southprint 89-0978

APPENDIX C

WATER SAMPLING LOGS

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Petrotomics / CO0318.002 Page 3 of 3

Site Location: Shirley Basin Wyoming

Site/Well No. 14DC Coded/ Replicate No. 41CD Date 3-2-94

Weather 35° Clear Time Sampling Began 901 Time Sampling Completed 903

EVACUATION DATA

Description of Measuring Point (MP) Eastside top of PVC casing

Height of MP Above/Below Land Surface 2.08' MP Elevation 7120.08 GL 7118.0 'asl

Total Sounded Depth of Well Below MP 242.12 Water-Level Elevation

Heid NA Depth to Water Below MP 181.93 Diameter of Casing 6"

Wet NA Water Column in Well 60.19 Gallons Pumped/Bailed Prior to Sampling 330

Gallons per Foot 1.47

Gallons in Well ~92 Sampling Pump Intake Setting (feet below land surface) 232

Evacuation Method Submersible pump (½ hp @ ~5 gpm)

SAMPLING DATA/FIELD PARAMETERS

Color clear Odor NONE Appearance clear Temperature 10.1 °F (°C)

Other (specific ion; OVA; HNU; etc.)

Total Dissolved Solids 4130 mg/L at 10.2°C

Specific Conductance, umhos/cm 6230 pH 6.05

Sampling Method and Material pumped

Constituents Sampled	Container Description From ~~Lab~~ ____ or G&M ____	Preservative
Metals, Radionuclides	Petrotomics 1 gallon plastic	Filtered / HNO_3
HCO_3, CO_3, Boron, Cl, F, SO_4, TDS	1 liter plastic	" / NONE
Ammonia, Nitrate, Nitrite	250ml plastic	" / H_2SO_4

Remarks Replicate (41CD) & Duplicate 14DC (Split) collected at this location

Sampling Personnel Dave Kvasnicka

WELL CASING VOLUMES

GAL./FT.							
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Petrotomics / CO0318.002 Page 2 of 3

Site Location Shirley Basin Wyoming

Site/Well No. 150C Coded/ Replicate No. NA Date 3-1-94

Weather 45° Clear Time Sampling Began 1609 Time Sampling Completed 1610

EVACUATION DATA

Description of Measuring Point (MP) East side top of PVC casing

Height of MP Above/Below Land Surface 1.50 MP Elevation 7110.40

Total Sounded Depth of Well Below MP 235.30 Water-Level Elevation 6937.55

Held NA Depth to Water Below MP 172.85 Diameter of Casing 6"

Wet NA Water Column in Well 62.45 Gallons (Pumped)/Bailed Prior to Sampling 339

Gallons per Foot 1.5

Gallons in Well 94 Sampling Pump Intake Setting (feet below land surface) 230'

Evacuation Method ½ submersible pump @ 5 gpm

SAMPLING DATA/FIELD PARAMETERS

Color NONE Odor NONE Appearance Clear Temperature 9.3 °F (°C)

Other (specific ion; OVA; HNU; etc.)

TDS 6710 mg/L temp 9.3°C

Specific Conductance, umhos/cm 1315 pH 5.86

Sampling Method and Material pumped

Constituents Sampled	Container Description From ~~Lab~~ ____ or G&M ____ Petrotomics	Preservative
Metals, Radionuclides, HCO_3, CO_3, Boron, Cl^-, F^-, SO_4, TDS, Ammonia, Nitrate, Nitrite	1 gallon plastic	filtered / HNO_3
	1 liter plastic	filtered / NONE
	250 ml plastic	filtered / H_2SO_4

Remarks NONE

Sampling Personnel Gail Thayer

WELL CASING VOLUMES

GAL./FT.				
1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

GERAGHTY & MILLER, INC.
Environmental Services

WATER SAMPLING LOG

Project/No. Petrotomics / COP 318.002 Page 1 of 3

Site Location Shirley Basin Wyoming

Site/Well No. 16 DC Coded/ Replicate No. NA Date 3-1-94

Weather 32° Clear Calm Time Sampling Began 1117 Time Sampling Completed 1118

EVACUATION DATA

Description of Measuring Point (MP) N. side top of PVC casing

Height of MP Above/Below Land Surface 1.70 MP Elevation 7102.20 (GL = 7100.5)

Total Sounded Depth of Well Below MP 237.77 Water-Level Elevation 6939.70

Held NA Depth to Water Below MP 162.50 Diameter of Casing 6"

Wet NA Water Column in Well 75.27 gal Gallons Pumped/Bailed Prior to Sampling ~980

Gallons per Foot 1.47

Gallons in Well ~112 Sampling Pump Intake Setting (feet below land surface) 220

Evacuation Method 1½" submersible pump @ ~15 gpm

SAMPLING DATA/FIELD PARAMETERS

Color Slightly milky white Odor none Appearance v. sl. cloudy Temperature 11.6 °F (°C)

Other (specific ion; OVA; HNU; etc.) TDS 1340 mg/L @ 11.4 °C

Specific Conductance, umhos/cm 2.59 mS at 12°C pH 6.82

Sampling Method and Material pumped into 1 gallon plastic jugs

Constituents Sampled	Container Description From ~~Lab~~ ____ or G&M ____	Preservative
Metals, Radionuclides	Shipped up Bulk to Petrotomics 1 gallon plastic	filtered / HNO_3
HCO_3, CO_3, Boron, Cl^-, F^-, SO_4, TDS	1 liter plastic	filtered / none
Ammonia, Nitrate, Nitrite	250 ml plastic	filtered / H_2SO_4

Remarks Pumping W.L. at 172.37

Sampling Personnel Gail Thayer / Dave Kronicle

WELL CASING VOLUMES

GAL./FT.							
	1-¼" = 0.06	1-½" = 0.09	2" = 0.16	2-½" = 0.26	3" = 0.37	3-½" = 0.50	4" = 0.65	6" = 1.47

APPENDIX D

ANALYTICAL GROUNDWATER QUALITY DATA

WESTERN ATLAS

Core Laboratories

CORE LABORATORIES
A N A L Y T I C A L R E P O R T

Job Number: 940355
Prepared For:

PETROTOMICS COMPANY
STEVE PFAFF
P. O. BOX 8509
SHIRLEY BASIN, WY 82615

Date: 03/17/94

Shari Davis
Signature

3-17-94
Date:

Name: Shari Davis

Core Laboratories, Inc.
420 West First Street
Casper, WY 82601

Title: Project Manager

Case Narrative for Petrotomics Company

Project ID: CO0318.002

Core Project ID: 940355

This case narrative refers only to the analysis samples from the Core Laboratories samples listed below for job number 940355:

Core Laboratories Sample No	Petrotomics Identifier
0001	16 DC
0002	15 DC
0003	ER-1
0004	14 DC
0005	41 CD

METALS:

This information is pertinent to the interpretation of the results for the metals analysis of job number 940355.

The samples were received on March 2, 1994 at 12:00. They were subsequently logged in for dissolved metals analysis by ICP, FLAA, Gaseous Hydride AA, and Cold Vapor AA. As these were dissolved metals and were field filtered and preserved to pH <2.0, no digestion took place.

The ICP analysis was run on both a 1/25 dilution and no dilution due to varying concentrations of analytes.

There were some problems encountered with clogging of the nebulizer on the ICP due to high dissolved solids content. This caused a couple of the QC Data points to run low.

Mercury analysis by CVAA ran well with the exception that the samples had to be purged prior to the addition of the reducing agent to remove the chloride interference.

Hydride analysis of Arsenic and Selenium ran with no problems.

FLAA analysis of Ca, Cu, Cr, Mg, Fe, Mn, K, Na, and Zn ran with no unusual problems.

WET CHEMISTRY:

This information is pertinent to the interpretation of the results for the wet chemistry analysis of job number 940355.

WESTERN ATLAS

Core Laboratories

The samples were received on March 2, 1994 at 12:00. They were subsequently logged in for various wet chemistry parameters. No unusual problems were encountered with the analyses except for some precipitation of dissolved solids as the pH was changed. No other problems were encountered with the wet chemistry analy s.

RADIOCHEMICAL PARAMETERS:

The samples were logged in for radium 226, radium 228, thorium 230 and natural uranium. A complete set of quality assurance samples consisting of at least one blank, laboratory control sample, matrix spike and method duplicate per batch was analyzed with each sample set. None of the quality control sample results were outside acceptable limits, and no problems were encountered during the analytical steps associated with these samples.

Note: LLD on the Quality Control Report = Lower Limit of Detection, 99% confidence level.

John Hewett, Su,ervising Chemist

John Hewett/sms

Don Ukele, Quality Control Coordinator

Don Ukele 3/17/94

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 11:18
WORK DESCRIPTION...: 16 DC

LABORATORY I.D...: 940355-0001
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	0.5	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	359	10	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	9.2	0.5	mg/L	7380 (2)	03/17/94	JH
Lead, Diss. (Pb)	0.35	0.05	mg/l	6010 (2)	03/16/94	JL
Magnesium, Diss. (Mg)	120	10	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	0.63	0.05	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	0.23	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.12	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	12	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	71	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	0.51	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.01	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	159		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	4.7		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	7.0		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	1.9		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: CO0318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 11:18
WORK DESCRIPTION...: 16 DC

LABORATORY I.D...: 940355-0001
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, dissolved	0.4		pCi/l		03/15/94	DF
Thorium 230, diss., error, +/-	0.2		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.2		pCi/l		03/15/94	DF
Alkalinity, total	293	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	2660	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.98	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	2410	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	358	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	1530	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	59	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	0.8	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.2	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.082	0.001	mg/l	908.1 (1)	03/07/94	RS

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: CO0318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:10
WORK DESCRIPTION...: 15 DC

LABORATORY I.D...: 940355-0002
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	7.5	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	373	10	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	3040	50	mg/L	7380 (2)	03/17/94	JH
Lead, Diss. (Pb)	3.03	0.05	mg/l	6010 (2)	03/16/94	JL
Magnesium, Diss. (Mg)	1240	100	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	114	5	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	2.38	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	3.87	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	28	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	366	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	2.02	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	2.40	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	847		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	10.8		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	15.6		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	2.3		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:10
WORK DESCRIPTION...: 15 DC

LABORATORY I.D...: 940355-0002
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, dissolved	7		pCi/l		03/15/94	DF
Thorium 230, diss., error, +/-	0.3		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.2		pCi/l		03/15/94	DF
Alkalinity, total	120	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	11800	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	5.85	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	19200	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	146	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	11900	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	318	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	17.5	0.2	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	7.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.003	0.001	mg/l	908.1 (1)	03/07/94	RS

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: CC0318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:50
WORK DESCRIPTION...: ER-1

LABORATORY I.D...: 940355-0003
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	6	1	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	0.6	0.5	mg/L	7380 (2)	03/17/94	JH
Lead, Diss. (Pb)	0.17	0.05	mg/l	6010 (2)	03/16/94	JL
Magnerium, Diss. (Mg)	3	1	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	0.22	0.05	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.08	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	1	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	7	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.02	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	1.6		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	0.6		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	0.8		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	1.6		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:50
WORK DESCRIPTION...: ER-1

LABORATORY I.D...: 940355-0003
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, dissolved	0.6		pCi/l		03/15/94	DF
Thorium 230, diss., error, +/-	0.4		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.4		pCi/l		03/15/94	DF
Alkalinity, total	16	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	101	1	umho/cm @77f	120.1 (1)	03/03/94	JL
pH	7.40	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	46	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	20	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	20	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	3	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	<0.1	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.3	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	<0.001	0.001	mg/l	908.1 (1)	03/07/94	RS

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:03
WORK DESCRIPTION...: 14 DC

LABORATORY I.D...: 940355-0004
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	0.8	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	535	50	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	523	5	mg/L	7380 (2)	03/17/94	JH
Lead, Diss. (Pb)	1.13	0.05	mg/l	6010 (2)	03/16/94	JL
Magnesium, Diss. (Mg)	925	50	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	40.5	0.5	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	1.09	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.60	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	22	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	414	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	1.60	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.08	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	1230		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	13.0		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	10.9		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	2.1		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:03
WORK DESCRIPTION...: 14 DC

LABORATORY I.D...: 940355-0004
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, dissolved	1.1		pCi/l		03/15/94	DF
Thorium 230, diss., error, +/-	0.4		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.4		pCi/l		03/15/94	DF
Alkalinity, total	360	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	8640	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.16	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	10900	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	439	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	6640	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	342	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	1.2	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.032	0.001	mg/l	908.1 (1)	03/07/94	RS

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: CO0318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:33
WORK DESCRIPTION...: 41 CD

LABORATORY I.D...: 940355-0005
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
luminum, Diss. (Al)	0.7	0.1	mg/l	6010 (2)	03/17/94	JH
arium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
oron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
admium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
alcium, Diss. (Ca)	481	10	mg/l	7140 (2)	03/16/94	JL
hromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
opper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
ron, Diss. (Fe)	520	5	mg/L	7380 (2)	03/17/94	JH
ead, Diss. (Pb)	1.86	0.05	mg/l	6010 (2)	03/16/94	JL
agnesium, Diss. (Mg)	920	50	mg/l	7450 (2)	03/16/94	JL
anganese, Diss. (Mn)	41.0	0.5	mg/l	7460 (2)	03/17/94	JH
olybdenum, Diss. (Mo)	1.00	0.05	mg/l	6010 (2)	03/17/94	JH
ickel, Diss. (Ni)	1.12	0.05	mg/l	6010 (2)	03/16/94	JL
otassium, Diss. (K)	20	1	mg/l	7610 (2)	03/16/94	JL
odium, Diss. (Na)	420	1	mg/l	7770 (2)	03/16/94	JL
anadium, Diss. (V)	2.49	0.05	mg/l	6010 (2)	03/16/94	JL
inc, Diss. (Zn)	0.09	0.01	mg/l	7950 (2)	03/17/94	JH
adium 226, dissolved	1450		pCi/l	EPA 903.1	03/16/94	NRF
adium 226, diss., error, +/-	14.1		pCi/l		03/16/94	NRF
adium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
adium 228, dissolved	14.0		pCi/l	904.0 (4)	03/16/94	BB
adium 228, diss., error, +/-	2.2		pCi/l		03/16/94	BB
adium 228, diss., LLD	2.7		pCi/l		03/16/94	BB

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:33
WORK DESCRIPTION...: 41 CD

LABORATORY I.D...: 940355-0005
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, dissolved	0.9		pCi/l		03/15/94	DF
Thorium 230, diss., error, +/-	0.3		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.1		pCi/l		03/15/94	DF
Alkalinity, total	370	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	8750	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.20	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	10600	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	451	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	6400	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	332	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	1.2	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Mercury (Hg), dissolved	0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.026	0.001	mg/l	908.1 (1)	03/07/94	RS

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFIFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Fluoride (F), dissolved				DATE/TIME ANALYZED:03/02/94 16:22						QC BATCH NUMBER:148649
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :340.2 (1)						TECHNICIAN:AF
BLANK	ICB	940031	<0.1							
BLANK	CCB	940032	<0.1							
STANDARD	ICV	940028	5.0			5.0	100			
STANDARD	CCV	940029	5.1			5.0	102			
STANDARD	LCS	940030	5.2			5.0	104			
SPIKE	MS1	940355-5	0.6					0.1	0.5	100
SPIKE	MS2	940355-5	0.6					0.1	0.5	100
DUPLICATE	MD	940355-2	7.1	7.1	0					
PARAMETER:pH				DATE/TIME ANALYZED:03/02/94 15:30						QC BATCH NUMBER:148693
REPORTING LIMIT/DF: 0.01	UNITS:pH units			METHOD REFERENCE :150.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7.00			7.00	100			
DUPLICATE	MD	940357-1	7.42	7.44	0					
PARAMETER:Conductivity				DATE/TIME ANALYZED:03/03/94 11:00						QC BATCH NUMBER:148695
REPORTING LIMIT/DF: 1	UNITS:umho/cm @77f			METHOD REFERENCE :120.1 (1)						TECHNICIAN:JL
STANDARD	LCS	L0303401	152			147	103			
STANDARD	LCS	L0303402	1420			1410	101			
STANDARD	LCS	L0303403	12900			12900	100			
DUPLICATE	MD	940355-5	8750	8710	0					
DUPLICATE	MD	940359-10	14800	14900	1					
PARAMETER:Mercury (Hg), dissolved				DATE/TIME ANALYZED:03/03/94 10:01						QC BATCH NUMBER:148747
REPORTING LIMIT/DF: 0.0002	UNITS:mg/l			METHOD REFERENCE :7470 (2)						TECHNICIAN:AF
BLANK	ICB	A94099	<0.0002							
BLANK	CCB	A94104	<0.0002							
BLANK	PB	REAGENT	<0.0002							
STANDARD	ICV/LCS	A94103	0.0021			0.0020	105			
STANDARD	CCV/LCS	A94104	0.0022			0.0020	110			
SPIKE	MS1	940355-5	0.0022					0.0002	0.0020	100
SPIKE	MS2	940355-5	0.0022					0.0002	0.0020	100
SPIKE	MS	940359-10	0.0017					<0.0002	0.0020	85
DUPLICATE	MD	940359-10	<0.0002	<0.0002	NC					
PARAMETER:Alkalinity, total				DATE/TIME ANALYZED:03/04/94 13:26						QC BATCH NUMBER:148752
REPORTING LIMIT/DF: 1	UNITS:mg/l CaCO3			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7			7	100			
STANDARD	LCS	BUFFER	4			4	100			
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940355-5	370	370	0					
DUPLICATE	MD	940357-3	280	280	0					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Carbonate (CO3), dissolved				DATE/TIME ANALYZED:03/04/94 13:36						QC BATCH NUMBER:148753
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7			7	100			
STANDARD	LCS	BUFFER	4			4	100			
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940355-5	<1	<1	NC					
DUPLICATE	MD	940357-3	<1	<1	NC					
PARAMETER:Bicarbonate (HCO3), dissolved				DATE/TIME ANALYZED:03/04/94 13:42						QC BATCH NUMBER:148754
REPORTING LIMIT/DF: 5	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
DUPLICATE	MD	940359-1	<5	<5	NC					
DUPLICATE	MD	940355-5	451	451	0					
DUPLICATE	MD	940357-3	342	342	0					
DUPLICATE	MD	940359-7	116	122	5					
PARAMETER:Hydroxide (OH), dissolved				DATE/TIME ANALYZED:03/04/94 14:44						QC BATCH NUMBER:148755
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940359-10	<1	<1	NC					
DUPLICATE	MD	940355-5	<1	<1	NC					
PARAMETER:Total Dissolved Solids (TDS)				DATE/TIME ANALYZED:03/03/94 13:00						QC BATCH NUMBER:148763
REPORTING LIMIT/DF: 10	UNITS:mg/l			METHOD REFERENCE :160.1 (1)						TECHNICIAN:JL
BLANK	REAGENT	DI	<10							
STANDARD	LCS	L0303404	990			1000	99			
DUPLICATE	MD	940355-5	10600	10700	1					
DUPLICATE	MD	940357-3	12400	12400	0					
DUPLICATE	MD	940342-1	1400	1390	1					
PARAMETER:Chloride (Cl), dissolved				DATE/TIME ANALYZED:03/04/94 15:00						QC BATCH NUMBER:148781
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :325.3 (1)						TECHNICIAN:JL
BLANK	RB	DI	1							
STANDARD	LCS	L0304404	499			500	100			
SPIKE	MS	940342-1	108					59	50	98
SPIKE	MS	940359-10	450					352	100	98
SPIKE	MS	940359-7	161					113	50	96
SPIKE	MS	940359-8	125					75	50	100
SPIKE	MS	940367-10	235					137	100	98
DUPLICATE	MD	940342-1	59	59	0					
DUPLICATE	MD	940355-5	332	328	1					
DUPLICATE	MD	940359-10	352	352	0					
DUPLICATE	MD	940367-10	137	137	0					

420 West First Street
Casper, WY 82601
(307) 235-5741

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Nitrite (NO2-N), dissolved				DATE/TIME ANALYZED:03/02/94 15:45						QC BATCH NUMBER:148782
REPORTING LIMIT/DF: 0.02 UNITS:mg/l				METHOD REFERENCE :354.1 (1)						TECHNICIAN:JL
BLANK	REAGENT	DI	<0.02							
STANDARD	LCS	L0302408	0.05			0.05	100			
SPIKE	MS	940355-1	0.05					<0.02	0.05	100
DUPLICATE	MD	940355-1	<0.02	<0.02	NC					
PARAMETER:Uranium (U), dissolved				DATE/TIME ANALYZED:03/07/94 09:09						QC BATCH NUMBER:148802
REPORTING LIMIT/DF: UNITS:mg/l				METHOD REFERENCE :908.1 (1)						TECHNICIAN:RS
BLANK	MB	MB1UN0307	<0.001							
BLANK	CCB ugU3O8	CCB1UN0307	<1.0							
BLANK	CCB ugU3O8	CCB2UN0307	<1.0							
BLANK	CCB ugU3O8	CCB3UN0307	<1.0							
BLANK	CCB ugU3O8	CCB4UN0307	<1.0							
BLANK	CCB ugU3O8	CCB5UN0307	<1.0							
STANDARD	LCS	LC1UN0307	0.041			0.035	117			
STANDARD	LCS	LC2UN0307	0.041			0.035	117			
STANDARD	CCV ugU3O8	CCV1UN0307	1000			1000	100			
STANDARD	CCV ugU3O8	CCV2UN0307	997			1000	100			
STANDARD	CCV ugU3O8	CCV3UN0307	999			1000	100			
STANDARD	CCV ugU3O8	CCV4UN0307	9950			10000	100			
STANDARD	CCV ugU3O8	CCV5UN0307	9860			10000	99			
SPIKE	MS	940363-1	0.105					0.001	0.100	104
DUPLICATE	MD	940363-1	0.001	0.001	0					
PARAMETER:Nitrate (NO3-N), dissolved				DATE/TIME ANALYZED:03/05/94 10:22						QC BATCH NUMBER:148806
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :353.3 (1)						TECHNICIAN:RCP
BLANK	CCB	03058A	<0.05							
STANDARD	ICV	0305QA	0.46			0.50	92			
STANDARD	CCV	0305Q8	0.46			0.50	92			
SPIKE	MS	940357-3	0.60					0.06	0.50	108
DUPLICATE	DUP	940357-1	0.45	0.46	2					
PARAMETER:Ammonia (NH3-N), dissolved				DATE/TIME ANALYZED:03/09/94 12:39						QC BATCH NUMBER:148842
REPORTING LIMIT/DF: 0.1 UNITS:mg/l				METHOD REFERENCE :350.3 (1)						TECHNICIAN:RCP
BLANK	ICB		<0.1							
BLANK	CCB		<0.1							
STANDARD	LCS	LCS1	5.1			5.0	102			
STANDARD	LCS	LCS2	4.9			5.0	98			
SPIKE	MS1	940359-4	4.8					<0.1	5.0	96
SPIKE	MS2	940359-4	4.9					<0.1	5.0	98
DUPLICATE	MD1	940359-5	<0.1	<0.1	NC					
DUPLICATE	MD2	940359-5	<0.1	<0.1	NC					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Radium 226, dissolved				DATE/TIME ANALYZED:03/16/94 11:50						QC BATCH NUMBER:149058
REPORTING LIMIT/DF:		UNITS:pCi/l		METHOD REFERENCE :903.1 (4)						TECHNICIAN:NRF
BLANK	MB	MB2R60310	ND							
STANDARD	LCS	LC1R60310	14.6			15.0	97			
SPIKE	MS	940367-4	68.8					47.4	21.4	100
DUPLICATE	MD	940367-8	61.1	62.8	3					
DUPLICATE	MD	940367-10	57.9	63.2	9					
PARAMETER:Selenium (Se), dissolved				DATE/TIME ANALYZED:03/16/94 14:45						QC BATCH NUMBER:149066
REPORTING LIMIT/DF: 0.001		UNITS:mg/l		METHOD REFERENCE :7741 (2)						TECHNICIAN:JH
BLANK	ICB	03168A	<0.001							
BLANK	CCB	03168B	<0.001							
BLANK	CCB	0313BC	<0.001							
STANDARD	ICV	0316QA	0.009			0.010	90			
STANDARD	CCV	0316QB	0.010			0.010	100			
STANDARD	CCV	0316QC	0.011			0.010	110			
SPIKE	MS	940355-2	0.010					<0.001	0.010	100
SPIKE	MSD	940355-2	0.011					<0.001	0.010	110
DUPLICATE	DUP	940355-1	<0.001	<0.001	NC					
PARAMETER:Radium 228, dissolved				DATE/TIME ANALYZED:03/16/94 15:37						QC BATCH NUMBER:149071
REPORTING LIMIT/DF:		UNITS:pCi/l		METHOD REFERENCE :904.0 (4)						TECHNICIAN:BB
BLANK	MB	MB2RB0310	0.8							
STANDARD	LCS	LC1RB0310	13.8			15.0	92			
SPIKE	MS	940367-1	21.5					3.5	21.4	84
SPIKE	MS	940367-7	23.6					4.4	21.4	90
DUPLICATE	MD	940367-8	15.9	16.1	1					
DUPLICATE	MD	940367-10	14.6	14.1	3					
PARAMETER:Thorium 230, dissolved				DATE/TIME ANALYZED:03/15/94 16:27						QC BATCH NUMBER:149081
REPORTING LIMIT/DF:		UNITS:pCi/l		METHOD REFERENCE :						TECHNICIAN:DF
BLANK	MB	MB1T0309	0.2							
BLANK	MB	MB2T0309	0.1							
STANDARD	LCS	ST1T0309	17.8			17.0	105			
STANDARD	LCS	LC1T0309	16.5			17.0	97			
SPIKE	MS	940355-3	24.5					0.6	24.3	98
SPIKE	MS	940355-5	25.5					0.9	24.3	101
DUPLICATE	MD	940317-1	5.9	5.2	13					
DUPLICATE	MD	940355-1	0.4	0.4	0					
PARAMETER:Cadmium, Diss. (Cd)				DATE/TIME ANALYZED:03/16/94 00:50						QC BATCH NUMBER:149086
REPORTING LIMIT/DF: 0.05		UNITS:mg/l		METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	ICB	03168A	<0.05							
BLANK	CCB	03168B	<0.05							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Cadmium, Diss. (Cd)				DATE/TIME ANALYZED:03/16/94 00:50						QC BATCH NUMBER:149086
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	CCB	03168C	<0.05							
BLANK	CCB	03168D	<0.05							
BLANK	CCB	03168E	<0.05							
STANDARD	ICV	03160A	4.65			5.00	93			
STANDARD	CCV	03160B	4.63			5.00	93			
STANDARD	CCV	03160C	4.63			5.00	93			
STANDARD	CCV	03160D	4.89			5.00	98			
STANDARD	CCV	03160E	5.12			5.00	102			
STANDARD	CCV	03160F	5.01			5.00	100			
SPIKE	MS	940355-5	3.96					<0.05	5.00	79
SPIKE	MSD	940355-5	4.03					<0.05	5.00	81
DUPLICATE	DUP	940355-5	<0.05	<0.05	NC					
PARAMETER:Lead, Diss. (Pb)				DATE/TIME ANALYZED:03/16/94 01:02						QC BATCH NUMBER:149087
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	ICB	03168A	<0.05							
BLANK	CCB	03168B	<0.05							
BLANK	CCB	03168C	<0.05							
BLANK	CCB	03168D	<0.05							
BLANK	CCB	03168E	<0.05							
BLANK	CCB	03168F	<0.05							
STANDARD	ICV	03160A	4.83			5.00	97			
STANDARD	CCV	03160B	4.79			5.00	96			
STANDARD	CCV	03160C	4.71			5.00	94			
STANDARD	CCV	03160D	4.59			5.00	92			
STANDARD	CCV	03160E	4.60			5.00	92			
STANDARD	CCV	03160F	4.90			5.00	98			
SPIKE	MS	940355-5	4.15					0.14	5.00	80
SPIKE	MSD	940355-5	4.77					0.14	5.00	93
DUPLICATE	DUP	940355-5	1.86	1.83	2					
PARAMETER:Chromium, Diss. Cr)				DATE/TIME ANALYZED:03/15/94 10:32						QC BATCH NUMBER:149090
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :7190 (2)						TECHNICIAN:JH
BLANK	ICB	03158A	<0.05							
BLANK	CCB	03158B	<0.05							
STANDARD	ICV	03150A	0.95			1.00	95			
STANDARD	CCV	03150B	0.96			1.00	96			
STANDARD	CRDL	DL STD	<0.05			<0.05	NC			
SPIKE	MS	940355-2	0.68					<0.05	1.00	68
SPIKE	MSD	940355-2	0.68					<0.05	1.00	68
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Copper, Diss. (Cu)				DATE/TIME ANALYZED:03/15/94 10:35						QC BATCH NUMBER:149091
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :7210 (2)						TECHNICIAN:JH
BLANK	ICB	0315BA	<0.05							
BLANK	CCB	0315BB	<0.05							
STANDARD	ICV	0315QA	1.01			1.00	101			
STANDARD	CCV	0315QB	0.99			1.00	99			
STANDARD	CRDL	DL STD	0.05			0.05	100			
SPIKE	MS	940355-2	0.99					<0.05	1.00	99
SPIKE	MSD	940355-2	0.98					<0.05	1.00	98
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					
PARAMETER:Arsenic (As), dissolved				DATE/TIME ANALYZED:03/16/94 11:17						QC BATCH NUMBER:149092
REPORTING LIMIT/DF: 0.002 UNITS:mg/l				METHOD REFERENCE :7061 (2)						TECHNICIAN:JH
BLANK	ICB	0316BA	<0.002							
BLANK	CCB	0316BB	<0.002							
BLANK	CCB	0316BC	<0.002							
STANDARD	ICV	0316QA	0.011			0.010	110			
STANDARD	CCV	0316QB	0.010			0.010	100			
STANDARD	CCV	0316QC	0.010			0.010	100			
SPIKE	MS	940355-2	0.010					<0.002	0.010	100
SPIKE	MSD	940355-2	0.010					<0.002	0.010	100
DUPLICATE	MD	940355-1	<0.002	<0.002	NC					
PARAMETER:Sodium, Diss. (Na)				DATE/TIME ANALYZED:03/16/94 12:56						QC BATCH NUMBER:149094
REPORTING LIMIT/DF: 1 UNITS:mg/l				METHOD REFERENCE :7770 (2)						TECHNICIAN:JL
BLANK	ICB	0316BA	<1							
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							
BLANK	CCB	0316BD	<1							
STANDARD	ICV	0316QA	199			200	100			
STANDARD	CCV	0316QB	185			200	92			
STANDARD	CCV	0316QC	187			200	94			
STANDARD	CCV	0316QD	183			200	92			
SPIKE	MS1	940355-5	504					420	100	84
SPIKE	MS2	940355-5	501					420	100	81
SPIKE	MS1	940359-10	432					332	100	100
SPIKE	MS2	940359-10	444					332	100	112
DUPLICATE	MD	940355-5	420	417	1					
DUPLICATE	MD	940359-10	332	326	2					
PARAMETER:Potassium, Diss. (K)				DATE/TIME ANALYZED:03/16/94 16:01						QC BATCH NUMBER:149095
REPORTING LIMIT/DF: 1 UNITS:mg/l				METHOD REFERENCE :7610 (2)						TECHNICIAN:JL
BLANK	ICB	0316BA	<1							
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Potassium, Diss. (K)				DATE/TIME ANALYZED:03/16/94 16:01						QC BATCH NUMBER:149095
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :7610 (2)						TECHNICIAN:JL
BLANK	CCB	03168D	<1							
STANDARD	ICV	0316QA	20			20	100			
STANDARD	CCV	0316QB	20			20	100			
STANDARD	CCV	0316QC	19			20	95			
STANDARD	CCV	0316QD	20			20	100			
SPIKE	MS1	940355-5	30					20	10	100
SPIKE	MS2	940355-5	29					20	10	90
SPIKE	MS1	940359-10	185					90	100	95
SPIKE	MS2	940359-10	182					90	100	92
DUPLICATE	MD	940355-5	20	21	5					
DUPLICATE	MD	940359-10	90	94	4					
PARAMETER:Manganese, Diss. (Mn)				DATE/TIME ANALYZED:03/17/94 13:04						QC BATCH NUMBER:149096
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :7460 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	1.04			1.00	104			
STANDARD	CCV	0317QB	1.09			1.00	109			
STANDARD	CCV	0317QC	0.99			1.00	99			
SPIKE	MS	940355-1	1.13					0.63	0.50	100
SPIKE	MSD	940355-1	1.12					0.63	0.50	98
DUPLICATE	DUP	940355-1	0.63	0.64	2					
PARAMETER:Calcium, Diss. (Ca)				DATE/TIME ANALYZED:03/16/94 16:07						QC BATCH NUMBER:149097
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :7140 (2)						TECHNICIAN:JL
BLANK	ICB	03168A	<1							
BLANK	CCB	03168B	<1							
BLANK	CCB	03168C	<1							
BLANK	CCB	03168D	<1							
STANDARD	ICV	0316QA	20			20	100			
STANDARD	CCV	0316QB	20			20	100			
STANDARD	CCV	0316QC	20			20	100			
STANDARD	CCV	0316QD	20			20	100			
SPIKE	MS1	940355-5	935					481	500	91
SPIKE	MS2	910355-5	920					481	500	88
SPIKE	MS1	940359-10	815					364	500	90
SPIKE	MS2	940359-10	835					364	500	94
DUPLICATE	MD	940355-5	481	483	0					
DUPLICATE	MD	940359-10	364	358	2					
PARAMETER:Iron, Diss. (Fe)				DATE/TIME ANALYZED:03/17/94 13:08						QC BATCH NUMBER:149098
REPORTING LIMIT/DF: 0.5	UNITS:mg/L			METHOD REFERENCE :7380 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.5							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Iron, Diss. (Fe)				DATE/TIME ANALYZED:03/17/94 13:08						QC BATCH NUMBER:149098
REPORTING LIMIT/DF: 0.5	UNITS:mg/l			METHOD REFERENCE :7380 (2)						TECHNICIAN:JH
BLANK	CCB	0317BB	<0.5							
STANDARD	ICV	0317QA	20.0			20.0	100			
STANDARD	CCV	0317QB	20.9			20.0	104			
SPIKE	MS	940355-1	20.8					9.2	10.0	116
SPIKE	MSD	940355-1	20.4					9.2	10.0	112
DUPLICATE	DUP	940355-1	9.2	9.2	0					
PARAMETER:Magnesium, Diss. (Mg)				DATE/TIME ANALYZED:03/16/94 13:13						QC BATCH NUMBER:149099
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :7450 (2)						TECHNICIAN:JL
BLANK	ICB	03168A	<1							
BLANK	CCB	03168B	<1							
BLANK	CCB	03168C	<1							
BLANK	CCB	03168D	<1							
STANDARD	ICV	0316QA	10			10	100			
STANDARD	CCV	0316QB	10			10	100			
STANDARD	CCV	0316QC	10			10	100			
STANDARD	CCV	0316QD	10			10	100			
SPIKE	MS1	940355-5	1820					920	1000	90
SPIKE	MS2	940355-5	1790					920	1000	87
SPIKE	MS1	940359-10	1850					950	1000	90
SPIKE	MS2	940359-10	1860					950	1000	91
DUPLICATE	MD	940355-5	920	905	2					
DUPLICATE	MD	940359-10	950	960	1					
PARAMETER:Boron, Diss. (B)				DATE/TIME ANALYZED:03/17/94 13:14						QC BATCH NUMBER:149100
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.1							
BLANK	CCB	0317BB	<0.1							
BLANK	CCB	0317BC	<0.1							
STANDARD	ICV	0317QA	5.0			5.0	100			
STANDARD	CCV	0317QB	4.7			5.0	94			
STANDARD	CCV	0317QC	4.8			5.0	96			
SPIKE	MS	940355-1	8.3					<0.1	10.0	83
SPIKE	MSD	940355-1	8.5					<0.1	10.0	85
DUPLICATE	DUP	940355-1	<0.1	<0.1	NC					
PARAMETER:Aluminum, Diss. (Al)				DATE/TIME ANALYZED:03/17/94 13:20						QC BATCH NUMBER:149101
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.1							
BLANK	CCB	0317BB	<0.1							
BLANK	CCB	0317BC	<0.1							
STANDARD	ICV	0317QA	4.9			5.0	98			
STANDARD	CCV	0317QB	4.5			5.0	90			

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Aluminum, Diss. (Al)				DATE/TIME ANALYZED:03/17/94 13:20						QC BATCH NUMBER:149101
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
STANDARD	CCV	0317QC	4.7			5.0	94			
SPIKE	MS	940355-1	8.3					0.5	10.0	78
SPIKE	MSD	940355-1	8.3					0.5	10.0	78
DUPLICATE	DUP	940355-1	0.5	0.4	0.1					
PARAMETER:Molybdenum, Diss. (Mo)				DATE/TIME ANALYZED:03/17/94 13:26						QC BATCH NUMBER:149102
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	4.56			5.00	91			
STANDARD	CCV	0317QB	4.95			5.00	99			
STANDARD	CCV	0317QC	4.82			5.00	96			
SPIKE	MS	940355-1	7.69					0.23	10.0	75
SPIKE	MSD	940355-1	8.24					0.23	10.0	80
DUPLICATE	DUP	940355-1	0.23	0.21	0.02					
PARAMETER:Barium, Diss. (Ba)				DATE/TIME ANALYZED:03/17/94 13:33						QC BATCH NUMBER:149104
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	CIB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	4.70			5.00	94			
STANDARD	CCV	0347QB	3.77			5.00	75			
STANDARD	CCV	0317QC	4.40			5.00	88			
SPIKE	MS	940355-1	6.48					<0.05	10.0	65
SPIKE	MSD	940355-1	7.02					<0.05	10.0	70
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					
PARAMETER:Sulfate (SO4), dissolved				DATE/TIME ANALYZED:03/16/94 13:45						QC BATCH NUMBER:149105
REPORTING LIMIT/DF: 10	UNITS:mg/l			METHOD REFERENCE :375.4 (1)						TECHNICIAN:JL
BLANK	RB	DI	<10							
STANDARD	LCS	0316QA	2070			2000	103			
SPIKE	MS1	940355-1	3520					1530	2000	100
SPIKE	MS2	940355-1	3600					1530	2000	103
DUPLICATE	MD	940355-1	1530	1390	10					
PARAMETER:Zinc, Diss. (Zn)				DATE/TIME ANALYZED:03/17/94 13:35						QC BATCH NUMBER:149106
REPORTING LIMIT/DF: 0.01	UNITS:mg/l			METHOD REFERENCE :7950 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.01							
BLANK	CCB	0317BB	<0.01							
STANDARD	ICV	0317QA	0.99			1.00	99			

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/17/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Zinc, Diss. (Zn)				DATE/TIME ANALYZED:03/17/94 13:35						QC BATCH NUMBER:149106
REPORTING LIMIT/DF: 0.01	UNITS:mg/l			METHOD REFERENCE :7950 (2)						TECHNICIAN:JH
STANDARD	CCV	0317QB	0.99			1.00	99			
SPIKE	MS	940355-1	0.99					0.01	1.00	98
SPIKE	MSD	940355-1	1.00					0.01	1.00	99
DUPLICATE	DUP	940355-1	0.01	0.01	0.00					
PARAMETER:Nickel, Diss. (Ni)				DATE/TIME ANALYZED:03/16/94 13:48						QC BATCH NUMBER:149107
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	CIB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
BLANK	CCB	0317BD	<0.05							
BLANK	CCB	0317BE	<0.05							
BLANK	CCB	0317BF	<0.05							
STANDARD	ICV	0317QA	5.30			5.00	106			
STANDARD	CCV	0317QB	5.58			5.00	112			
STANDARD	CCV	0317QC	5.11			5.00	102			
STANDARD	CCV	0317QD	4.11			5.00	82			
STANDARD	CCV	0317QE	5.59			5.00	112			
STANDARD	CCV	0317QF	5.46			5.00	109			
SPIKE	MS	940355-5	3.17					1.12	2.00	102
SPIKE	MSD	940355-5	3.18					1.12	2.00	103
DUPLICATE	DUP	940355-5	1.12	0.96	15					
PARAMETER:Vanadium, Diss. (V)				DATE/TIME ANALYZED:03/16/94 13:51						QC BATCH NUMBER:149108
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	CIB	03168A	<0.05							
BLANK	CCB	03168B	<0.05							
BLANK	CCB	03168C	<0.05							
BLANK	CCB	03168D	<0.05							
BLANK	CCB	03168E	<0.05							
BLANK	CCB	03168F	<0.05							
STANDARD	ICV	0316QA	4.87			5.00	97			
STANDARD	CCV	0316QB	5.16			5.00	103			
STANDARD	CCV	0316QC	5.02			5.00	100			
STANDARD	CCV	0316QD	3.21			5.00	64			
STANDARD	CCV	0316QE	4.96			5.00	99			
STANDARD	CCV	0316QF	4.71			5.00	94			
SPIKE	MS	940359-10	4.94					0.80	5.00	83
SPIKE	MSD	940359-10	5.46					0.80	5.00	93
DUPLICATE	DUP	940359-10	0.80	0.75	6					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL FOOTER

METHOD REFERENCES

(1) EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983
(2) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, November 1990 and July 1992 update
(3) Standard Methods for the Examination of Water and Wastewater, 17th, 1989
(4) EPA 600/4-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980
(5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136)
(6) EPA 600/8-78-017, Microbiological Methods for Monitoring the Environment, December 1978

COMMENTS

(1) The data in the Laboratory Test Results Report may differ from the data in the QC Report due to calculations for sample preparation and/or dilutions.
(2) The "Time Analyzed" in the QC Report may not reflect the actual time of each analysis. The "Date Analyzed" is the actual date of analysis.
(3) Soil and sludge samples are reported on a wet basis or on an "as received" basis unless otherwise indicated.
(4) The data in this report are within the limits of uncertainty specified in the referenced method unless otherwise indicated.
(5) Analyses performed by a subcontract laboratory are indicated with an asterisk and associated code in the "Technician" data field.

Subcontract Laboratories	Code
Core Laboratories - Anaheim, CA	* AN
Core Laboratories - Aurora, CO	* AU
Core Laboratories - Casper, WY	* CA
Core Laboratories - Corpus Christi, TX	* CC
Core Laboratories - Houston, TX	* HP
Core Laboratories - Lake Charles, LA	* LC
Core Laboratories - Long Beach, CA	* LB
Other Subcontract Laboratories	* XX

DEFINITIONS

(1) NC = Not Calculable due to values lower than the reporting limit.
(2) ND = Not Detected above the reporting limit.

QC SAMPLE IDENTIFICATIONS

BLANKS

MB = Method Blank (also referred to as a preparation blank)
RB = Reagent Blank
IB = Instrument Blank
ICB = Initial Calibration Blank
CCB = Continuing Calibration Blank
HB = Holding Blank (also referred to as as a storage blank)

DUPLICATES

MSD = Matrix Spike Duplicate
MD = Method Duplicate

SPIKES

MS = Matrix Spike
MSD = Matrix Spike Duplicate
PDS = Post Digestion Spike
BS = Blank Spike (also referred to as a method spike)
SS = Surrogate Spike

REFERENCE STANDARDS

CS = Calibration Standard
RS = Reference Standard(also referred to as an external reference standard)
ICV = Initial Calibration Verification
CCV = Continuing Calibration Calibration
LCS = Laboratory Control Sample

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

CORE LABORATORIES
A N A L Y T I C A L R E P O R T

Job Number: 940355
Prepared For:

PETROTOMICS COMPANY
STEVE PFAFF
P. O. BOX 8509
SHIRLEY BASIN, WY 82615

Date: 03/29/94

Signature

Date: 3/29/94

Name: John Hewett

Core Laboratories, Inc.
420 West First Street
Casper, WY 82601

Title: Supervising Chemist

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 11:18
WORK DESCRIPTION...: 16 DC

LABORATORY I.D...: 940355-0001
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	0.5	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	359	10	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	9.2	0.5	mg/L	7380 (2)	03/17/94	JH
Magnesium, Diss. (Mg)	120	10	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	0.63	0.05	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	0.23	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.12	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	12	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	71	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	0.51	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.01	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	159		pCi/l	EPA 903.1	03/16/94	MRF
Radium 226, diss., error, +/-	4.7		pCi/l		03/16/94	MRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	MRF
Radium 228, dissolved	7.0		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	1.9		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB
Thorium 230, dissolved	0.4		pCi/l		03/15/94	DF

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS

03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 11:18
WORK DESCRIPTION...: 16 DC

LABORATORY I.D...: 940355-0001
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, diss., error, +/-	0.2		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.2		pCi/l		03/15/94	DF
Alkalinity, total	293	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	2660	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.98	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	2410	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	358	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	1530	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	59	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	0.8	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.2	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Lead (Pb), dissolved	<0.002	0.002	mg/l	7421 (2)	03/24/94	AF
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.082	0.001	mg/l	908.1 (1)	03/07/94	RS

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: CO0318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:10
WORK DESCRIPTION...: 15 DC

LABORATORY I.D...: 940355-0002
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	7.5	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	373	10	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	3040	50	mg/L	7380 (2)	03/17/94	JH
Magnesium, Diss. (Mg)	1240	100	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	114	5	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	2.38	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	3.87	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	28	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	366	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	2.02	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	2.40	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	847		pCi/l	EPA 903.1	03/16/94	MRF
Radium 226, diss., error, +/-	10.8		pCi/l		03/16/94	MRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	MRF
Radium 228, dissolved	15.6		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	2.3		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB
Thorium 230, dissolved	0.7		pCi/l		03/15/94	DF

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:10
WORK DESCRIPTION...: 15 DC

LABORATORY I.D...: 940355-0002
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, diss., error, +/-	0.3		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.2		pCi/l		03/15/94	DF
Alkalinity, total	120	1	mg/' CaCO3	310.1 (1)	03/04/94	JL
Conductivity	11800	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	5.85	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	19200	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	146	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	11900	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	318	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	17.5	0.2	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	7.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Lead (Pb), dissolved	0.013	0.002	mg/l	7421 (2)	03/24/94	AF
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.003	0.001	mg/l	908.1 (1)	03/07/94	RS

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:50
WORK DESCRIPTION...: ER-1

LABORATORY I.D...: 940355-0003
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	6	1	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	0.6	0.5	mg/L	7380 (2)	03/17/94	JH
Magnesium, Diss. (Mg)	3	1	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	0.22	0.05	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.08	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	1	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	7	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.02	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	1.6		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	0.6		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	0.8		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	1.6		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB
Thorium 230, dissolved	0.6		pCi/l		03/15/94	DF

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/01/94
TIME SAMPLED.....: 16:50
WORK DESCRIPTION...: ER-1

LABORATORY I.D...: 940355-0003
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, diss., error, +/-	0.4		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.4		pCi/l		03/15/94	DF
Alkalinity, total	16	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	101	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	7.40	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	46	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	20	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	20	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	3	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	<0.1	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.3	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Lead (Pb), dissolved	<0.002	0.002	mg/l	7421 (2)	03/24/94	AF
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	<0.001	0.001	mg/l	908.1 (1)	03/07/94	RS

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTONICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:03
WORK DESCRIPTION...: 14 DC

LABORATORY I.D...: 940355-0004
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	0.8	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	535	50	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	523	5	mg/L	7380 (2)	03/17/94	JH
Magnesium, Diss. (Mg)	925	50	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	40.5	0.5	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	1.09	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	0.60	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	22	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	414	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	1.60	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.08	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	1230		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	13.0		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	10.9		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	2.1		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB
Thorium 230, dissolved	1.1		pCi/l		03/15/94	DF

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:03
WORK DESCRIPTION...: 14 DC

LABORATORY I.D...: 940355-0004
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, diss., error, +/-	0.4		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.4		pCi/l		03/15/94	DF
Alkalinity, total	360	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	8640	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.16	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	10900	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	439	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	6640	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	342	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	1.2	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Lead (Pb), dissolved	<0.002	0.002	mg/l	7421 (2)	03/24/94	AF
Mercury (Hg), dissolved	<0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.032	0.001	mg/l	908.1 (1)	03/07/94	RS

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:33
WORK DESCRIPTION...: 41 CD

LABORATORY I.D...: 940355-0005
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Aluminum, Diss. (Al)	0.7	0.1	mg/l	6010 (2)	03/17/94	JH
Barium, Diss. (Ba)	<0.05	0.05	mg/l	6010 (2)	03/17/94	JH
Boron, Diss. (B)	<0.1	0.1	mg/l	6010 (2)	03/17/94	JH
Cadmium, Diss. (Cd)	<0.05	0.05	mg/l	6010 (2)	03/16/94	JL
Calcium, Diss. (Ca)	481	10	mg/l	7140 (2)	03/16/94	JL
Chromium, Diss. Cr)	<0.05	0.05	mg/l	7190 (2)	03/15/94	JH
Copper, Diss. (Cu)	<0.05	0.05	mg/l	7210 (2)	03/15/94	JH
Iron, Diss. (Fe)	520	5	mg/L	7380 (2)	03/17/94	JH
Magnesium, Diss. (Mg)	920	50	mg/l	7450 (2)	03/16/94	JL
Manganese, Diss. (Mn)	41.0	0.5	mg/l	7460 (2)	03/17/94	JH
Molybdenum, Diss. (Mo)	1.00	0.05	mg/l	6010 (2)	03/17/94	JH
Nickel, Diss. (Ni)	1.12	0.05	mg/l	6010 (2)	03/16/94	JL
Potassium, Diss. (K)	20	1	mg/l	7610 (2)	03/16/94	JL
Sodium, Diss. (Na)	420	1	mg/l	7770 (2)	03/16/94	JL
Vanadium, Diss. (V)	2.49	0.05	mg/l	6010 (2)	03/16/94	JL
Zinc, Diss. (Zn)	0.09	0.01	mg/l	7950 (2)	03/17/94	JH
Radium 226, dissolved	1450		pCi/l	EPA 903.1	03/16/94	NRF
Radium 226, diss., error, +/-	14.1		pCi/l		03/16/94	NRF
Radium 226, diss., LLD	0.5		pCi/l		03/16/94	NRF
Radium 228, dissolved	14.0		pCi/l	904.0 (4)	03/16/94	BB
Radium 228, diss., error, +/-	2.2		pCi/l		03/16/94	BB
Radium 228, diss., LLD	2.7		pCi/l		03/16/94	BB
Thorium 230, dissolved	0.9		pCi/l		03/15/94	DF

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

LABORATORY TESTS RESULTS
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

CLIENT I.D.....: C00318.002
DATE SAMPLED.....: 03/02/94
TIME SAMPLED.....: 09:33
WORK DESCRIPTION...: 41 CD

LABORATORY I.D...: 940355-0005
DATE RECEIVED....: 03/02/94
TIME RECEIVED....: 12:00
REMARKS.....: WATER

TEST DESCRIPTION	FINAL RESULT	DETECTION LIMIT	UNITS OF MEASURE	TEST METHOD	DATE	TECHNICIAN
Thorium 230, diss., error, +/-	0.3		pCi/l		03/15/94	DF
Thorium 230, diss., LLD	0.1		pCi/l		03/15/94	DF
Alkalinity, total	370	1	mg/l CaCO3	310.1 (1)	03/04/94	JL
Conductivity	8750	1	umho/cm @77F	120.1 (1)	03/03/94	JL
pH	6.20	0.01	pH units	150.1 (1)	03/02/94	JL
Total Dissolved Solids (TDS)	10600	10	mg/l	160.1 (1)	03/03/94	JL
Bicarbonate (HCO3), dissolved	451	5	mg/l	310.1 (1)	03/04/94	JL
Carbonate (CO3), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Hydroxide (OH), dissolved	<1	1	mg/l	310.1 (1)	03/04/94	JL
Sulfate (SO4), dissolved	6400	10	mg/l	375.4 (1)	03/16/94	JL
Chloride (Cl), dissolved	332	1	mg/l	325.3 (1)	03/04/94	JL
Ammonia (NH3-N), dissolved	1.2	0.1	mg/l	350.3 (1)	03/09/94	RCP
Fluoride (F), dissolved	0.1	0.1	mg/l	340.2 (1)	03/02/94	AF
Nitrate (NO3-N), dissolved	<0.05	0.05	mg/l	353.3 (1)	03/05/94	RCP
Nitrite (NO2-N), dissolved	<0.02	0.02	mg/l	354.1 (1)	03/02/94	JL
Arsenic (As), dissolved	<0.002	0.002	mg/l	7061 (2)	03/16/94	JH
Lead (Pb), dissolved	0.002	0.002	mg/l	7421 (2)	03/24/94	AF
Mercury (Hg), dissolved	0.0002	0.0002	mg/l	7470 (2)	03/03/94	AF
Selenium (Se), dissolved	<0.001	0.001	mg/l	7741 (2)	03/16/94	JH
Uranium (U), dissolved	0.026	0.001	mg/l	908.1 (1)	03/07/94	RS

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTONICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Vanadium, Diss. (V)				DATE/TIME ANALYZED:03/16/94 13:51						QC BATCH NUMBER:149108
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	CCB	03168C	<0.05							
BLANK	CCB	03168D	<0.05							
BLANK	CCB	03168E	<0.05							
BLANK	CCB	03168F	<0.05							
STANDARD	ICV	03160A	4.87			5.00	97			
STANDARD	CCV	03160B	5.16			5.00	103			
STANDARD	CCV	03160C	5.02			5.00	100			
STANDARD	CCV	03160D	3.21			5.00	64			
STANDARD	CCV	03160E	4.96			5.00	99			
STANDARD	CCV	03160F	4.71			5.00	94			
SPIKE	MS	940359-10	4.94					0.80	5.00	83
SPIKE	MSD	940359-10	5.46					0.80	5.00	93
DUPLICATE	DUP	940359-10	0.80	0.75	6					
PARAMETER:Lead (Pb), dissolved				DATE/TIME ANALYZED:03/24/94 16:11						QC BATCH NUMBER:149387
REPORTING LIMIT/DF: 0.002 UNITS:mg/l				METHOD REFERENCE :7421 (2)						TECHNICIAN:AF
BLANK	ICB	0324BA	<0.002							
BLANK	CCB	0324BB	<0.002							
BLANK	CCB	0324BC	<0.002							
BLANK	ICAL	ICAL1	<0.002							
STANDARD	ICV	0324QA	0.052			0.050	104			
STANDARD	CCV	0324QB	0.052			0.050	104			
STANDARD	CCV	0324QC	0.053			0.050	106			
STANDARD	ICAL	ICAL2	0.025			0.025	100			
STANDARD	ICAL	ICAL4	0.050			0.050	100			
STANDARD	ICAL	ICAL5	0.100			0.100	100			
SPIKE	MS	940449-10	0.048					<0.002	0.050	96
DUPLICATE	DUP	940449-10	<0.002	<0.002	NC					

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

	SOLUTION	BLANK	MODIFIER
LANK	--	20	5
TANDARD 1	5	15	5
TANDARD 2	10	10	5
TANDARD 3	15	5	5
TANDARD 4	20		5
AMPLE	20		5

RECALIBRATION RATE 0
RESLOPE RATE 0

LTIPLE INJECT NO HOT INJECT NO PRE INJECT NO

DITIONS FOR Pb :

imum Ash Temperature : 400 xC
commended Atomize Temperature : 2000 xC

esponse with Argon :
microlitres of 30 micrograms/litre gives about 0.2 ABS.

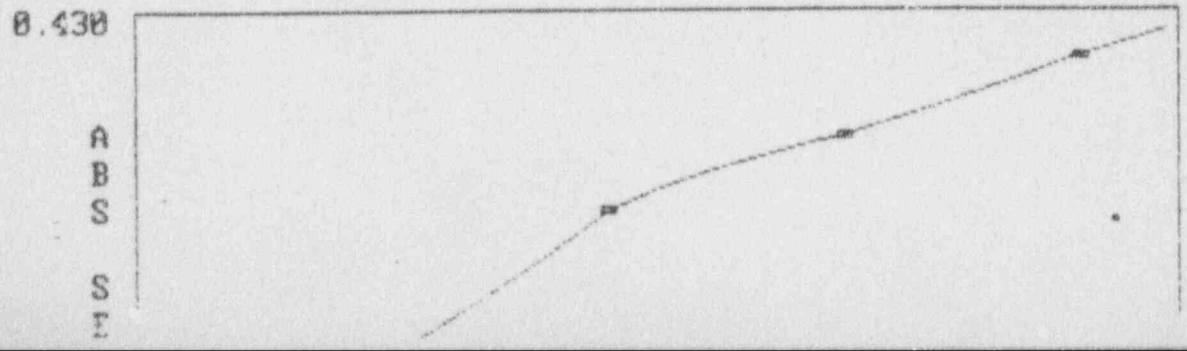
7.0 nm wavelength gives twice the absorbance,
t 283.3 nm is recommended because background absorbance
d baseline noise are lower.

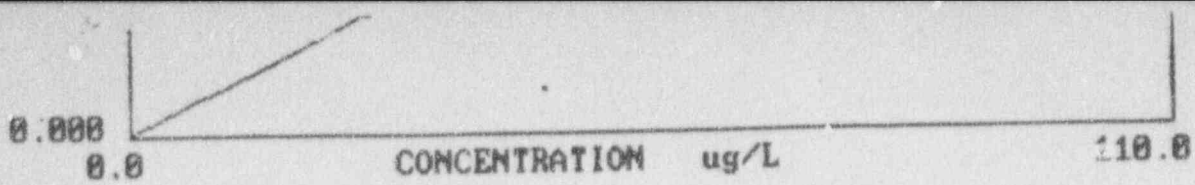
e of a multi-element lamp may require a different slit width,
p current and wavelength to isolate the analytical line.

	%SD	MEAN ABS	
0.0		0.023	0.023
25.0	0.0	0.109	0.109
50.0	0.0	0.248	0.248
75.0	0.0	0.318	0.318
100.0	0.0	0.391	0.391

PB

QA 149276.





PB

03-24-94 AF

	AREA	SPEED	MEAN AREA	READINGS
	52.1	0.0	0.256	0.256
	1.2	0.0	0.005	0.005
	1.1	0.0	0.005	0.005
	7.5	0.0	0.033	0.033
	3.1	0.0	0.014	0.014
	2.4	0.0	0.011	0.011
	3.2	0.0	0.014	0.014
	2.4	0.0	0.010	0.010
	10.7	0.0	0.047	0.047
	5.7	0.0	0.025	0.025
	8.2	0.0	0.036	0.036
	1.8	0.0	0.008	0.008
	2.2	0.0	0.010	0.010
	47.6	0.0	0.233	0.233
	51.6	0.0	0.254	0.254
	1.0	0.0	0.004	0.004
	1.7	0.0	0.008	0.008
	12.7	0.0	0.055	0.055
	0.6	0.0	0.003	0.003
	1.5	0.0	0.007	0.007
	2.5	0.0	0.011	0.011
	0.0		-0.032	-0.032
	9.6	0.0	0.042	0.042
	53.0	0.0	0.259	0.259
	0.1	0.0	0.000	0.000

QA
149276

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Fluoride (f), dissolved				DATE/TIME ANALYZED:03/02/94 16:22						QC BATCH NUMBER:148649
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :340.2 (1)						TECHNICIAN:AF
BLANK	ICB	940031	<0.1							
BLANK	CCB	940032	<0.1							
STANDARD	ICV	940028	5.0			5.0	100			
STANDARD	CCV	940029	5.1			5.0	102			
STANDARD	LCS	940030	5.2			5.0	104			
SPIKE	MS1	940355-5	0.6					0.1	0.5	100
SPIKE	MS2	940355-5	0.6					0.1	0.5	100
DUPLICATE	MD	940355-2	7.1	7.1	0					
PARAMETER:pH				DATE/TIME ANALYZED:03/02/94 15:30						QC BATCH NUMBER:148693
REPORTING LIMIT/DF: 0.01	UNITS:pH units			METHOD REFERENCE :150.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7.00			7.00	100			
DUPLICATE	MD	940357-1	7.42	7.44	0					
PARAMETER:Conductivity				DATE/TIME ANALYZED:03/03/94 11:00						QC BATCH NUMBER:148695
REPORTING LIMIT/DF: 1	UNITS:umho/cm @77f			METHOD REFERENCE :120.1 (1)						TECHNICIAN:JL
STANDARD	LCS	L0303401	152			147	103			
STANDARD	LCS	L0303402	1420			1410	101			
STANDARD	LCS	L0303403	12900			12900	100			
DUPLICATE	MD	940355-5	8750	8710	0					
DUPLICATE	MD	940359-10	14800	14900	1					
PARAMETER:Mercury (Hg), dissolved				DATE/TIME ANALYZED:03/03/94 10:01						QC BATCH NUMBER:148747
REPORTING LIMIT/DF: 0.0002	UNITS:mg/l			METHOD REFERENCE :7470 (2)						TECHNICIAN:AF
BLANK	ICB	A94099	<0.0002							
BLANK	CCB	A94104	<0.0002							
BLANK	PB	REAGENT	<0.0002							
STANDARD	ICV/LCS	A94103	0.0021			0.0020	105			
STANDARD	CCV/LCS	A94104	0.0022			0.0020	110			
SPIKE	MS1	940355-5	0.0022					0.0002	0.0020	100
SPIKE	MS2	940355-5	0.0022					0.0002	0.0020	100
SPIKE	MS	940359-10	0.0017					<0.0002	0.0020	85
DUPLICATE	MD	940359-10	<0.0002	<0.0002	NC					
PARAMETER:Alkalinity, total				DATE/TIME ANALYZED:03/04/94 13:26						QC BATCH NUMBER:148752
REPORTING LIMIT/DF: 1	UNITS:mg/l CaCO3			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7			7	100			
STANDARD	LCS	BUFFER	4			4	100			
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940355-5	370	370	0					
DUPLICATE	MD	940357-3	280	280	0					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Carbonate (CO3), dissolved				DATE/TIME ANALYZED:03/04/94 13:36						QC BATCH NUMBER:148753
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
STANDARD	LCS	BUFFER	7			7	100			
STANDARD	LCS	BUFFER	4			4	100			
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940355-5	<1	<1	NC					
DUPLICATE	MD	940357-3	<1	<1	NC					
PARAMETER:Bicarbonate (HCO3), dissolved				DATE/TIME ANALYZED:03/04/94 13:42						QC BATCH NUMBER:148754
REPORTING LIMIT/DF: 5	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
DUPLICATE	MD	940359-1	<5	<5	NC					
DUPLICATE	MD	940355-5	451	451	0					
DUPLICATE	MD	940357-3	342	342	0					
DUPLICATE	MD	940359-7	116	122	5					
PARAMETER:Hydroxide (OH), dissolved				DATE/TIME ANALYZED:03/04/94 14:44						QC BATCH NUMBER:148755
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :310.1 (1)						TECHNICIAN:JL
DUPLICATE	MD	940359-1	<1	<1	NC					
DUPLICATE	MD	940359-10	<1	<1	NC					
DUPLICATE	MD	940355-5	<1	<1	NC					
PARAMETER:Total Dissolved Solids (TDS)				DATE/TIME ANALYZED:03/03/94 13:00						QC BATCH NUMBER:148763
REPORTING LIMIT/DF: 10	UNITS:mg/l			METHOD REFERENCE :160.1 (1)						TECHNICIAN:JL
BLANK	REAGENT	DI	<10							
STANDARD	LCS	L0303404	990			1000	99			
DUPLICATE	MD	940355-5	10600	10700	1					
DUPLICATE	MD	940357-3	12400	12400	0					
DUPLICATE	MD	940342-1	1400	1390	1					
PARAMETER:Chloride (Cl), dissolved				DATE/TIME ANALYZED:03/04/94 15:00						QC BATCH NUMBER:148781
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :325.3 (1)						TECHNICIAN:JL
BLANK	RB	DI	1							
STANDARD	LCS	L0304404	499			500	100			
SPIKE	MS	940342-1	108					59	50	98
SPIKE	MS	940359-10	450					352	100	98
SPIKE	MS	940359-7	161					113	50	96
SPIKE	MS	940359-8	125					75	50	100
SPIKE	MS	940367-10	235					137	100	98
DUPLICATE	MD	940342-1	59	59	0					
DUPLICATE	MD	940355-5	332	328	1					
DUPLICATE	MD	940359-10	352	352	0					
DUPLICATE	MD	940367-10	137	137	0					

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Nitrite (NO2-N), dissolved				DATE/TIME ANALYZED:03/02/94 15:45						QC BATCH NUMBER:148782
REPORTING LIMIT/DF: 0.02 UNITS:mg/l				METHOD REFERENCE :354.1 (1)						TECHNICIAN:JL
BLANK	REAGENT	DI	<0.02							
STANDARD	LCS	L0302408	0.05			0.05	100			
SPIKE	MS	940355-1	0.05					<0.02	0.05	100
DUPLICATE	MD	940355-1	<0.02	<0.02	NC					
PARAMETER:Uranium (U), dissolved				DATE/TIME ANALYZED:03/07/94 09:09						QC BATCH NUMBER:148802
REPORTING LIMIT/DF:		UNITS:mg/l		METHOD REFERENCE :908.1 (1)						TECHNICIAN:RS
BLANK	MB	MB1UN0307	<0.001							
BLANK	CCB ugU308	CCB1UN0307	<1.0							
BLANK	CCB ugU308	CCB2UN0307	<1.0							
BLANK	CCB ugU308	CCB3UN0307	<1.0							
BLANK	CCB ugU308	CCB4UN0307	<1.0							
BLANK	CCB ugU308	CCB5UN0307	<1.0							
STANDARD	LCS	LC1UN0307	0.041			0.035	117			
STANDARD	LCS	LC2UN0307	0.041			0.035	117			
STANDARD	CCV ugU308	CCV1UN0307	1000			1000	100			
STANDARD	CCV ugU308	CCV2UN0307	997			1000	100			
STANDARD	CCV ugU308	CCV3UN0307	999			1000	100			
STANDARD	CCV ugU308	CCV4UN0307	9950			10000	100			
STANDARD	CCV ugU308	CCV5UN0307	9860			10000	99			
SPIKE	MS	940363-1	0.105					0.001	0.100	104
DUPLICATE	MD	940363-1	0.001	0.001	0					
PARAMETER:Sulfate (SO4), dissolved				DATE/TIME ANALYZED:03/07/94 17:50						QC BATCH NUMBER:148805
REPORTING LIMIT/DF: 10		UNITS:mg/l		METHOD REFERENCE :375.4 (1)						TECHNICIAN:AF
BLANK	ICB	A030715	<10							
BLANK	CCB	A030715	<10							
BLANK	PB	A030712	<10							
STANDARD	ICV/LCS	A030712	2010			2000	100			
STANDARD	CCV/LCS	A030714	1980			2000	99			
SPIKE	MS	940355-1	2390					1210	1000	118
SPIKE	MSD	940355-1	2390					1210	1000	118
SPIKE	MS	940359-7	2010					1150	1000	86
SPIKE	MS	940367-2	2250					1110	1000	114
DUPLICATE	MD	940363-1	206	230	11					
DUPLICATE	MD	940355-2	14200	14800	4					
DUPLICATE	MD	940359-7	1150	1090	5					
DUPLICATE	MD	940367-7	1200	1180	2					
PARAMETER:Ammonia (NH3-N), dissolved				DATE/TIME ANALYZED:03/09/94 12:39						QC BATCH NUMBER:148842
REPORTING LIMIT/DF: 0.1		UNITS:mg/l		METHOD REFERENCE :350.3 (1)						TECHNICIAN:RCP
BLANK	ICB		<0.1							
BLANK	CCB		<0.1							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Ammonia (NH3-N), dissolved				DATE/TIME ANALYZED:03/09/94 12:39						QC BATCH NUMBER:148842
REPORTING LIMIT/DF: 0.1 UNITS:mg/l				METHOD REFERENCE :350.3 (1)						TECHNICIAN:RCP
STANDARD	LCS	LCS1	5.1			5.0	102			
STANDARD	LCS	LCS2	4.9			5.0	98			
SPIKE	MS1	940359-4	4.8					<0.1	5.0	96
SPIKE	MS2	940359-4	4.9					<0.1	5.0	98
DUPLICATE	MD1	940359-5	<0.1	<0.1	NC					
DUPLICATE	MD2	940359-5	<0.1	<0.1	NC					
PARAMETER:Radium 226, dissolved				DATE/TIME ANALYZED:03/16/94 11:50						QC BATCH NUMBER:149058
REPORTING LIMIT/DF: UNITS:pCi/l				METHOD REFERENCE :903.1 (4)						TECHNICIAN:NRF
BLANK	MB	MB2R60310	ND							
STANDARD	LCS	LC1R60310	14.6			15.0	97			
SPIKE	MS	940367-4	68.8					47.4	21.4	100
DUPLICATE	MD	940367-8	61.1	62.8	3					
DUPLICATE	MD	940367-10	57.9	63.2	9					
PARAMETER:Selenium (Se), dissolved				DATE/TIME ANALYZED:03/16/94 14:45						QC BATCH NUMBER:149066
REPORTING LIMIT/DF: 0.001 UNITS:mg/l				METHOD REFERENCE :7741 (2)						TECHNICIAN:JH
BLANK	ICB	0316BA	<0.001							
BLANK	CCB	0316BB	<0.001							
BLANK	CCB	0313BC	<0.001							
STANDARD	ICV	0316QA	0.009			0.010	90			
STANDARD	CCV	0316QB	0.010			0.010	100			
STANDARD	CCV	0316QC	0.011			0.010	110			
SPIKE	MS	940355-2	0.010					<0.001	0.010	100
SPIKE	MSD	940355-2	0.011					<0.001	0.010	110
DUPLICATE	DUP	940355-1	<0.001	<0.001	NC					
PARAMETER:Radium 228, dissolved				DATE/TIME ANALYZED:03/16/94 15:37						QC BATCH NUMBER:149071
REPORTING LIMIT/DF: UNITS:pCi/l				METHOD REFERENCE :904.0 (4)						TECHNICIAN:SB
BLANK	MB	MB2R80310	0.8							
STANDARD	LCS	LC1R80310	13.8			15.0	92			
SPIKE	MS	940367-1	21.5					3.5	21.4	84
SPIKE	MS	940367-7	23.6					4.4	21.4	90
DUPLICATE	MD	940367-8	15.9	16.1	1					
DUPLICATE	MD	940367-10	14.6	14.1	3					
PARAMETER:Thorium 230, dissolved				DATE/TIME ANALYZED:03/15/94 16:27						QC BATCH NUMBER:149081
REPORTING LIMIT/DF: UNITS:pCi/l				METHOD REFERENCE :						TECHNICIAN:DF
BLANK	MB	MB1T0309	0.2							
BLANK	MB	MB2T0309	0.1							
STANDARD	LCS	ST1T0309	17.8			17.0	105			
STANDARD	LCS	LC1T0309	16.5			17.0	97			

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 960355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Thorium 230, dissolved				DATE/TIME ANALYZED:03/15/94 16:27						QC BATCH NUMBER:149081
REPORTING LIMIT/DF:	UNITS:pCi/l			METHOD REFERENCE :						TECHNICIAN:DF
SPIKE	MS	940355-3	24.5					0.6	24.3	98
SPIKE	MS	940355-5	25.5					0.9	24.3	101
DUPLICATE	MD	940317-1	5.9	5.2	13					
DUPLICATE	MD	940355-1	0.4	0.4	0					
PARAMETER:Thorium 230, diss., error, +/-				DATE/TIME ANALYZED:03/15/94 16:31						QC BATCH NUMBER:149082
REPORTING LIMIT/DF:	UNITS:pCi/l			METHOD REFERENCE :						TECHNICIAN:DF
DUPLICATE	MD	940317-1	1.6	1.4	13					
DUPLICATE	MD	940355-1	0.2	0.3	40					
PARAMETER:Cadmium, Diss. (Cd)				DATE/TIME ANALYZED:03/16/94 00:50						QC BATCH NUMBER:149086
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	ICB	0316BA	<0.05							
BLANK	CCB	0316BB	<0.05							
BLANK	CCB	0316BC	<0.05							
BLANK	CCB	0316BD	<0.05							
BLANK	CCB	0316BE	<0.05							
STANDARD	ICV	0316QA	4.65			5.00	93			
STANDARD	CCV	0316QB	4.63			5.00	93			
STANDARD	CCV	0316QC	4.63			5.00	93			
STANDARD	CCV	0316QD	4.89			5.00	98			
STANDARD	CCV	0316QE	5.12			5.00	102			
STANDARD	CCV	0316QF	5.01			5.00	100			
SPIKE	MS	940355-5	3.96					<0.05	5.00	79
SPIKE	MSD	940355-5	4.03					<0.05	5.00	81
DUPLICATE	DUP	940355-5	<0.05	<0.05	NC					
PARAMETER:Lead, Diss. (Pb)				DATE/TIME ANALYZED:03/16/94 01:02						QC BATCH NUMBER:149087
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
BLANK	ICB	0316BA	<0.05							
BLANK	CCB	0316BB	<0.05							
BLANK	CCB	0316BC	<0.05							
BLANK	CCB	0316BD	<0.05							
BLANK	CCB	0316BE	<0.05							
BLANK	CCB	0316BF	<0.05							
STANDARD	ICV	0316QA	4.83			5.00	97			
STANDARD	CCV	0316QB	4.79			5.00	96			
STANDARD	CCV	0316QC	4.71			5.00	94			
STANDARD	CCV	0316QD	4.59			5.00	92			
STANDARD	CCV	0316QE	4.60			5.00	92			
STANDARD	CCV	0316QF	4.90			5.00	98			
SPIKE	MS	940355-5	4.15					0.14	5.00	80
SPIKE	MSD	940355-5	4.77					0.14	5.00	93

AMENDED REPORT

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Lead, Diss. (Pb)				DATE/TIME ANALYZED:03/16/94 01:02						QC BATCH NUMBER:149087
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :6010 (2)						TECHNICIAN:JL
DUPLICATE	DUP	940355-5	1.86	1.83	2					
PARAMETER:Chromium, Diss. Cr)				DATE/TIME ANALYZED:03/15/94 10:32						QC BATCH NUMBER:149090
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :7190 (2)						TECHNICIAN:JH
BLANK	ICB	03150A	<0.05							
BLANK	CCB	0315BB	<0.05							
STANDARD	ICV	0315QA	0.95			1.00	95			
STANDARD	CCV	0315QB	0.96			1.00	96			
STANDARD	CRDL	DL STD	<0.05			<0.05	NC			
SPIKE	MS	940355-2	0.68					<0.05	1.00	68
SPIKE	MSD	940355-2	0.68					<0.05	1.00	68
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					
PARAMETER:Copper, Diss. (Cu)				DATE/TIME ANALYZED:03/15/94 10:35						QC BATCH NUMBER:149091
REPORTING LIMIT/DF: 0.05 UNITS:mg/l				METHOD REFERENCE :7210 (2)						TECHNICIAN:JH
BLANK	ICB	03158A	<0.05							
BLANK	CCB	0315BB	<0.05							
STANDARD	ICV	0315QA	1.01			1.00	101			
STANDARD	CCV	0315QB	0.99			1.00	99			
STANDARD	CRDL	DL STD	0.05			0.05	100			
SPIKE	MS	940355-2	0.99					<0.05	1.00	99
SPIKE	MSD	940355-2	0.98					<0.05	1.00	98
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					
PARAMETER:Arsenic (As), dissolved				DATE/TIME ANALYZED:03/16/94 11:17						QC BATCH NUMBER:149092
REPORTING LIMIT/DF: 0.002 UNITS:mg/l				METHOD REFERENCE :7061 (2)						TECHNICIAN:JH
BLANK	ICB	03168A	<0.002							
BLANK	CCB	0316BB	<0.002							
BLANK	CCB	0316BC	<0.002							
STANDARD	ICV	0316QA	0.011			0.010	110			
STANDARD	CCV	0316QB	0.010			0.010	100			
STANDARD	CCV	0316QC	0.010			0.010	100			
SPIKE	MS	940355-2	0.010					<0.002	0.010	100
SPIKE	MSD	940355-2	0.010					<0.002	0.010	100
DUPLICATE	MD	940355-1	<0.002	<0.002	NC					
PARAMETER:Sodium, Diss. (Na)				DATE/TIME ANALYZED:03/16/94 12:56						QC BATCH NUMBER:149094
REPORTING LIMIT/DF: 1 UNITS:mg/l				METHOD REFERENCE :7770 (2)						TECHNICIAN:JL
BLANK	ICB	03168A	<1							
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							
BLANK	CCB	0316BD	<1							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Sodium, Diss. (Na) REPORTING LIMIT/DF: 1 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 12:56 METHOD REFERENCE :7770 (2)						QC BATCH NUMBER:149094 TECHNICIAN:JL
STANDARD	ICV	0316QA	199			200	100			
STANDARD	CCV	0316QB	185			200	92			
STANDARD	CCV	0316QC	187			200	94			
STANDARD	CCV	0316QD	183			200	92			
SPIKE	MS1	940355-5	504					420	100	84
SPIKE	MS2	940355-5	501					420	100	81
SPIKE	MS1	940359-10	432					332	100	100
SPIKE	MS2	940359-10	444					332	100	112
DUPLICATE	MD	940355-5	420	417	1					
DUPLICATE	MD	940359-10	332	326	2					
PARAMETER:Potassium, Diss. (K) REPORTING LIMIT/DF: 1 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 16:01 METHOD REFERENCE :7610 (2)						QC BATCH NUMBER:149095 TECHNICIAN:JL
BLANK	ICB	0316BA	<1							
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							
BLANK	CCB	0316BD	<1							
STANDARD	ICV	0316QA	20			20	100			
STANDARD	CCV	0316QB	20			20	100			
STANDARD	CCV	0316QC	19			20	95			
STANDARD	CCV	0316QD	20			20	100			
SPIKE	MS1	940355-5	30					20	10	100
SPIKE	MS2	940355-5	29					20	10	90
SPIKE	MS1	940359-10	185					90	100	95
SPIKE	MS2	940359-10	182					90	100	92
DUPLICATE	MD	940355-5	20	21	5					
DUPLICATE	MD	940359-10	90	94	4					
PARAMETER:Manganese, Diss. (Mn) REPORTING LIMIT/DF: 0.05 UNITS:mg/l				DATE/TIME ANALYZED:03/17/94 13:04 METHOD REFERENCE :7460 (2)						QC BATCH NUMBER:149096 TECHNICIAN:JH
BLANK	ICB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	1.04			1.00	104			
STANDARD	CCV	0317QB	1.09			1.00	109			
STANDARD	CCV	0317QC	0.99			1.00	99			
SPIKE	MS	940355-1	1.13					0.63	0.50	100
SPIKE	MSD	940355-1	1.12					0.63	0.50	98
DUPLICATE	DUP	940355-1	0.63	0.64	2					
PARAMETER:Calcium, Diss. (Ca) REPORTING LIMIT/DF: 1 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 16:07 METHOD REFERENCE :7140 (2)						QC BATCH NUMBER:149097 TECHNICIAN:JL
BLANK	ICB	03168A	<1							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Calcium, Diss. (Ca)				DATE/TIME ANALYZED:03/16/94 16:07						QC BATCH NUMBER:149097
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :7140 (2)						TECHNICIAN:JL
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							
BLANK	CCB	0316BD	<1							
STANDARD	ICV	0316QA	20			20	100			
STANDARD	CCV	0316QB	20			20	100			
STANDARD	CCV	0316QC	20			20	100			
STANDARD	CCV	0316QD	20			20	100			
SPIKE	MS1	940355-5	935					481	500	91
SPIKE	MS2	910355-5	920					481	500	88
SPIKE	MS1	940359-10	815					364	500	90
SPIKE	MS2	940359-10	835					364	500	94
DUPLICATE	MD	940355-5	481	483	0					
DUPLICATE	MD	940359-10	364	358	2					
PARAMETER:Iron, Diss. (Fe)				DATE/TIME ANALYZED:03/17/94 13:08						QC BATCH NUMBER:149098
REPORTING LIMIT/DF: 0.5	UNITS:mg/L			METHOD REFERENCE :7380 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.5							
BLANK	CCB	0317BB	<0.5							
STANDARD	ICV	0317QA	20.0			20.0	100			
STANDARD	CCV	0317QB	20.9			20.0	104			
SPIKE	MS	940355-1	20.8					9.2	10.0	116
SPIKE	MSD	940355-1	20.4					9.2	10.0	112
DUPLICATE	DUP	940355-1	9.2	9.2	0					
PARAMETER:Magnesium, Diss. (Mg)				DATE/TIME ANALYZED:03/16/94 13:13						QC BATCH NUMBER:149099
REPORTING LIMIT/DF: 1	UNITS:mg/l			METHOD REFERENCE :7450 (2)						TECHNICIAN:JL
BLANK	ICB	0316BA	<1							
BLANK	CCB	0316BB	<1							
BLANK	CCB	0316BC	<1							
BLANK	CCB	0316BD	<1							
STANDARD	ICV	0316QA	10			10	100			
STANDARD	CCV	0316QB	10			10	100			
STANDARD	CCV	0316QC	10			10	100			
STANDARD	CCV	0316QD	10			10	100			
SPIKE	MS1	940355-5	1820					920	1000	90
SPIKE	MS2	940355-5	1790					920	1000	87
SPIKE	MS1	940359-10	1850					950	1000	90
SPIKE	MS2	940359-10	1860					950	1000	91
DUPLICATE	MD	940355-5	920	905	2					
DUPLICATE	MD	940359-10	950	960	1					
PARAMETER:Boron, Diss. (B)				DATE/TIME ANALYZED:03/17/94 13:14						QC BATCH NUMBER:149100
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.1							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTONICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Boron, Diss. (B)				DATE/TIME ANALYZED:03/17/94 13:14						QC BATCH NUMBER:149100
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	CCB	0317BB	<0.1							
BLANK	CCB	0317BC	<0.1							
STANDARD	ICV	0317QA	5.0			5.0	100			
STANDARD	CCV	0317QB	4.7			5.0	94			
STANDARD	CCV	0317QC	4.8			5.0	96			
SPIKE	MS	940355-1	8.3					<0.1	10.0	83
SPIKE	MSD	940355-1	8.5					<0.1	10.0	85
DUPLICATE	DUP	940355-1	<0.1	<0.1	NC					
PARAMETER:Aluminum, Diss. (Al)				DATE/TIME ANALYZED:03/17/94 13:20						QC BATCH NUMBER:149101
REPORTING LIMIT/DF: 0.1	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.1							
BLANK	CCB	0317BB	<0.1							
BLANK	CCB	0317BC	<0.1							
STANDARD	ICV	0317QA	4.9			5.0	98			
STANDARD	CCV	0317QB	4.5			5.0	90			
STANDARD	CCV	0317QC	4.7			5.0	94			
SPIKE	MS	940355-1	8.3					0.5	10.0	78
SPIKE	MSD	940355-1	8.3					0.5	10.0	78
DUPLICATE	DUP	940355-1	0.5	0.4	0.1					
PARAMETER:Molybdenum, Diss. (Mo)				DATE/TIME ANALYZED:03/17/94 13:26						QC BATCH NUMBER:149102
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	ICB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	4.56			5.00	91			
STANDARD	CCV	0317QB	4.95			5.00	99			
STANDARD	CCV	0317QC	4.82			5.00	96			
SPIKE	MS	940355-1	7.69					0.23	10.0	75
SPIKE	MSD	940355-1	8.24					0.23	10.0	80
DUPLICATE	DUP	940355-1	0.23	0.21	0.02					
PARAMETER:Barium, Diss. (Ba)				DATE/TIME ANALYZED:03/17/94 13:33						QC BATCH NUMBER:149104
REPORTING LIMIT/DF: 0.05	UNITS:mg/l			METHOD REFERENCE :6010 (2)						TECHNICIAN:JH
BLANK	CIB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
STANDARD	ICV	0317QA	4.70			5.00	94			
STANDARD	CCV	0347QB	3.77			5.00	75			
STANDARD	CCV	0317QC	4.40			5.00	88			
SPIKE	MS	940355-1	6.48					<0.05	10.0	65
SPIKE	MSD	940355-1	7.02					<0.05	10.0	70

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL REPORT
03/29/94

JOB NUMBER: 940355 CUSTOMER: PETROTOMICS COMPANY ATTN: STEVE PFAFF

ANALYSIS				DUPLICATES		REFERENCE STANDARDS		MATRIX SPIKES		
ANALYSIS TYPE	ANALYSIS SUB-TYPE	ANALYSIS I.D.	ANALYZED VALUE (A)	DUPLICATE VALUE (B)	RPD or (|A-B|)	TRUE VALUE	PERCENT RECOVERY	ORIGINAL VALUE	SPIKE ADDED	PERCENT RECOVERY
PARAMETER:Barium, Diss. (Ba) REPORTING LIMIT/DF: 0.05 UNITS:mg/l				DATE/TIME ANALYZED:03/17/94 13:33 METHOD REFERENCE :6010 (2)						QC BATCH NUMBER:149104 TECHNICIAN:JH
DUPLICATE	DUP	940355-1	<0.05	<0.05	NC					
PARAMETER:Sulfate (SO4), dissolved REPORTING LIMIT/DF: 10 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 13:45 METHOD REFERENCE :375.4 (1)						QC BATCH NUMBER:149105 TECHNICIAN:JL
BLANK	RB	DI	<10							
STANDARD	LCS	0316QA	2070			2000	103			
SPIKE	MS1	940355-1	3520					1530	2000	100
SPIKE	MS2	940355-1	3600					1530	2000	103
DUPLICATE	MD	940355-1	1530	1390	10					
PARAMETER:Zinc, Diss. (Zn) REPORTING LIMIT/DF: 0.01 UNITS:mg/l				DATE/TIME ANALYZED:03/17/94 13:35 METHOD REFERENCE :7950 (2)						QC BATCH NUMBER:149106 TECHNICIAN:JH
BLANK	ICB	0317BA	<0.01							
BLANK	CCB	0317BB	<0.01							
STANDARD	ICV	0317QA	0.99			1.00	99			
STANDARD	CCV	0317QB	0.99			1.00	99			
SPIKE	MS	940355-1	0.99					0.01	1.00	98
SPIKE	MSD	940355-1	1.00					0.01	1.00	99
DUPLICATE	DUP	940355-1	0.01	0.01	0.00					
PARAMETER:Nickel, Diss. (Ni) REPORTING LIMIT/DF: 0.05 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 13:48 METHOD REFERENCE :6010 (2)						QC BATCH NUMBER:149107 TECHNICIAN:JL
BLANK	CIB	0317BA	<0.05							
BLANK	CCB	0317BB	<0.05							
BLANK	CCB	0317BC	<0.05							
BLANK	CCB	0317BD	<0.05							
BLANK	CCB	0317BE	<0.05							
BLANK	CCB	0317BF	<0.05							
STANDARD	ICV	0317QA	5.30			5.00	106			
STANDARD	CCV	0317QB	5.58			5.00	112			
STANDARD	CCV	0317QC	5.11			5.00	102			
STANDARD	CCV	0317QD	4.11			5.00	82			
STANDARD	CCV	0317QE	5.59			5.00	112			
STANDARD	CCV	0317QF	5.46			5.00	109			
SPIKE	MS	940355-5	3.17					1.12	2.00	102
SPIKE	MSD	940355-5	3.18					1.12	2.00	103
DUPLICATE	DUP	940355-5	1.12	0.96	15					
PARAMETER:Vanadium, Diss. (V) REPORTING LIMIT/DF: 0.05 UNITS:mg/l				DATE/TIME ANALYZED:03/16/94 13:51 METHOD REFERENCE :6010 (2)						QC BATCH NUMBER:149108 TECHNICIAN:JL
BLANK	CIB	0316BA	<0.05							
BLANK	CCB	0316BB	<0.05							

420 West First Street
Casper, WY 82601
(307) 235-5741

WESTERN ATLAS

Core Laboratories

QUALITY CONTROL FOOTER
03/29/94

NC = Not Calculable due to values lower than the detection limit
ND = Not detected at level in limits column
* in the "TECHN" column signifies that the analysis was performed by a subcontract laboratory.
Analyses on soil/sediment samples are performed "as received" (e.g., uncorrected for moisture) unless otherwise specified.

(1) EPA 600/4-79-020, Methods for Chemical Analysis of Water and Wastes, March 1983
(2) EPA SW-846, Test Methods for Evaluating Solid Waste, Third Edition, November 1986
(3) Standard Methods for the Examination of Water and Wastewater, 16th, 1985
(4) EPA/6004-80-032, Prescribed Procedures for Measurement of Radioactivity in Drinking Water, August 1980
(5) Federal Register, Friday, October 26, 1984 (40 CFR Part 136)
(6) EPA 600/8-78-017, Microbiological Methods for Monitoring the Environment, December 1978
NOTE - Data reported in QA report may differ from values on data page due to dilution of sample into analytical ranges.
NOTE - The "TIME ANALYZED" as indicated in the QA Report may not reflect the actual time of analysis.
The "DATE ANALYZED" is the actual date of analysis.

420 West First Street
Casper, WY 82601
(307) 235-5741

Accu-Labs® Research, Inc.

4663 Table Mountain Drive Golden, Colorado 80403-1650
(303) 277-9514 FAX (303) 277-9512

ANALYSIS REPORT

DATE: 03/14/94 PAGE 1

RANDY SIPE
GERAGHTY & MILLER, INC.
1099 18TH. ST, SUITE 2100
DENVER, CO 80202

Lab Job Number: 9524K-53019-1
Date Samples Received: 03/03/94
Customer PO Number: PROJ#CO0318.002

These samples to be disposed of 30 days after the date of this report.

ALR Designation -	9524K-53019-1-1
Sponsor Designation -	14CD
Date Collected -	03/02/94

Determinations in mg/L unless noted

Aluminum - total	<0.1
Boron-ICP - total	0.1
Barium - total	<0.05
Calcium - total	710
Cadmium - total	0.006
Chromium - total	<0.05 [9]
Copper - total	<0.05 [9]
Iron - total	360
Potassium - total	24
Magnesium - total	1,100
Manganese - total	41
Molybdenum - total	<0.01
Sodium - total	440
Nickel - total	0.42
Vanadium - total	0.030
Zinc - total	0.065
Carbonate (as CO3)	<5
Bicarbonate (as HCO3)	680
pH (pH Units)	6.0
Arsenic - total	<0.005
Mercury - total	<0.0001
Lead - total	<0.025 [9]
Selenium - total	<0.05 [9]
Ammonia (as N)	1.3
Nitrite (as N)	<0.05

53019-02

Accu-Labs Research, Inc.

ANALYSIS REPORT

DATE: 03/14/94 PAGE 2

Lab Job Number 9524K-53019-1

These samples to be disposed of 30 days after the date of this report.

ALR Designation -	9524K-53019-1-1
Sponsor Designation -	14CD
Date Collected -	03/02/94

Determinations in mg/L unless noted

Nitrate (as N)	<0.05
Total Dissolved Solids (@180 °C)	11,000
Chloride	390
Fluoride	<0.5
Sulfate (as SO4)	6,800

Notes:

[9] -- HIGHER D.L. DUE TO SAMPLE MATRIX INTERFERENCE

By: Eyda Hergenreder

Eyda Hergenreder
Metals Laboratory Supervisor

By: Susan J. Barker

Susan J. Barker
Inorganic Chemistry Supervisor

EH/SJB/rt

Re: 9524K-53019-1

Case Narrative

The sample was received and analyzed within holding time of the analyses requested.

A higher detection limit is reported for the following metals, due to sample matrix interference which required dilution:

Metal	Detection Limit
Total Chromium	0.05
Total Copper	0.05
Total Lead	0.025
Total Selenium	0.05

For the analysis of Nitrate + Nitrite, the sample was filtered through a Dionex Corporation On-Guard H filter cartridge to remove interference from high metal concentrations. 100% spike recovery from a similarly treated spiked aliquot indicates that the treatment was effective. A reagent blank and Laboratory Control sample were also treated and gave good results, indicating that the treatment did not add a positive or negative bias.

FEDERAL EXPRESS

USE THIS AIRBILL FOR SHIPMENTS WITHIN THE CONTINENTAL U.S.A., ALASKA AND HAWAII
USE THE INTERNATIONAL AIR WAYBILL FOR SHIPMENTS TO PUERTO RICO AND ALL NON U.S. LOCATIONS
QUESTIONS? CALL 800-238-5355 TOLL FREE.

PACKAGE TRACKING NUMBER 8094762922

8094762922

RECIPIENT'S COPY

1 [redacted]

Date: 3-2-94

From (Your Name) Please Print: Dave Krusnicki
Your Phone Number (Very Important): (307) 234-9341
Company: [illegible] COMPANY
Department/Floor No.
Street Address: [illegible]
City: [illegible] BASIN
State: [illegible]
ZIP Required

2 To (Recipient's Name) Please Print: Euda Hargreaves
Recipient's Phone Number (Very Important): (303) 277-1514
Company: Accu-Labs Research, Inc
Department/Floor No.
Exact Street Address (We Cannot Deliver to P.O. Boxes or P.O. Zip Codes.): 4663 Table Mountain Drive
City: Golden
State: CO
ZIP Required: 80403-1650

YOUR INTERNAL BILLING REFERENCE INFORMATION (optional) (First 24 characters will appear on invoice.): Geraghty & Miller #CO04-18.002

H IF HOLD AT FEDEX LOCATION, Print FEDEX Address Here
Street Address
City
State
ZIP Required

3 PAYMENT 1 [X] Bill Sender 2 [ ] Bill Recipient's FedEx Acct. No. 3 [ ] Bill 3rd Party FedEx Acct. No. 4 [ ] Bill Credit Card
5 [ ] Cash/Check [redacted]

4 SERVICES (Check only one box)

Priority Overnight (Delivery by next business morning)
11 [X] OTHER PACKAGING
16 [ ] FEDEX LETTER*
12 [ ] FEDEX PAK*
13 [ ] FEDEX BOX
14 [ ] FEDEX TUBE

Standard Overnight (Delivery by next business afternoon)
51 [ ] OTHER PACKAGING
56 [ ] FEDEX LETTER*
52 [ ] FEDEX PAK*
53 [ ] FEDEX BOX
54 [ ] FEDEX TUBE

Economy Two-Day (Delivery by second business day)
30 [ ] ECONOMY*
* Economy Letter Rate not available. Minimum charge: One pound Economy rate.

Government Overnight (Restricted for authorized users only)
46 [ ] GOV'T LETTER
41 [ ] GOV'T PACKAGE

Freight Service (for packages over 150 lbs.)
70 [ ] OVERNIGHT FREIGHT** (Confirmed reservation required)
80 [ ] TWO-DAY FREIGHT**
† Delivery commitment may be later in some areas.
** Declared Value Limit $500. ** Call for delivery schedule.

5 DELIVERY AND SPECIAL HANDLING (Check services required)

Weekday Service
1 [ ] HOLD AT FEDEX LOCATION WEEKDAY (Fill in Section H)
2 [X] DELIVER WEEKDAY

Saturday Service
31 [ ] HOLD AT FEDEX LOCATION SATURDAY (Fill in Section H)
3 [ ] DELIVER SATURDAY (Extra charge) (Not available to all locations)
9 [ ] SATURDAY PICK-UP (Extra charge)

Special Handling
4 [ ] DANGEROUS GOODS (Extra charge)
6 [ ] DRY ICE — Dangerous Goods Shipper's Declaration not required
Dry Ice 9, UN 1845 ___ x ___ kg 904 III
[ ]
12 [ ] HOLIDAY DELIVERY (If offered) (Extra charge)

6

PACKAGES	WEIGHT In Pounds Only	YOUR DECLARED VALUE (See right)
Total 1	Total 22	Total

DIM SHIPMENT (Chargeable Weight)
[ ] ___ lbs
L x W x H

Received At
1 [ ] Regular Stop 3 [ ] Drop Box
4 [ ] B.S.C.
2 [ ] On-Call Stop 5 [ ] Station

Emp. No. | Date
[ ] Cash Received
[ ] Return Shipment
[ ] Third Party [ ] Chg. To Del. [ ] Chg. To Hold
Street Address
City State Zip
Received By:
X
Date/Time Received FedEx Employee Number

7 Release Signature

Federal Express Use
Base Charges
Declared Value Charge
Other 1
Other 2
Total Charges

REVISION DATE 12/92
PART #137204 FXEM 7/93
FORMAT #158
158
PRINTED IN U.S.A.

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. _____

CHAIN-OF-CUSTODY RECORD

Page 1 of 1

Project Number CO0318.002

Project Location Petrolomics Facility, Wyoming

Laboratory Accu-Lab (Golden, CO)

Sampler(s)/Affiliation Dave Kreamer (G&M)

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	SAMPLE BOTTLE / CONTAINER DESCRIPTION: Ammonia, Nitrate, Nitrite	Total Carbonates / Alkalinity as CaCO3, Bromide, Chloride, Fluoride, Sulfate	HCO3, CO3, Br, Cl, F, SO4, Total Dissolved Solids	NH3, NO3, Ca, Cl, Fe, Mg, K, Na, Zn, TDS	Light Hard Plastic Bottle						TOTAL
14CO	L	3-2-94/903		1	1	1								3

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers: 3

Relinquished by: David Kreamer	Organization: Geraghty & Miller	Date 3/2/94	Time 1130	Seal Intact?	Yes No N/A
Received by: Bob Wyman	Organization: Accu-Lab	Date 3/3/94	Time 0745		
Relinquished by: _____	Organization: _____	Date / /	Time _____	Seal Intact?	Yes No N/A
Received by: _____	Organization: _____	Date / /	Time _____		

Special Instructions/Remarks: Also include: Trace metals, (Al, Ba, Cu, Pb, Hg), Vanadium, Uranium, Nickel, Thorium 230, Radium 226, Radium 228

Level III QA/QC Retain Data Necessary for Level IV (if requested)

Delivery Method: ☒ In Person ☒ Common Carrier Fed Ex ☐ Lab Courier ☐ Other _____

SPECIFY

SPECIFY

5301-0230

Accu-Labs® Research, Inc.

F 8366 Rev. C

QA/QC DATA SHEET

ALR ID: 9524 - 53019-1

Date Received: 3/03/94

Analyte*	Date of Analysis	Time of Analysis	Analyst	Replicate		Spike		CV	Calibration Blank	Method
				ALR #	% RPD	ALR #	% Rec	% Rec		
Se	3-7-94	13:00	CBS	1	0	1	88	101	<0.005	270.2
Pb	3-8-94	17:00	CBS	1	0	1	86	101	<0.005	239.2
Hg	3-8-94	8:25	TC	1	0	1	92	102	<0.001	245.1
As	3-9-94	7:00	TC	1	0	1	82	98	<0.005	206.2
Al	3-7-94	12:54	AL	1	0	1	92	99	<0.1	200.7
B	3-7-94	12:54	AL	1	0	1	83	96	<0.1	↓
Ba	3-7-94	12:54	AL	1	0	1	84	101	<0.05	↓
Ca	3-9-94	13:43	MG	1	0	1	77	92	<0.1	↓
Cd	3-7-94	12:54	AL	1	1 det limit	1	96	100	<0.005	↓
Cr	↓	↓	↓	1	0	1	84	94	<0.005	↓
Cu	↓	↓	↓	1	0	1	82	105	<0.005	↓
Fe	↓	↓	↓	1	0	1	RPD 1%	96	<0.01	↓
K	↓	↓	↓	1	2	1	96	103	<0.5	↓
Mg	3-8-94	9:12	AL	1	0	1	99	99	<0.05	↓

Comments:

Approved: IS

Date: 3-11-94

* mg/L unless otherwise noted.

Accu-Labs® Research, Inc.

F 8366 Rev. C

QA/QC DATA SHEET

ALR ID: 9524 - 53019 - 1

Date Received: 3/05/94

Analyte*	Date of Analysis	Time of Analysis	Analyst	Replicate		Spike		CV	Calibration Blank	Method
				ALR #	% RPD	ALR #	% Rec	% Rec		
Mn	3-7-94	12:54	AL	1	0	1	RPD 1%	100	<0.005	200.7
Mo	↓	↓	↓	1	0	1	95	99	<0.01	↓
Na	↓	↓	↓	1	0	1	108	101	<0.1	↓
Ni	↓	↓	↓	1	4	1	101	97	<0.02	↓
V	↓	↓	↓	1	0	1	86	100	<0.005	↓
Zn	↓	↓	↓	1	2	1	80	100	<0.005	↓

Comments:

Approved: JH

Date: 3-10-94

* mg/L unless otherwise noted.

Accu-Labs® Research, Inc.

F 8366 Rev. C

QA/QC DATA SHEET

ALR ID: 9524K-53019-1

Date Received: 03/03/94

Analyte*	Date of Analysis	Time of Analysis	Analyst	Replicate ALR #	Replicate % RPD	Spike ALR #	Spike % Rec	CV % Rec	Calibration Blank	Method
Carbonate	3-7-94	0730	CM	1	0	1	85	94	<5	310.1
Bicarbonate	↓	↓	↓	↓	0	1	85	↓	<5	310.1
pH (pH units)	↓	↓	↓	↓	3	NA	NA	100	5.8	150.1
Ammonia	3-7-94	1000	EP	1	8	1	92	100	<0.2	350.3
Nitrite	3-3-94	1730	GH	1	0	1	106	87	<0.05	354.1
Nitrate	3-4-94	08:30	SRB	1	0	1	100	103	<0.05	353.2
TDS	3-4-94	1400	EP	1	0	N/A	N/A	102	<5	160.1
Chloride	3-10-94	1000	EP	1	0	1	112	106	<3	325.2
Fluoride	3-7-94	2340	YS	1	0	1	101	111	<0.5	340.2
Sulfate	3-11-94	0900	RLV	1	1	1	120	110	<10	375.4

Comments:

Approved: RJungk

Date: 3-11-94

* mg/L unless otherwise noted.

Accu-Labs® Research, Inc.

4663 Table Mountain Drive Golden, Colorado 80403-1650
(303) 277-9514 FAX (303) 277-9512

ANALYSIS REPORT

DATE: 03/15/94 PAGE 1

RANDY SIPE
GERAGHTY & MILLER, INC.
1099 18TH. ST, SUITE 2100
DENVER, CO 80202

Lab Job Number: 9524K-53019-1
Date Samples Received: 03/03/94
Customer PO Number: PROJ#CO0318.002

These samples to be disposed of 30 days after the date of this report.

ALR Designation -	9524K-53019-1-1
Sponsor Designation -	14CD
Date Collected -	03/02/94

Determinations in pCi/L unless noted

Radium-226 - total	1400 ± 100 *
Radium-228 - total	15 ± 1 *
Thorium-230 - total	0.5 ± 0.3 *
Uranium - total (mg/L)	0.047

* Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

By: _____
for Bud Summers
Radiochemistry Supervisor

BS/rt

53019-03

Re: 9254K-53019-1

Case Narrative

The high log-in screening is due to the high Radium-226 and Rn-222. There were no other problems with this set.

Accu-Labs® Research, Inc. F8512 Rev. ___

Internal Laboratory Control Sample Report

Matrix: Water

Units: U=mg/L Th=pCi/ml Ra226, Ra228=pCi/L

9524K 53019	Ra 226	Ra 228	U Total	Th 230								
Actual Value	2973 ± 150	1867 ± 100	0.168 ± —	4.31 ± 0.13	±	±	±	±	±	±	±	±
Calculated Value	2930 ± 220	2181 ± 344	0.142 ± —	4.78 ± 0.46	±	±	±	±	±	±	±	±
% Recovery	99%	117%	85%	111%								
Calculated Value	2960 ± 220	2133 ± 341	±	±	±	±	±	±	±	±	±	±
% Recovery	99%	114%										
Calculated Value	±	±	±	±	±	±	±	±	±	±	±	±
% Recovery												
Calculated Value	±	±	±	±	±	±	±	±	±	±	±	±
% Recovery												
Calculated Value	±	±	±	±	±	±	±	±	±	±	±	±
% Recovery												

Accu-Labs® Research, Inc. F8514 Rev. ___

Blank Analysis Report

Units: pCi /Blank Reagent Blank

4524-1 53019	Ra 226	Ra 228	U Natural	Th 230								
Blank 1	0.01 ± 0.09	0.00 ± 0.35	-0.002 ± —	0.11 ± 0.07	±	±	±	±	±	±	±	±
Blank 2	-0.03 ± 0.12	0.11 ± 0.37	±	±	±	±	±	±	±	±	±	±
Blank 3	±	±	±	±	±	±	±	±	±	±	±	±
Blank 4	±	±	±	±	±	±	±	±	±	±	±	±
Blank 5	±	±	±	±	±	±	±	±	±	±	±	±
Blank 6	±	±	±	±	±	±	±	±	±	±	±	±
Blank 7	±	±	±	±	±	±	±	±	±	±	±	±
Blank 8	±	±	±	±	±	±	±	±	±	±	±	±

Accu-Labs® Research, Inc. F8513 Rev. ___

Replicate Analysis Report

Matrix: Water

Units: pCi/L

G524K			Th 230									
53019-1	±	±	0.5 ± 0.3	±	±	±	±	±	±	±	±	±
1R	±	±	0.4 ± 0.3	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±
	±	±	±	±	±	±	±	±	±	±	±	±

53019 4

Accu-Labs® Research, Inc. F8511 Rev. ___

Lower Limit of Detection Report

Matrix: Water

Units: pCi/L = $\frac{Ra\ 226 + Ra\ 228}{Th\ 230}$ U = mg/L

ALR #	Ra 226	Ra 228	U Total	Th 230								
53019-1	0.2	0.9	0.005	0.1								

53019 4

GERAGHTY & MILLER, INC.
Environmental Services

Laboratory Task Order No. ______

CHAIN-OF-CUSTODY RECORD

Project Number CO0318.002

Project Location Petrotomics Shirley Basin Wyoming

Laboratory Accu-Lab (Golden CO)

Sampler(s)/Affiliation [illegible] (G&M)

SAMPLE BOTTLE / CONTAINER DESCRIPTION

SAMPLE IDENTITY	Code	Date/Time Sampled	Lab ID	[illegible]	HCO3, CO3, Cl, F, [illegible]	As, Cd, Cr, Fe, Mn, K, Na, Zn * [illegible]								TOTAL
14CO	L	2-2-94/905		1	1	1								3

Sample Code: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 3

Relinquished by: [illegible]	Organization: Geraghty & Miller	Date 3/2/94	Time 1130	Seal Intact? Yes No N/A
Received by: [illegible]	Organization: Accu-Lab	Date 3/3/94	Time 0845	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks: * Also include: Trace metals, (Al, Ba, Cu, Pb, Hg), Vanadium, Uranium, Nickel, Thorium 230, Radium 226, Radium 228

Level III QA/QC Retain Data Necessary for Level IV (if requested)

Delivery Method: ☒ In Person ☒ Common Carrier Fed Ex ☐ Lab Courier ☐ Other

63019 5

Accu-Labs Research, Inc.

F 8321 Rev. 8

9524 53019
1 1

pH/Radioactivity Screening Log

ALR Number: 9524K-5301:9

Date: 03/03/94 Time: 0945

Analyst: BJW

Screening Location: X Main Lab ____ Prep Lab

1) Record pH of improperly preserved samples.

2) Record samples which are radioactive along with the appropriate readings.

3) Record comments as required.

Sample No. (ALR)	pH	Alpha/Beta MR/HR	Gamma uR/HR	Comments
Background	--	0.02	14	
Standard	--	0.08	26	
(1)	N/A	1.00	30	

LOW LEVEL RADIOACTIVE MATERIAL

Notes: N/A All samples properly preserved.

Y All samples within radioactivity tolerances.

Standards ID: Alpha/Beta 10518 Th 230

Gamma 423-5435-13-11

53019 6

WESTERN ENVIRONMENTAL SERVICES AND TESTING INC.

6756 West Uranium Road
Casper, Wyoming 82604
307/234-5511

76 Imperial Drive, Unit I
Evanston, Wyoming 82930
307/789-6420

Lab Number : 93-5196-7

Petrotomics Company
P.O.Box 8509, Shirley Basin, WY 82615-8509
Attention: Steve Pfaff

10 DC
November 22, 1993
Sample was field filtered & preserved by S. Pfaff.

	mg/l		mg/l
TDS (Calculated)	1655	Boron (B)	<0.05
TDS (Observed)	1881	Cadmium (Cd)	0.01
Conductivity @25c,umho/cm	2143	Chromium (Cr)	<0.01
Tot.Alkalinity (as CaCO3)	181	Copper (Cu)	<0.01
Tot. Hardness (as CaCO3)	1196	Fluoride (F)	0.15
Sodium (Na, Calculated)	38.4	Iron (Fe)	34.3
Sodium (Na, Observed)	70.7	Lead (Pb)	<0.05
Potassium (K)	11.4	Manganese (Mn)	1.1
Calcium (Ca)	308	Mercury (Hg)	<0.001
Magnesium (Mg)	104	Molybdenum (Mo)	<0.1
Chloride (Cl)	63.3	Nickel (Ni)	<0.03
Sulfate (SO4)	1050	Nitrate (NO3 as N)	<0.01
Bicarbonate (HCO3)	221	Selenium (Se)	<0.001
Carbonate (CO3)	0	Uranium (U)	0.011 T.U.
pH, Units	6.42	Vanadium (V)	<0.1
Aluminum (Al)	0.10	Zinc (Zn)	0.03
Ammonia (NH3 as N)	1.9		
Arsenic (As)	<0.001		
Barium (Ba)	<0.05		

	pCi/l	LLD uCi/ml
Radium 226	22.3 ± 0.9	2x10E-10
Radium 228	11.15 ± 3.59	3x10E-9
Thorium 230	0.00 ± 0.33	6x10E-10
Lead 210	0.00 ± 1.44	2x10E-9
Polonium 210	0.00 ± 0.16	3x10E-9

Radium 226 was determined by de-emanation.

Submitted By: S. Pfaff
Date Submitted: 11-22-93
Analyzed By: RC, GLH, KAH, JPM
Date Analyzed : 01-10-94

Niels L Rasmussen
Laboratory Supervisor

OVERSIZE DOCUMENT PAGE PULLED

SEE APERTURE CARDS

NUMBER OF OVERSIZE PAGES FILMED ON APERTURE CARDS 2

9404060199-01-02

APERTURE CARD/HARD COPY AVAILABLE FROM

RECORDS AND REPORTS MANAGEMENT BRANCH