

SEMI-ANNUAL QUALITY ASSURANCE  
CHURCH ROCK SITE  
SECOND HALF OF 1996  
JULY AND OCTOBER SAMPLING EVENTS  
JANUARY 1997

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PDR ADOCK 04008907  
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## **1.0 Requirements**

The quality assurance and control procedures are contained in Section 3.0 of the Remedial Action Plan for the Church Rock site dated April, 1989. The procedures address sampling, chain of custody, laboratory quality control, and data validation.

These requirements became effective July 3, 1989, when United Nuclear received the Administrative Order on the Church Rock site from the Environmental Protection Agency (EPA).

## **2.0 Field Sampling Procedure**

Copies of the field sampling report sheets for the third and fourth quarters of 1996 are included as Appendix A. These sheets indicate the estimated volume of water purged from the well prior to sampling and the field parameters of pH, temperature, and conductivity. The Field Blank and Rinsate analysis reports are also included in Appendix A.

## **3.0 Chain of Custody**

Copies of the Chain of Custody forms are included as Appendix B. Energy Laboratories, Inc., our contract laboratory, is located in Casper, Wyoming. Energy Labs inspects the sample shipments upon arrival to verify the information on the Chain of Custody form and to determine if samples arrive at the appropriate temperature.

## **4.0 Laboratory Control**

Copies of the Internal Quality Control report prepared by Energy Laboratories and the associated EPA performance evaluations are included in Appendix C.

## **5.0 Data Evaluation**

Analytical reports are reviewed by the Church Rock General Manager/Radiation Safety Officer after receipt from Energy Labs. Significant increases or decreases and out of range values are identified and the laboratory is requested to recheck the suspect values. The laboratory responds by checking transcription for these items, and, where necessary, repeats the analysis. A revised report is then issued for that sample if an error is discovered.

APPENDIX A  
Field Data Sheets

34 QUARTER 19 26

<u>Well No.</u>	<u>Month /Day</u>	<u>Time</u>	<u>Water Depth</u>	<u>Purging Method</u>	<u>Est. Vol. Purged</u>
GW-1	7/1	1032	58.1	HAND BAILED	15-GALLS
GW-2	"	1055	53.8	" "	30
GW-3	"	1113	50.3	" "	10.0
GW-4	"	1005	50.6	" "	2.0
EPA-1	7/15	920	240.8	PUMPED	1.2
EPA-2	"	1118	171.0	"	25.6
EPA-3	X	X	X	X	X
EPA-4	7/15	1012	199.6	PUMPED	81.7
EPA-5	"	1045	118.4	"	44.1
EPA-7	"	1034	108.1	"	59.0
EPA-8	"	935	214.1	"	101.8
EPA-9	7/15	1005	162.2	"	1.5
EPA-12	"	850	189.0 EST	X	X
EPA-13	"	920	169.2	Pumped	6.3
EPA-14	7/15	1400	109.6	"	274.8
EPA-15	"	1103	142.0 ???	No WATER ?? NO TRUE MEASUREMENT	X
EPA-17	"	915	176.0 EST.	X	X
EPA-18	7/15	917	189.5 "	X	X
EPA-22A	"	1206	59.2	Pumped	3.1
EPA-23	"	1440	43.8*	"	168.6
EPA-25	7/15	1518	49.7	"	47.5 *
EPA-27	"	1143	54.4	"	1.7
EPA-28	"	1148	60.1	"	17.9
411	7/15	820	136.3	Bailed	3.0 EST 5' O.I. TOP OF WAT.
420	7/19	855	130.3	"	240.1
TWQ-126	"	0914	103.3 Est.	X	X
NR-1	7/15	1305	62.2	Pumped	
SANDY WATER PLUGGED METER.					

## GROUND WATER MONITORING FIELD DATA SHEET

\*WATER DEPTH AND PURGING\*

3<sup>rd</sup> QUARTER 19 96

Well No.	Month /Day	Time	Water Depth	Purging Method	Est. Vol. Purged
501-B	7/9	1339	174.5	<del>BAILED (SMEAL)</del>	<del>5.0</del>
502-B	"	1303	160.3	BAILED (SMEAL)	5.0
504-B	"	1247	159.0	" "	5.0
509-D	7/9	1017	58.3	AIR LIFT	15.0
515-A	"	928	26.5	" "	5.0
516-A	"	950	98.2	" "	2.5
517	"	905	27.8	" "	2.0
518	7/9	1315	130.2	BAILED (SMEAL)	5.0
604	"	936	25.8	AIR LIFT	20.0
614	"	920	21.6	" "	30.0
619	"	942	124.7	" "	40.0
624	7/9	1042	45.7	" "	40.0
627	"	1137	51.0	" "	10.0??
632	"	1028	44.7	BAILED (SMEAL)	5.0
639	"	1235	40.7 EST.	NO WATER	-
642	7/9	1239	62.5	NO WATER BENTONITE ONLY	-
644	"	812	51.0 EST.	<del>BAILED (SMEAL)</del>	<del>5.0</del>
645	"	835	46.0 EST.	<del>BAILED (SMEAL)</del>	<del>5.0</del>
TWQ-9D	"	957	26.0 EST.	<del>BAILED (SMEAL)</del>	<del>5.0</del>
TWQ-29A	7/9	1122	65.6	<del>BAILED (SMEAL)</del>	<del>5.0</del>
TWQ-106D	"	959	48.5	<del>BAILED (SMEAL)</del>	<del>5.0</del>
TWQ-141	"	815	197.0	AIR LIFT	25.0
TWQ-142	"	830	207.2	" "	30.0
TWQ-143	"	846	213.6	" "	30.0
804	7/12	0830	47.2	<del>BAILED (SMEAL)</del>	<del>5.0</del>
805	"	0835	50.2	<del>BAILED (SMEAL)</del>	<del>5.0</del>
806	"	0838	50.1	<del>BAILED (SMEAL)</del>	<del>5.0</del>
807	"	0842	51.3	<del>BAILED (SMEAL)</del>	<del>5.0</del>
FIELD BLANK	<del>X</del>	<del>X</del>	<del>X</del>	<del>BAILED (SMEAL)</del>	<del>5.0</del>
RINSATE	<del>X</del>	<del>X</del>	<del>X</del>	<del>BAILED (SMEAL)</del>	<del>5.0</del>

## GROUND WATER MONITORING FIELD DATA SHEET

4<sup>th</sup> QUARTER 19 96  
\*\*WATER DEPTH AND PURGING\*\*

Well No.	Month/Day	Time	Water Depth	Purging Method	Est. Vol. Purged
GW-1	9/30	1032	58.1	AIR LIFT	2.0 9.765
GW-2	"	1054	53.6	" "	30.0 "
GW-3	"	1129	50.3	" "	10.0 "
GW-4	"	1003	50.7	" "	5.0 "
EPA-1	10/7	0915	291.0	PUMPED	4.4 "
EPA-2	"	1134	170.8	"	25.8 "
EPA-4	"	1035	199.7	"	66.2 "
EPA-5	"	1107	118.5	"	43.3 "
EPA-6	—	—	—	—	—
EPA-7	10/7	1056	108.3	PUMPED	57.5 "
EPA-8	"	0957	214.1	"	89.3 "
EPA-9	"	1025	169.2	"	9.1 "
EPA-13	"	0940	169.4	"	18.5 "
EPA-14	"	1255	104.5	"	25.2 "
EPA-15	"	1125	142.0	NO WATER	—
EPA-22A	"	1224	60.0	PUMPED	22.2 "
EPA-23	"	1330	44.0	"	19.2 "
EPA-25	"	1405	49.8	"	41.7 "
EPA-27	10/7	1200	54.7	"	29.3 "
EPA-28	"	1206	60.3	"	17.7 "
411	"	0855	136.2	BAILED	3.0 "
420	9/30	0844	130.9	AIR LIFT	3.0 "
Two-126	"	0950	103.3 EST.	—	—
EPA #17	10/7	0950	189.4	"	—
EPA #18	"	0953	172.0	"	—
EPA #12	"	0921	189.0	"	—

\*WATER DEPTH AND PURGING\*

4th QUARTER 19 96

Well No.	Month / Day	Time	Water Depth	Purging Method	Est. ft. Purged	Guils
501-B	9/30	1341	176.2	<del>BAILED (SMEAL)</del>	<del>3.5</del>	
502-B	"	1318	160.2	BAILED (SMEAL)	3.5	
504-B	"	1303	158.5	" "	3.0	
509-D	"	1018	58.8	AIR LIFT	6.0	
515-A	"	0931	96.7	" "	2.0	
516-A	9/30	0956	98.6	" "	3.0	
517	"	0858	98.0	" "	1.5	
518	"	1330	130.5	BAILED (SMEAL)	3.5	
604	"	0938	96.1	AIR LIFT	2.0	
614	"	0920	92.2	"	15.0	
619	"	0947	124.9	"	35.0	
624	"	1043	45.7	"	40.0	
627	"	1151	51.2	"	1.0	
632	9/30	1106	44.2	"	1.0	
639	"	1241	40.7 EST.			
642	"	1250	62.5 EST.			
644	"	0757	51.0 EST.			
645	"	0823	46.0 EST.			
TWQ-9D	"	0936	76.0 EST.			
TWQ-29A	9/30	1138	65.7			
TWQ-106D	"	0940	48.5			
TWQ-141	"	0800	196.9	AIR LIFT	35.0	
TWQ-142	"	0816	202.1	" "	25.0	
TWQ-143	"	0831	213.3	" "	30.0	
804	9/30	1109	47.4			
805	"	1113	49.9			
806	"	1115	49.9			
807	"	1117	51.7			
FIELD BLANK						
RINSATE						

GROUND WATER MONITORING FIELD DATA SHEET  
3<sup>rd</sup> QUARTER 1991  
\*\*SAMPLING\*\*

Well No.	Month/Day	Time	Sampling Method	pH	Cond.	C° Temp.	Comments
GW-1	7/10	1351	BAILED	6.3	2,800	13.1	
GW-2	"	1409	"	6.3	4,200	14.6	
GW-3	"	1504	"	6.3	2,600	14.3	
GW-4	"	1317	WELL DID NOT RECOVER TO MAKE COMPLETE SAMPLING				
EPA-1	7/16	1000	PUMPED	7.0	3,400	16.6	
EPA-2	"	1125	"	6.7	2,500	12.6	
EPA-4	"	1040	"	6.8	3,200	13.4	
EPA-5	"	1103	"	6.4	7,000	13.8	
EPA-6	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>	<del>X</del>
EPA-7	7/16	1056	Pumped	6.2	6,000	13.2	
EPA-8	"	1028	"	6.8	3,400	12.8	
EPA-9	"	1036	"	5.9	3,600	12.5	
EPA-13	"	1018	"	6.2	4,500	13.6	
EPA-14	7/15	1400	"	6.5	2,400	12.5	PUMPED UNTIL COND.
EPA-15	NO	WATER -	NO WATER -	NO WATER -	NO WATER -	NO WATER -	
EPA-22A	7/16	1217	Pumped	7.0	1,600	12.7	
EPA-23	7/15	1440	"	6.5	3,400	13.5	Pumped UNTIL COND. SET
EPA-25	"	1518	"	6.7	3,100	12.9	" " " "
EPA-27	7/16	1145	"	7.8	3,200	13.8	
EPA-28	"	1150	"	7.0	3,900	13.1	
411	7/16	940	BAILED	* 7.0	4,300	16.6	
420	7/10	953	"	6.7	3,400	14.0	
NR-1	7/15	1305	PUMPED	7.0	2,200	15.5	PUMPED UNTIL COND. SET

\* FIELD DATA TAKEN AFTER FILTERING IN LAB.

## GROUND WATER MONITORING FIELD DATA SHEET

3<sup>rd</sup> QUARTER 19 96

\*\*SAMPLING\*\*

Well No.	Month/Day	Time	Sampling Method	pH	Cond.	C <sup>o</sup> Temp.	Comments
502-B	7/11	924	Bailed	4.5	3,700	13.6	
504-B	"	904	" (SMEAL)	6.0	3,600	13.0	
509-D	7/10	1327	"	6.2	2,500	12.9	
515-A	"	1156	"	5.3	3,700	14.0	
516-A	"	1305	"	6.1	8,000	14.1	
517	"	1013	"	4.5	3,600	13.4	
518	7/11	938	"	3.5	4,600	13.1	
604	7/10	1207	"	4.4	4,000	13.5	
614	"	1147	"	6.3	7,000	14.0	
619	"	1245	"	6.4	3,500	14.2	
624	"	1402	"	6.6	4,000	12.9	
627	"	1521	"	6.8	4,400	14.3	
632	"	1339	"	6.4	2,600	13.7	
TWQ-141	7/10	915	Bailed (SME-L)	8.4	1,200	14.4	
TWQ-142	"	920	" "	7.9	1,200	14.2	
TWQ-143	"	932	" "	7.5	1,100	14.3	
801	7/16	1208	Pumped	6.3	6,500	13.4	
802	7/15	1505	"	6.3	5,100	13.7	
803	"	1500	"	6.3	5,800	14.7	
Field Blank	7/10	1447	—	7.6	130	24.4	
Winsate	"	1207	—	6.6	100	21.8	

## GROUND WATER MONITORING FIELD DATA SHEET

4<sup>th</sup> QUARTER 19 96

\*\*SAMPLING\*\*

Well No.	Month/Day	Time	Sampling Method	pH	Cond.	C° Temp.	Comments
GW-1	10/1	1254	BAILED	6.5	4,600	12.6	
GW-2	"	1321	"	6.4	4,500	11.1	
GW-3	"	1350	"	6.4	4,900	12.9	
GW-4	"	1210	"	6.9	4,000	13.6	
EPA-1	10/8	945	PUMPED	7.0	3,200	15.2	
EPA-2	"	1137	"	6.7	2,400	12.9	
EPA-4	"	1059	"	6.6	3,300	13.7	
EPA-5	"	1119	"	6.4	6,500	14.2	
EPA-6	"	—	—	—	—	—	—
EPA-7	"	1112	PUMPED	6.1	6,000	13.5	
EPA-8	10/8	1043	"	6.6	3,300	13.2	
EPA-9	"	1051	"	5.7	3,600	13.1	
EPA-13	"	1012	"	6.3	4,300	13.5	
EPA-14	10/7	1320	"	6.5	2,400	13.7	
EPA-15	NO	WATER	— NO WATER —	—	—	—	—
EPA-22A	10/8	1326	PUMPED	6.9	1,800	12.6	
EPA-23	10/7	1351	"	6.5	3,400	13.6	
EPA-25	"	1420	"	6.7	3,200	13.9	
EPA-27	10/8	1259	"	7.7	3,200	13.7	
EPA-28	"	1312	"	7.0	3,900	13.3	
411	"	912	"	* 6.9	3,600	19.6	
420	10/1	936	"	6.5	2,500	13.5	

\* FIELD DATA TAKEN AFTER FILTERING IN LAB.

## GROUND WATER MONITORING FIELD DATA SHEET

4<sup>th</sup> QUARTER 19 96

\*\*SAMPLING\*\*

Well No.	Month/ Day	Time	Sampling Method	pH	Cond.	C° Temp.	Comments
502-B	10/1	1447	BAILED	4.7	3700	13.5	
504-B	"	1438	"	6.3	3700	13.9	
509-D	"	1230	"	6.4	5500	13.1	
515-A	"	1016	"	5.7	6600	13.1	
516-A	"	1020	"	6.4	8000	13.5	
517	10/1	0851	BAILED	4.8	3700	1.1	
518	"	1457	"	3.8	4400	13.6	
604	"	1025	"	4.8	6000	13.5	
614	"	1006	"	6.5	7800	13.5	
619	10/1	1038	"	6.4	4500	13.4	
624	"	1310	BAILED	6.8	3900	13.1	
627	"	1410	"	6.8	4800	13.7	
632	"	1328	"	6.5	5800	13.0	
TWQ-141	"	0859	"	7.3	1200	13.2	
TWQ-142	"	0912	"	7.5	1200	13.7	
TWQ-143	"	0824	"	7.2	1100	13.7	
801	10/8	0852	PUMPED	6.3	5900	12.9	
802	"	0843	"	6.7	5600	13.1	
803	"	0834	"	6.4	5200	13.4	
Field Blank	10/1	1418		7.7	100	19.4	
Rinsate	"	1240		7.3	110	17.9	

## EPA WELLS

3<sup>rd</sup> Quarter 1996

Date	Well No.	HP	Elevation T.O.P.	Meter Reading Start	(-)	Meter Reading End	=	Gals. Purged	Time for Well To Go Dry Minutes/Seconds
7/15	EPA-1	1/2	7035.544	54,002.7		54,023.9		1.2	1:11
"	EPA-2	1/3	7019.485	54,258.3		54,323.5		25.6	5:09
"	EPA-4	1/2	7069.798	54,113.5		54,195.2		81.7	10:33
"	EPA-5	1/3	7011.444	54,254.2		54,258.3		44.1	6:22
"	EPA-7	1/3	7011.662	54,195.2		54,254.2		59.0	6:00
"	EPA-8	1/2	7076.402	54,010.2		54,112.0		101.8	25:16
7/15	EPA-9	1/3	7076.612	54,112.0		54,113.5		1.5	1:43
"	EPA-13	1/2	7030.467	54,003.9		54,010.2		6.3	1:26
"	EPA-14	1/2	6965.611	54,586.7		54,861.5		274.8	24:35
"	EPA-15	5-30	7002.932	DONT GET ANY WATER					—
7/15	EPA-22A	1/2	6954.512	54,343.5		54,346.6		3.1	:16
"	EPA-23	2	6926.312	54,861.5		55,030.1		168.6	17:07
"	EPA-25	1/2	6903.383	* 55,030.1		55,077.6		47.5	18:06
"	EPA-27	1/3	6910.946	54,323.9		54,325.6		1.7	:05
7/15	EPA-28	1	6917.861	54,325.6		54,343.5		17.9	1:13
"	NR-1	1/3		54,346.6		54,586.7		240.1	31:38

\*Deleted EPA-3, EPA-12, EPA-17, EPA-18 due to lack of water.

## EPA WELLS

4<sup>th</sup> Quarter 1966

Date	Well No.	HP	Elevation T.O.P.	Meter Reading Start	(-)	Meter Reading End	=	Gals. Purged	Time for Well To Go Dry Minutes/Seconds
4/2	EPA-1	1/2	7035.544	55,077.6		55,082.0		4.4	1:18
"	EPA-2	1/3	7019.485	55,365.8		55,391.6		25.8	5:21
"	EPA-4	1/2	7069.798	55,198.8		55,265.0		66.2	10:42
"	EPA-5	1/3	7011.444	55,322.5		55,365.8		43.3	5:59
"	EPA-7	1/3	7011.662	55,265.0		55,322.5		57.5	5:46
10/7	EPA-8	1/2	7076.402	55,100.5		55,189.8		89.3	23:11
"	EPA-9	1/3	7076.612	55,189.8		55,198.9		9.1	1:40
"	EPA-13	1/2	7030.467	55,082.0		55,100.5		18.5	1:20
"	EPA-14	1/2	6965.611	55,417.3		55,668.5		251.2	21:34
"	EPA-15	5-30	7002.932	-	No	WATER	-		
10/7	EPA-22A	1/2	6954.512	55,395.1		55,417.3		22.2	:09
"	EPA-23	2	6926.312	55,668.5		55,860.5		192	15:14
"	EPA-25	1/2	6903.383	55,860.5		55,902.2		41.7	21:06
"	EPA-27	1/3	6910.946	55,365.8		55,395.1		29.3	:04
"	EPA-28	1	6917.861	55,395.1		55,412.8		17.7	1:12
"	NR-1	1/3		SAMPLE	1 <sup>ST</sup> & 3 <sup>RD</sup>	QUARTERS ONLY			

\*Deleted EPA-3, EPA-12, EPA-17, EPA-18 due to lack of water.

**ENERGY LABORATORIES, INC.**

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**UNC MINING AND MILLING: CHURCHROCK OPERATIONS  
 GROUNDWATER MONITORING PROGRAM**

WELL NUMBER:  
 LAB I.D.:  
 SAMPLE DATE:  
 REPORT DATE:  
 QUARTER REPRESENTED:  
 UNC SUBMITTAL #:

Field Blank	Field Blank	Field Blank	Field Blank
96-12282	96-19723	96-41358	96-54991
01-04-96	04-02-96	07-07-96	10-01-96
02-13-96	05-12-96	09-03-96	Dec. 9, 1996
First '96	Second '96	Third '96	Fourth '96
TE-2-1-96	TE-5-4-96	TE-7-7-96	TE-9-10-96

Major Ions	Units	Results	Results	Results	Results	Detection Limit
Calcium (Ca)	mg/L	0.23	< 0.05	0.40	0.76	0.05
Magnesium (Mg)	mg/L	0.16	0.20	0.20	0.20	0.01
Sodium (Na)	mg/L	3.5	7.6	6.0	5.6	0.05
Potassium (K)	mg/L	0.17	0.20	< 0.10	0.19	0.10
Bicarbonate (HCO <sub>3</sub> )	mg/L	8.8	12.0	11.9	11.9	0.10
Sulfate (SO <sub>4</sub> )	mg/L	1.5	5.4	5.0	3.8	1.0
Chloride (Cl)	mg/L	< 1.0	1.7	1.3	3.0	1.0
Ammonium (NH <sub>4</sub> ) as N	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Nitrite + Nitrate (NO <sub>2</sub> + NO <sub>3</sub> ) as N	mg/L	< 0.10	< 0.10	< 0.10	0.15	0.10

Non-Metals						
Total Dissolved Solids (TDS) @ 180°C	mg/L	12.0	23.0	18.7	16.0	1.0
pH	std. units	6.60	7.29	6.79	7.05	0.10

Trace Metals						
Aluminum (Al)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Arsenic (As) III	mg/L	< 0.001	< 0.001	< 0.001	0.002	0.001
Beryllium (Be)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Cadmium (Cd)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Cobalt (Co)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Lead (Pb)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Manganese (Mn)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Molybdenum (Mo)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Nickel (Ni)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Selenium (Se) IV	mg/L	< 0.001	< 0.001	< 0.001	0.003	0.001
Vanadium (V)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10

Radiometric						
Uranium (U <sup>238</sup> )	mg/L	< 0.0003	0.013	0.0014	< 0.0003	0.0003
Radium 226 (Ra <sup>226</sup> )	pCi/L	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Radium Precision ±						
Radium 228 (Ra <sup>228</sup> )	pCi/L	< 1.0	< 1.0	< 1.0	< 1.0	1.0
Radium Precision ±						
Thorium 230 (Th <sup>230</sup> )	pCi/L	0.7	< 0.2	< 0.2	< 0.2	0.2
Thorium Precision ±		0.4				
Lead 210 (Pb <sup>210</sup> )	pCi/L	< 1.0	< 1.0	< 1.0	< 1.0	1.0
Lead Precision ±						
Gross Alpha	pCi/L	< 1.0	< 1.0	< 1.0	< 1.0	1.0
G. Alpha Precision ±						

Trace Organics						
Chloroform	µg/L	< 1.00	< 1.00	< 1.00	< 1.00	1.00

Quality Assurance Data						Target Range
Anion	meq	0.21	0.36	0.34	0.37	
Cation	meq	0.20	0.37	0.32	0.32	
WYDEQ A/C Balance	%	-3.98	0.78	-4.20	-7.45	-5 - +5
Calc TDS	mg/L	12	22	19	20	
TDS A/C Balance	dec. %	1.04	1.06	0.96	0.79	0.80 - 1.20

PER 10/10/96/54991/4/10/96



# ENERGY LABORATORIES, INC.

P.O. BOX 3258 • CASPER, WY 82602 • PHONE (307) 235-0515 ✓  
2393 SALT CREEK HIGHWAY • CASPER, WY 82601 • FAX (307) 234-1639

## UNC MINING AND MILLING: CHURCHROCK OPERATIONS GROUNDWATER MONITORING PROGRAM

Page 9 of 11

WELL NUMBER:

LAB I.D.:

SAMPLE DATE:

REPORT DATE:

QUARTER REPRESENTED:

UNC SUBMITTAL #:

Rinsate	Rinsate	Rinsate	Rinsate
96-12208	96-19724	96-41355	96-54990
01-03-96	04-02-96	07-07-96	10-01-96
02-13-96	05-12-96	09-03-96	Dec. 9, 1996
First '96	Second '96	Third '96	Fourth '96
TE-1-1-96	TE-5-4-96	TE-7-7-96	TE-9-10-96

Major Ions	Units	Results	Results	Results	Results	Detection Limit
Calcium (Ca)	mg/L	4.0	4.1	4.0	6.3	0.05
Magnesium (Mg)	mg/L	1.2	6.3	4.5	3.2	0.01
Sodium (Na)	mg/L	5.0	10.7	9.1	7.7	0.05
Potassium (K)	mg/L	0.50	0.40	0.29	0.44	0.10
Bicarbonate (HCO <sub>3</sub> )	mg/L	13.8	18.4	15.1	15.0	0.10
Sulfate (SO <sub>4</sub> )	mg/L	14.5	41	31	22.6	1.0
Chloride (Cl)	mg/L	< 1.0	3.2	2.7	4.4	1.0
Ammonium (NH <sub>4</sub> ) as N	mg/L	0.10	0.18	0.20	0.08	0.05
Nitrite + Nitrate (NO <sub>2</sub> + NO <sub>3</sub> ) as N	mg/L	0.17	0.34	0.42	0.86	0.10

Non-Metals						
Total Dissolved Solids (TDS) @ 180°C	mg/L	37.6	75.0	68.3	56.0	1.0
pH	std. units	5.40	7.34	6.88	7.17	0.10

Trace Metals						
Aluminum (Al)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Arsenic (As) III	mg/L	< 0.001	< 0.001	< 0.001	0.001	0.001
Beryllium (Be)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Cadmium (Cd)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Cobalt (Co)	mg/L	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Lead (Pb)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Manganese (Mn)	mg/L	0.02	0.08	0.05	0.01	0.01
Molybdenum (Mo)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10
Nickel (Ni)	mg/L	< 0.05	< 0.05	< 0.05	< 0.05	0.05
Selenium (Se) IV	mg/L	< 0.001	< 0.001	< 0.001	0.002	0.001
Vanadium (V)	mg/L	< 0.10	< 0.10	< 0.10	< 0.10	0.10

Radiometric						
Uranium (U <sup>238</sup> )	mg/L	< 0.0003	0.0067	< 0.0003	< 0.0003	0.0003
Radium 226 (Ra <sup>226</sup> )	pCi/L	< 0.2	< 0.2	< 0.2	< 0.2	0.2
Radium Precision ±						
Radium 228 (Ra <sup>228</sup> )	pCi/L	< 1.0	< 1.0	< 1.0	< 1.0	1.0
Radium Precision ±						
Thorium 230 (Th <sup>230</sup> )	pCi/L	1.0	< 0.2	< 0.2	< 0.2	0.2
Thorium Precision ±		0.5				
Lead 210 (Pb <sup>210</sup> )	pCi/L	2.4	< 1.0	< 1.0	< 1.0	1.0
Lead Precision ±		2.1				
Gross Alpha	pCi/L	< 1.0	< 1.0	< 1.0	< 1.0	1.0
G. Alpha Precision ±						

Trace Organics						
Chloroform	µg/L	< 1.00	< 1.00	1.05	< 1.00	1.00

Quality Assurance Data						Target Range
Anion	meq	0.57	1.27	1.00	0.90	
Cation	meq	0.55	1.23	1.01	0.95	
WYDEQ A/C Balance	%	-1.71	-1.45	0.31	2.33	-5 - +5
Calc TDS	mg/L	34	77	61	56	
TDS A/C Balance	dec. %	1.00	0.98	1.11	1.00	0.80 - 1.20

APPENDIX B

Chain of Custody Forms

UNITED NUCLEAR CORPORATION  
(State Road 566 - 1.1 Miles NE of Gallup)  
P.O. Box 3077  
Gallup, NM 87305-3077  
505-722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.  
Laboratory  
254 North Central Street  
Address

Casper WY State 82601 Zip  
City

307-235-0515  
Phone No.

All analysis will be performed in accordance with EPA approved procedures and/or 15th Edition of Standard Methods

UNC Submittal No. TE- 7-7-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	NaOH	Preserved By	Analysis Required (For all samples listed)
✓ TWQ 141	7/10	0915	NB	CO	NB	NB	CO			As, Be, Ca, Cd, Cl, HCO <sub>3</sub> , K, Mg, Mn, Na, NH <sub>3</sub> , Ni, NO <sub>3</sub> , Pb, Pb-210, pH, Se, SO <sub>4</sub> , TDS, Th-230, U, V, Chloroform, Gross Alpha (-) U & Rn, Combined Ra-226 & Ra-228, Al, Co, Mo
✓ TWQ 142	"	0920								
✓ TWQ 143	"	0932								
✓ 420	"	0953								
✓ 517	"	1013	NB		NB	NB				
✓ 614	"	1147	CO		CO	CO	CO			
✓ 515-A	"	1156	NB		NB	NB				
✓ 604	"	1207								
✓ RINSE	"	1215								
✓ 619	"	1245								
✓ 516-A	"	1309								
✓ 509-D	"	1327								
✓ 632	"	1339								
✓ GW-1	"	1351								
✓ 624	"	1402	NB	CO	NB	NB	CO			

The above analysis to be performed is authorized by: Edward Morales - RB  
Signature  
Date July 11, 1990

Date 7-15-90 Time 11:00  
Lab Receipt Signature  
Date 7-15-90 Time 11:00

Received by 7-11-90 Time 3:30 pm  
Date

Sampled by: GPB  
Dispatched by: GPB  
Carrier: UPS  
Method of Shipment Insured

# CHAIN OF CUSTODY

307-235-0515  
Phone No.

UNC Submittal No. TE-

The above analysis to be performed is  
authorized by Edward Morales - RB  
Signature July 11, 1990  
Date

Sampled by: C. Cohen  
 Dispatched by: R. B. Vincent  
 Carrier: UPS  
 Method of Shipment: Air  
 Received by: 7-11-90 3:25 pm  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_  
 Lab Receipt Signature: \_\_\_\_\_  
 Date: \_\_\_\_\_ Time: \_\_\_\_\_

UNITED NUCLEAR CORPORATION  
 (State Road 566 - 1.1 Miles NE of Gallup)  
 P.O. Box 3077  
 Gallup, NM 87305-3077  
 505-722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.  
 Laboratory

254 North Center Street  
 Address

Casper City WY State Zip 82601

307-235-0515  
 Phone No.

All analysis will be performed in accordance with EPA approved procedures and/or 15th Edition of Standard Methods

UNC Submittal No. IE- 8-7-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	NaOH	Preserved By	Analysis Required (For all samples listed)
✓ NR-1	7-15	1305	MC	CO	MC	MC	CO			As, Be, Ca, Cd, Cl, HCO <sub>3</sub> , K, Mg, Mn, Na, NH <sub>3</sub> , Ni, NO <sub>3</sub> , Pb, Pb-210, pH, Se, SO <sub>4</sub> , TDS, Th-230, U, V, Chloroform, Gross Alpha (-) U & Rn, Combined Ra-226 & Ra-228, Al, Co, Mo
✓ EPA #14	"	1400								
✓ EPA #23	"	1440								
✓ 803	"	1500								
✓ 802	"	1505								
✓ EPA #25	"	1518								
✓ EPA #1	7-16	1000								
✓ EPA #13	"	1018								
✓ EPA #8	"	1028								
✓ EPA #9	"	1030								
✓ EPA #4	"	1040								
✓ EPA #7	"	1056								
✓ EPA #5	"	1103								
✓ EPA #2	"	1125								
✓ EPA #27	"	1145	MC	CO	MC	MC	CO			Wells GW-3 and GW-4 require Po-210 analysis in addition to above.

The above analysis to be performed is authorized by:  
 Signature: Marked by Fletcher  
 Date: 7-17-90

Date: 7-19-90 Time: 1:30  
 Lab Receipt Signature: L. Barker  
 Date: 7-19-90 Time: 1:30

Received by: Marked by Fletcher  
 Date: 7-17-90 Time: 3:30 pm

Sampled by: C. Brown  
 Dispatched by: V. J. Green  
 Carrier: VPS  
 Method of Shipment: Coolers

CHAIN OF CUSTODY

307-235-0515  
Phone No.

UNC Submittal No. TE-

The above analysis to be performed is  
authorized by: Michael J. Kelly  
Signature 7-17-96  
Date

Sampled by: A. Gibson  
 Dispatched by: R. H. Green  
 Carrier: UPS  
 Received by: Mrs. Chokley  
7-17-90 3:30 pm  
 Date Time  
 Date Time  
 Lab Receipt Signature

UNITED NUCLEAR CORPORATION  
 (State Road 566 - 21 Miles NE of Gallup)  
 P.O. Box 3077  
 Gallup, NM 87305-3077  
 505-722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.  
 Laboratory

254 North Center Street  
 Address

Casper WY 82601  
 City State Zip

307-235-0515  
 Phone No.

All analysis will be performed in accordance with EPA approved procedures and/or 15th Edition of Standard Methods

UNC Submittal No. IE- 9-10-96

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	NaOH	Preserved By	Analysis Required (For all samples listed)
TWQ 141	10-1-96	0859	1.2	CO	1.0	1.0	CO			As, Be, Ca, Cd, Cl, HCO <sub>3</sub> , K, Mg, Mn, Na, NH <sub>3</sub> , Ni, NO <sub>3</sub> , Pb, Pb-210, pH, Se, SO <sub>4</sub> , TDS, Th-230, U, V, Chloroform, Gross Alpha (-) U & Rn, Combined Ra-226 & Ra-228, Al, Co, Mo
TWQ 142	"	0912								
TWQ 143	"	0924								
410	"	0936								
517	"	0951								
614	"	1006								
515-A	"	1016								
604	"	1025								
619	"	1038								
516-A	"	1050								
GW-4	"	1210								
509-D	"	1230								
RINSTATE	"	1240								
GW-1	"	1254								
624	"	1310	1.5	CO	1.1	1.2	CO			

Sampled by: C. Dixon  
 Dispatched by: M. M. S. S. S.  
 Carrier: UPS  
 Method of Shipment: iced coolers

The above analysis to be performed is authorized by: [Signature]  
 Signature: [Signature]  
 Date: 10-2-96

Received by: M. M. S. S. S.  
 Date: 10-2-96  
 Time: 4:00 PM

Lab Receipt Signature: [Signature]  
 Date: 10-4-96  
 Time: 0930

# CHAIN OF CUSTODY

307-235-0515  
Phone No.

All analysis will be performed in accordance with EPA approved procedures and/or 15th Edition of Standard Methods

UNC Submittal No. TE- 9-10-96

Page 2-

Sample Description	Date	Time	Filter 0.45µ	PRESERVATION plain	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	NaOH	Preserved By	Analysis Required (For all samples listed)
GW-2	10-1-96	1321	nc	CD	nc	nc	CD	X		As, Be, Ca, Cd, Cl, HCO <sub>3</sub> , K, Mg, Mn, Na, NH <sub>3</sub> , Ni, NO <sub>3</sub> , Pb, Pb-210, pH, Se, SO <sub>4</sub> , TDS, Th-230, U, V, Chloroform, Gross Alpha (-) U & Rn, Combined Ra-226 & Ra-228, Al, Co, Mo
632	"	1328	{	{	{	{	{	{		
GW-3	"	1350	{	{	{	{	{	{		
627	"	1410	{	{	{	{	{	{		
FIELD BLANK	"	1418	{	{	{	{	{	{		
504-B	"	1438	{	{	{	{	{	{		
502-B	"	1447	{	{	{	{	{	{		
518	"	1457	nc	CD	nc	nc	CD			Wells GW-3 and GW-4 require Po-analysis in addition to above

The above analysis to be performed is authorized by: *[Signature]*

Samuel J. May

Date \_\_\_\_\_

Date: 10-2-96 Time: 1:30 P.M.

Lab Receipt Signature

Date 10-4-96 Time 0930

Received by M. M. S. Beards

Date	10-2-96	Time	4:00 PM
------	---------	------	---------

2109

Sampled by: *C. D. Davis*

Dispatched by: *Mr. McEld*

Carrier: 085

5 iced coolers

UNITED NUCLEAR CORPORATION  
(State Road 566 - 21 Miles NE of Gallup)  
P.O. Box 3077  
Gallup, NM 87305-3077  
505-722-6651

U1003 log 37315

CHAIN OF CUSTODY

Energy Laboratories, Inc.  
Laboratory

254 North Center Street  
Address

Casper WY 82601  
City State Zip

307-235-0515  
Phone No.

All analysis will be performed in accordance with EPA approved  
procedures and/or 15th Edition of Standard Methods

UNC Submittal No. TE-10-10-96

Page 1

Sample Description	Date	Time	Filter	PRESERVATION					Preserved By	Analysis Required (For all samples listed)
			0.45u	plain	HNO <sub>3</sub>	H <sub>2</sub> SO <sub>4</sub>	Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub>	NaOH		
EPA # 14	10-7-96	1320	CP	CP	CD	CD	CD			As, Be, Ca, Cd, Cl, HCO <sub>3</sub> ,
" 23	"	1351								K, Mg, Mn, Na, NH <sub>3</sub> , Ni,
" 25	"	1420								NO <sub>3</sub> , Pb, Pb-210, pH, Se,
803	10-8-96	0834								SO <sub>4</sub> , TDS, Th-230, U, V,
802	"	0843								Chloroform, Gross
801	"	0852								Alpha (-) U & Rn,
411	"	0912								Combined Ra-226 & Ra-228, Al,
EPA #1	"	0945	CD		CD	CD				Co, Mo
" 13	"	1012	LB		LB	LB				Wells GW-3 and GW-4 require Po-210 analysis in addition to above.
" 8	"	1043								
" 9	"	1051								
" 4	"	1059								
" 7	"	1112								
" 5	"	1119								
" 2	"	1137	LB	CD	LB	LB	CD			

Sampled by: C. Rife  
Dispatched by: MM McBride  
Carrier: UPS  
6 coolers  
Method of Shipment

Received by: MM McBride  
Date: 10-9-96 Time: 1:45 PM

10-9-96 1:30 PM  
Date Time  
L. Barker  
Lab Receipt Signature  
10-11-96 10:00  
Date Time

The above analysis to be performed is  
authorized by:  
March 17 Fletcher  
Signature  
10-9-96  
Date

## CHAIN OF CUSTODY

307-235-0515  
Phone No.

UNC Submittal No. TE- 10-10-96

Page 2-

The above analysis to be performed is  
authorized by: Murphy Fletcher  
Signature 10-9-96  
Date

10946 1:30 PM  
Date Time  
Lab Receipt Signature  
10-11-96 1000  
Date Time

Received by Mr. McGuire  
10-9-96 1:45 PM

Sampled by: CCP  
 Dispatched by: M. M. G. S. S.  
 Carrier: UPS  
 Method of Shipment: 6 covers

APPENDIX C

Laboratory Quality Control and Performance Reports



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

UNC MINING AND MILLING

Project:

Churchrock Operations - Quarterlies

Laboratory I.D.:

96-41344-48

Sample Matrix:

Water

Sample Date / Time:

07-07-96

Date Received:

07-15-96

Report Date:

August 25, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-26-96	DP
Laboratory #:		96-41347	96-41496	RA-201	RA-201		
Radium 226:	903.0	109	102	110	<0.2	08-07-96	RS
Laboratory #:		n/a	96-41501	228-158	228-158		
Radium 228:	904.0	-	86	-	<1.0	08-16-96	DB
Laboratory #:		96-41341	96-41351	AS-67	AS-67		
Thorium 230:	907.0	78	97	106	<0.2	08-12-96	PH
Laboratory #:		96-41351	96-41348	PB-40	PB-40		
Lead 210:	NERHL-65-4	100	92	92	<1.0	08-09-96	RS
Laboratory #:		96-41343	96-41517	GA-33	GA-33		
Gross Alpha:	900.1	100	106	84	<1.0	08-05-96	RS

\*Uranium is reported in mg/L.

Approved By:  
lmh qc41344*R.A. Leal*



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

UNC MINING AND MILLING

Project:

Churchrock Operations - Quarterlies

Laboratory I.D.:

96-41349-58

Sample Matrix:

Water

Sample Date / Time:

07-07-96

Date Received:

07-15-96

Report Date:

August 25, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-25-96	DP
Laboratory #:		96-41354	96-41994	RA-203	RA-203		
Radium 226:	903.0	76	94	106	<0.2	08-08-96	RS
Laboratory #:		n/a	96-41358	228-159	228-159		
Radium 228:	904.0	-	129	82	<1.0	08-16-96	DB
Laboratory #:		96-30797	96-41356	AS-68	AS-68		
Thorium 230:	907.0	104	92	99	<0.2	08-09-96	PH
Laboratory #:		96-41351	96-41348	PB-40	PB-40		
Lead 210:	NERHL-65-4	100	92	92	<1.0	08-09-96	RS
Laboratory #:		96-39731	96-42342	GA-34	GA-34		
Gross Alpha:	900.1	100	87	95	<1.0	08-07-96	RS

\*Uranium is reported in mg/L.

Approved By:  
lmh qc41349



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

UNC MINING AND MILLING

Project:  
Laboratory I.D.:  
Sample Matrix:  
Sample Date / Time:  
Date Received:  
Report Date:

## Churchrock Operations - Quarterlies

96-41512-17

Water

07-17-96

07-19-96

August 25, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-25-96	DP
Laboratory #:		96-41354	96-41994	RA-203	RA-203		
Radium 226:	903.0	76	94	106	<0.2	08-08-96	RS
Laboratory #:		n/a	96-41358	228-160	228-160		
Radium 228:	904.0	-	129	82	<1.0	08-16-96	DB
Laboratory #:		96-41494	96-41514	AS-69	AS-69		
Thorium 230:	907.0	105	103	103	<0.2	08-15-96	PH
Laboratory #:		96-41358	96-41517	PB-41	PB-41		
Lead 210:	NERHL-65-4	100	101	87	<1.0	08-12-96	RS
Laboratory #:		96-41343	96-41517	GA-33	GA-33		
Gross Alpha:	900.1	100	106	84	<1.0	08-05-96	RS

\*Uranium is reported in mg/L.

Approved By:  
lmh qc41512



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

UNC MINING AND MILLING

Project:

Laboratory I.D.:

Sample Matrix:

Sample Date / Time:

Date Received:

Report Date:

Churchrock Operations - Quarterlies

96-41518-22

Water

07-17-96

07-19-96

August 26, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-25-96	DP
Laboratory #:		96-41520	96-42162	RA-206	RA-206		
Radium 226:	903.0	106	105	97	<0.2	08-15-96	RS
Laboratory #:		n/a	96-41518	228-161, 162	228-161, 162		
Radium 228:	904.0	-	115	105	<1.0	08-21-96	LMH
Laboratory #:		96-41523	96-41693	AS-70	AS-70		
Thorium 230:	907.0	81	95	95	<0.2	08-16-96	PH
Laboratory #:		96-41522	96-41530	PB-43	PB-43		
Lead 210:	NERHL-65-4	100	98	76	<1.0	08-16-96	RS
Laboratory #:		96-39731	96-42342	GA-34	GA-34		
Gross Alpha:	900.1	100	87	95	<1.0	08-07-96	RS

\*Uranium is reported in mg/L.

Approved By:  
lmh qc41518



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

UNC MINING AND MILLING

Project:  
Laboratory I.D.:  
Sample Matrix:  
Sample Date / Time:  
Date Received:  
Report Date:

Churchrock Operations - Quarterlies
96-41337-43
Water
07-07-96
07-15-96
September 5, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-26-96	DP
Laboratory #:		96-41347	96-41496	RA-201	RA-201		
Radium 226:	903.0	109	102	110	<0.2	08-07-96	RS
Laboratory #:		n/a	96-41501	228-158	228-158		
Radium 228:	904.0	-	86	-	<1.0	08-16-96	DB
Laboratory #:		96-41341	96-41351	AS-67	AS-67		
Thorium 230:	907.0	78	97	106	<0.2	08-12-96	PH
Laboratory #:		96-41337	96-41338	PB-38	PB-38		
Lead 210:	NERHL-65-4	100	76	101	<1.0	08-01-96	RS
Laboratory #:		96-41343	96-41517	GA-33	GA-33		
Gross Alpha:	900.1	100	106	84	<1.0	08-05-96	RS
Laboratory #:		96-45847	96-45848	PO-12	PO-12		
Polonium 210:	Precipitation	100	81	81	<1.0	08-29-96	LH

\*Uranium is reported in mg/L.

Report Approved By:

lmh qc41337

*R.A. Leasing*



## RADIOCHEMICAL QUALITY ASSURANCE REPORT -

## UNC MINING AND MILLING

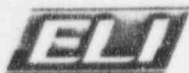
Project:  
Laboratory I.D.:  
Sample Matrix:  
Sample Date / Time:  
Date Received:  
Report Date:

Churchrock Quartermies
96-41523-30
Water
07-17-96
07-19-96
September 6, 1996

	Method	Duplicate Precision (Percent)	Spike Recovery (Percent)	LCS Recovery (Percent)	Method Blank (pCi/L)*	Date Analyzed	Analyst
Laboratory #:		96-41518	96-41528	U-64	U-64		
Uranium:	908.1	103	104	100	<0.0003	07-26-96	DP
Laboratory #:		96-41530	96-44175	RA-206	RA-206		
Radium 226:	903.0	108	93	105	<0.2	08-16-96	RS
Laboratory #:		96-41530	-	-	228-163		
Radium 228:	904.0	100	-	-	<1.0	08-26-96	LH
Laboratory #:		96-41523	96-41693	AS-70	AS-70		
Thorium 230:	907.0	81	95	95	<0.2	08-16-96	PH
Laboratory #:		96-41522	96-41530	PB-43	PB-43		
Lead 210:	NERHL-65-4	100	98	76	<1.0	08-16-96	RS
Laboratory #:		96-41530	96-47486	GA-35	GA-35		
Gross Alpha:	900.1	100	100	93	<1.0	08-16-96	LH

Report Approved By:  
lmh 96-41523

*J. Blanda*



## QUALITY ASSURANCE REPORT – UNC Mining &amp; Milling

Page 8 of 8

Project: Southwest Alluvium Quartermies  
Laboratory I.D. #(s): 96-41337 to 96-41343  
Report Date: 08-27-96

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	99	—	90	—	TS	07-29-96
Magnesium	EPA-200.7	100	—	94	—	TS	07-29-96
Sodium	EPA-200.7	100	—	91	—	TS	07-29-96
Potassium	EPA-200.7	100	—	97	—	TS	07-29-96
Bicarbonate	EPA-310.1	102	—	106	—	MM	07-16-96
Sulfate	EPA-200.7	100	—	99	—	TS	07-29-96
Chloride	EPA-200.7	99	—	91	—	TS	07-29-96
Ammonium	EPA-350.1	100	—	102	—	RK	07-16-96
Nitrite + Nitrate	EPA-353.2	102	—	102	—	RK	07-19-96

Non – Metals							
TDS @ 180 °C	EPA-160.1	100	—	—	—	MM	07-17-96
pH	EPA-150.1	100	—	—	—	MM	07-16-96

Trace Metals							
Aluminum	EPA-200.7	100	—	95	—	TS	07-29-96
Arsenic	EPA-206.3	100	—	87	—	MM	08-09-96
Beryllium	EPA-200.7	100	—	94	—	TS	07-29-96
Cadmium	EPA-200.7	100	—	92	—	TS	07-29-96
Cobalt	EPA-200.7	100	—	93	—	TS	07-29-96
Lead	EPA-200.7	100	—	98	—	TS	07-29-96
Manganese	EPA-200.7	100	—	96	—	TS	07-29-96
Molybdenum	EPA-200.7	100	—	97	—	TS	07-29-96
Nickel	EPA-200.7	100	—	91	—	TS	07-29-96
Selenium	EPA-270.3	100	—	83	—	MM	08-09-96
Vanadium	EPA-200.7	100	—	96	—	TS	07-29-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result.  
ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition.  
ELI performs a matrix spike on 10 percent of all samples for each analytical method

Report Approved By: *P.O. Leach*

PIM 41337alv.wk3



## QUALITY ASSURANCE REPORT – UNC Mining &amp; Milling

Page 6 of 6

Project: Zone 3 3rd Quarter  
Laboratory I.D. # (s): 96-41344 to 96-41348  
Report Date: 09-03-96

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	99	--	90	--	TS	07-29-96
Magnesium	EPA-200.7	100	--	94	--	TS	07-29-96
Sodium	EPA-200.7	100	--	91	--	TS	07-29-96
Potassium	EPA-200.7	100	--	97	--	TS	07-29-96
Bicarbonate	EPA-310.1	102	--	106	--	MM	07-16-96
Sulfate	EPA-200.7	100	--	99	--	TS	07-29-96
Chloride	EPA-200.7	99	--	91	--	TS	07-29-96
Ammonium	EPA-350.1	100	--	102	--	RK	07-16-96
Nitrite + Nitrate	EPA-353.2	102	--	102	--	RK	07-19-96

Non - Metals							
TDS @ 180 °C	EPA-160.1	100	--	--	--	MM	07-17-96
pH	EPA-150.1	100	--	--	--	MM	07-16-96

Trace Metals							
Aluminum	EPA-200.7	100	--	95	--	TS	07-29-96
Arsenic	EPA-206.3	100	--	--	--	MM	08-09-96
Beryllium	EPA-200.7	100	--	94	--	TS	07-29-96
Cadmium	EPA-200.7	100	--	92	--	TS	07-29-96
Cobalt	EPA-200.7	100	--	93	--	TS	07-29-96
Lead	EPA-200.7	100	--	98	--	TS	07-29-96
Manganese	EPA-200.7	100	--	96	--	TS	07-29-96
Molybdenum	EPA-200.7	100	--	97	--	TS	07-29-96
Nickel	EPA-200.7	100	--	91	--	TS	07-29-96
Selenium	EPA-270.3	100	--	--	--	MM	08-09-96
Vanadium	EPA-200.7	100	--	96	--	TS	07-29-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method

Report Approved By: *R.A. Hawley*

PIM 41344zn3.wk3



## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

Page 11 of 11

Project: Zone 1 3rd Quarter  
Laboratory I.D. # (s): 96-41349 to 96-41358  
Report Date: 09-03-96

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	99	-	93	-	TS	07-29-96
Magnesium	EPA-200.7	100	-	87	-	TS	07-29-96
Sodium	EPA-200.7	100	-	94	-	TS	07-29-96
Potassium	EPA-200.7	100	-	95	-	TS	07-29-96
Bicarbonate	EPA-310.1	100	-	106	-	MM	07-16-96
Sulfate	EPA-200.7	98	-	100	-	TS	07-29-96
Chloride	EPA-200.7	108	-	91	-	TS	07-29-96
Ammonium	EPA-350.1	99	-	96	-	RK	07-16-96
Nitrite + Nitrate	EPA-353.2	100	-	102	-	RK	07-19-96

Non - Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	MM	07-17-96
pH	EPA-150.1	100	-	-	-	MM	07-16-96

Trace Metals							
Aluminum	EPA-200.7	100	-	95	-	TS	07-29-96
Arsenic	EPA-206.3	100	-	97	-	MM	08-09-96
Beryllium	EPA-200.7	100	-	95	-	TS	07-29-96
Cadmium	EPA-200.7	100	-	89	-	TS	07-29-96
Cobalt	EPA-200.7	100	-	99	-	TS	07-29-96
Lead	EPA-200.7	100	-	99	-	TS	07-29-96
Manganese	EPA-200.7	100	-	91	-	TS	07-29-96
Molybdenum	EPA-200.7	100	-	99	-	TS	07-29-96
Nickel	EPA-200.7	100	-	91	-	TS	07-29-96
Selenium	EPA-270.3	100	-	89	-	MM	08-09-96
Vanadium	EPA-200.7	100	-	98	-	TS	07-29-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method

Report Approved By: *P. A. Leach*

PIM 41349zn1.wk3



## QUALITY ASSURANCE REPORT – UNC Mining &amp; Milling

Page 7 of 7

Project: Zone 1 Quarterlies  
Laboratory I.D. #(s): 96-41512 to 96-41517  
Report Date: 09-03-96

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	99	--	93	--	TS	07-29-96
Magnesium	EPA-200.7	100	--	87	--	TS	07-29-96
Sodium	EPA-200.7	99	--	94	--	TS	07-29-96
Potassium	EPA-200.7	100	--	95	--	TS	07-29-96
Bicarbonate	EPA-310.1	100	--	95	--	MM	07-22-96
Sulfate	EPA-200.7	98	--	100	--	TS	07-29-96
Chloride	EPA-200.7	108	--	91	--	TS	07-29-96
Ammonium	EPA-350.1	100	--	102	--	RK	07-23-96
Nitrite + Nitrate	EPA-353.2	100	--	98	--	RK	07-24-96

Non - Metals							
TDS @ 180 °C	EPA-160.1	100	--	--	--	MM	07-23-96
pH	EPA-150.1	100	--	--	--	MM	07-22-96

Trace Metals							
Aluminum	EPA-200.7	100	--	98	--	TS	07-29-96
Arsenic	EPA-206.3	100	--	116	--	MM	08-04-96
Beryllium	EPA-200.7	100	--	95	--	TS	07-29-96
Cadmium	EPA-200.7	100	--	89	--	TS	07-29-96
Cobalt	EPA-200.7	100	--	99	--	TS	07-29-96
Lead	EPA-200.7	100	--	99	--	TS	07-29-96
Manganese	EPA-200.7	100	--	91	--	TS	07-29-96
Molybdenum	EPA-200.7	100	--	99	--	TS	07-29-96
Nickel	EPA-200.7	100	--	91	--	TS	07-29-96
Selenium	EPA-270.3	100	--	96	--	MM	08-12-96
Vanadium	EPA-200.7	100	--	98	--	TS	07-29-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method

Report Approved By: *P.A. Harting*

PIM 41513zn1.wk3

**QUALITY ASSURANCE REPORT – UNC Mining & Milling**

Page 6 of 6

Project: Zone 3 Quarterlies  
Laboratory I.D. #(s): 96-41518 to 96-41522  
Report Date: 09-03-96

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	98	--	101	--	TS	07-29-96
Magnesium	EPA-200.7	98	--	95	--	TS	07-29-96
Sodium	EPA-200.7	100	--	102	--	TS	07-29-96
Potassium	EPA-200.7	100	--	98	--	TS	07-29-96
Bicarbonate	EPA-310.1	100	--	95	--	MM	07-22-96
Sulfate	EPA-200.7	98	--	102	--	TS	07-29-96
Chloride	EPA-200.7	98	--	101	--	TS	07-29-96
Ammonium	EPA-350.1	100	--	102	--	RK	07-23-96
Nitrite + Nitrate	EPA-353.2	100	--	98	--	RK	07-24-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	--	--	--	MM	07-23-96
pH	EPA-150.1	100	--	--	--	MM	07-22-96

Trace Metals							
Aluminum	EPA-200.7	100	--	105	--	TS	07-29-96
Arsenic	EPA-206.3	100	--	116	--	MM	08-04-96
Beryllium	EPA-200.7	100	--	104	--	TS	07-29-96
Cadmium	EPA-200.7	100	--	95	--	TS	07-29-96
Cobalt	EPA-200.7	100	--	108	--	TS	07-29-96
Lead	EPA-200.7	100	--	104	--	TS	07-29-96
Manganese	EPA-200.7	100	--	104	--	TS	07-29-96
Molybdenum	EPA-200.7	100	--	102	--	TS	07-29-96
Nickel	EPA-200.7	100	--	97	--	TS	07-29-96
Selenium	EPA-270.3	100	--	96	--	MM	08-12-96
Vanadium	EPA-200.7	100	--	104	--	TS	07-29-96

**NOTES:**

(1) These values are an assessment of analytical precision. They are a percent recovery of the original result.  
ELI duplicates 10 percent of all samples for each analytical method.

(2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition.  
ELI performs a matrix spike on 10 percent of all samples for each analytical method

Report Approved By: *A.A. Leasing*

PIM 41518zn3.wk3



## QUALITY ASSURANCE REPORT – UNC Mining &amp; Milling

Page 9 of 9

Project: Southwest Alluvium Quartermies  
Laboratory I.D. # (s): 96-41523 to 96-41530  
Report Date: 09-03-96

Major Ions	Method	Cup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	98	—	101	—	TS	07-29-96
Magnesium	EPA-200.7	98	—	95	—	TS	07-29-96
Sodium	EPA-200.7	100	—	102	—	TS	07-29-96
Potassium	EPA-200.7	100	—	98	—	TS	07-29-96
Bicarbonate	EPA-310.1	100	—	86	—	MM	07-22-96
Sulfate	EPA-200.7	98	—	102	—	TS	07-29-96
Chloride	EPA-200.7	98	—	101	—	TS	07-29-96
Ammonium	EPA-350.1	102	—	100	—	RK	07-23-96
Nitrite + Nitrate	EPA-353.2	100	—	98	—	RK	07-24-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	102	—	—	—	MM	07-23-96
pH	EPA-150.1	100	—	—	—	MM	07-22-96

Trace Metals							
Aluminum	EPA-200.7	100	—	105	—	TS	07-29-96
Arsenic	EPA-206.3	100	—	116	—	MM	08-14-96
Beryllium	EPA-200.7	100	—	104	—	TS	07-29-96
Cadmium	EPA-200.7	100	—	95	—	TS	07-29-96
Cobalt	EPA-200.7	100	—	105	—	TS	07-29-96
Lead	EPA-200.7	100	—	104	—	TS	07-29-96
Manganese	EPA-200.7	100	—	104	—	TS	07-29-96
Molybdenum	EPA-200.7	100	—	102	—	TS	07-29-96
Nickel	EPA-200.7	100	—	97	—	TS	07-29-96
Selenium	EPA-270.3	100	—	84	—	MM	08-12-96
Vanadium	EPA-200.7	100	—	104	—	TS	07-29-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *R.C. Leaking*

PIM 41523alv.wk3



## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

Page 6 of 6

Project: Zone 3 4th Quarter  
Laboratory I.D. #(s): 96-58645 to 96-58649  
Report Date: Dec. 7, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	100	-	101	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	94	-	TS	11-07-96
Sodium	EPA-200.7	100	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	96	-	TS	11-07-96
Bicarbonate	EPA-310.1	100	-	102	-	DJ	10-14-96
Sulfate	EPA-200.7	109	-	98	-	TS	11-07-96
Chloride	EPA-200.7	100	-	90	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	101	-	RK	10-21-96
Nitrite + Nitrate	EPA-353.2	100	-	88	-	SD	10-16-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	MM	10-16-96
pH	EPA-150.1	100	-	-	-	DJ	10-14-96

Trace Metals							
Aluminum	EPA-200.7	100	-	97	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-15-96
Beryllium	EPA-200.7	100	-	95	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	96	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	96	-	TS	11-07-96
Lead	EPA-200.7	100	-	97	-	TS	11-07-96
Manganese	EPA-200.7	100	-	96	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	90	-	MM	10-14-96
Vanadium	EPA-200.7	100	-	96	-	TS	11-07-96

Radiometrics							
Uranium	EPA-908.1	100	-	94	-	TL	10-23-96
Radium 226	EPA-903.0	100	-	80	-	RS	11-05-96
Radium 228	EPA-904.0	100	-	99	-	WD	11-18-96
Thorium 230	EPA-907.0	97	-	97	-	PH	11-13-96
Lead 210	NERHL-55-4	100	-	99	-	LH	11-21-96
Gross Alpha	EPA-900.0	100	-	78	-	LH	11-07-96

Trace Organics							
Chloroform	EPA-601	107	-	96	-	WD	10-15-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *J. H. Lacking*  
PIM c:\data\unc96\58645zn3.xls

Reviewed by: *Jm*



## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

Page 11 of 11

Project: Zone 1 4th Quarter  
Laboratory I.D. #(s): 96-54982 to 96-54991  
Report Date: Dec. 9, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	100	-	101	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	94	-	TS	11-07-96
Sodium	EPA-200.7	100	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	96	-	TS	11-07-96
Bicarbonate	EPA-310.1	100	-	97	-	LM	10-07-96
Sulfate	EPA-200.7	109	-	98	-	TS	11-07-96
Chloride	EPA-200.7	100	-	90	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	102	-	RK	10-08-96
Nitrite + Nitrate	EPA-353.2	100	-	102	-	RK	10-10-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	LM	10-08-96
pH	EPA-150.1	100	-	-	-	LM	10-07-96

Trace Metals							
Aluminum	EPA-200.7	100	-	97	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-08-96
Beryllium	EPA-200.7	100	-	95	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	96	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	96	-	TS	11-07-96
Lead	EPA-200.7	100	-	97	-	TS	11-07-96
Manganese	EPA-200.7	100	-	96	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	92	-	MM	10-08-96
Vanadium	EPA-200.7	100	-	96	-	TS	11-07-96

Radiometrics							
Uranium	EPA-908.1	100	-	104	-	TL	10-21-96
Radium 226	EPA-903.0	91	-	95	-	RS	11-04-96
Radium 228	EPA-904.0	100	-	102	-	WD	11-12-96
Thorium 230	EPA-907.0	83	-	81	-	PH	11-01-96
Lead 210	NERHL-65-4	100	-	87	-	LH	11-12-96
Gross Alpha	EPA-900.0	100	-	95	-	LH	10-22-96

Trace Organics							
Chloroforms	EPA-601	59	-	61	-	WD	10-08-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *P.A. Leach*Reviewed by: *[Signature]*

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## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

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Project: Southwest Alluvium 4th Quarter  
Laboratory I.D. #(s): 96-58637 to 96-53644  
Report Date: Dec. 10, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	100	-	101	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	94	-	TS	11-07-96
Sodium	EPA-200.7	100	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	96	-	TS	11-07-96
Bicarbonate	EPA-310.1	102	-	102	-	DJ	10-14-96
Sulfate	EPA-200.7	109	-	98	-	TS	11-07-96
Chloride	EPA-200.7	100	-	90	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	101	-	RK	10-21-96
Nitrite + Nitrate	EPA-353.2	100	-	88	-	RK	10-16-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	LM	10-16-96
pH	EPA-150.1	102	-	-	-	DJ	10-14-96

Trace Metals							
Aluminum	EPA-200.7	100	-	97	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-15-96
Beryllium	EPA-200.7	100	-	95	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	96	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	96	-	TS	11-07-96
Lead	EPA-200.7	100	-	97	-	TS	11-07-96
Manganese	EPA-200.7	100	-	96	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	90	-	MM	10-14-96
Vanadium	EPA-200.7	100	-	96	-	TS	11-07-96

Radiometrics							
Uranium	EPA-908.1	100	-	94	-	TL	10-23-96
Radium 226	EPA-903.0	70	-	97	-	RS	11-01-96
Radium 228	EPA-904.0	100	-	99	-	WD	11-12-96
Thorium 230	EPA-907.0	97	-	98	-	PH	11-13-96
Lead 210	NERHL-65-4	82	-	96	-	LH	11-18-96
Gross Alpha	EPA-900.0	100	-	97	-	LH	11-01-96

Trace Organics							
Chloroform	EPA-601	107	-	96	-	WD	10-15-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *R.A. Harding*  
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## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

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Project: Zone 1 4th Quarter  
Laboratory I.D. #(s): 96-58650 to 96-58654  
Report Date: Dec. 10, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	101	-	97	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	92	-	TS	11-07-96
Sodium	EPA-200.7	101	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	97	-	TS	11-07-96
Bicarbonate	EPA-310.1	100	-	102	-	DJ	10-14-96
Sulfate	EPA-200.7	100	-	97	-	TS	11-07-96
Chloride	EPA-200.7	100	-	93	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	102	-	RK	10-21-96
Nitrite + Nitrate	EPA-353.2	100	-	88	-	SD	10-16-96

**Non-Metals**

TDS @ 180 °C	EPA-160.1	100	-	-	-	LM	10-16-96
pH	EPA-150.1	100	-	-	-	DJ	10-14-96

**Trace Metals**

Aluminum	EPA-200.7	100	-	98	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-15-96
Beryllium	EPA-200.7	100	-	97	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	98	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	98	-	TS	11-07-96
Lead	EPA-200.7	100	-	98	-	TS	11-07-96
Manganese	EPA-200.7	100	-	97	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	90	-	MM	10-14-96
Vanadium	EPA-200.7	100	-	97	-	TS	11-07-96

**Radiometrics**

Uranium	EPA-908.1	100	-	94	-	TL	10-23-96
Radium 226	EPA-903.0	88	-	91	-	RS	11-07-96
Radium 228	EPA-904.0	130	-	96	-	WD	11-18-96
Thorium 230	EPA-907.0	97	-	97	-	PH	11-13-96
Lead 210	NERHL-65-4	100	-	99	-	LH	11-21-96
Gross Alpha	EPA-900.0	100	-	78	-	LH	11-07-96

**Trace Organics**

Chloroform	EPA-601	107	-	96	-	WD	10-15-96
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**NOTES:**

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *R.A. Sealing*

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## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

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Project: Zone 3 4th Quarter  
Laboratory I.D. #(s): 96-54992 to 96-54996  
Report Date: Dec. 11, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	101	-	97	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	92	-	TS	11-07-96
Sodium	EPA-200.7	101	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	97	-	TS	11-07-96
Bicarbonate	EPA-310.1	100	-	101	-	LM	10-08-96
Sulfate	EPA-200.7	100	-	97	-	TS	11-07-96
Chloride	EPA-200.7	100	-	93	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	100	-	RK	10-08-96
Nitrite + Nitrate	EPA-353.2	95	-	100	-	RK	10-10-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	LM	10-08-96
pH	EPA-150.1	100	-	-	-	LM	10-08-96

Trace Metals							
Aluminum	EPA-200.7	100	-	98	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-09-96
Beryllium	EPA-200.7	100	-	97	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	98	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	98	-	TS	11-07-96
Lead	EPA-200.7	100	-	98	-	TS	11-07-96
Manganese	EPA-200.7	100	-	97	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	92	-	MM	10-08-96
Vanadium	EPA-200.7	100	-	97	-	TS	11-07-96

Radiometrics							
Uranium	EPA-908.1	100	-	102	-	TL	10-21-96
Radium 226	EPA-903.0	100	-	92	-	RS	10-28-96
Radium 228	EPA-904.0	107	-	99	-	WD	11-08-96
Thorium 230	EPA-907.0	83	-	81	-	PH	11-01-96
Lead 210	NERHL-65.4	100	-	100	-	LH	11-13-96
Gross Alpha	EPA-900.0	100	-	95	-	LH	10-22-96

Trace Organics							
Chloroform	EPA-601	97	-	67	-	WD	10-08-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *L.A. Leasing*  
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Reviewed by: *[Signature]*



## QUALITY ASSURANCE REPORT - UNC Mining &amp; Milling

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Project: Southwest Alluvium 4th Quarter  
Laboratory I.D. #(s): 96-54997 to 96-55004  
Report Date: Dec. 11, 1996

Major Ions	Method	Dup <sup>1</sup> #1 %	Dup #2 %	Spk <sup>2</sup> #1 %	Spk #2 %	Analyst	Date Analyzed
Calcium	EPA-200.7	101	-	97	-	TS	11-07-96
Magnesium	EPA-200.7	100	-	92	-	TS	11-07-96
Sodium	EPA-200.7	101	-	96	-	TS	11-07-96
Potassium	EPA-200.7	100	-	97	-	TS	11-07-96
Bicarbonate	EPA-310.1	100	-	101	-	LM	10-07-96
Sulfate	EPA-200.7	100	-	97	-	TS	11-07-96
Chloride	EPA-200.7	100	-	93	-	TS	11-07-96
Ammonium	EPA-350.1	100	-	100	-	RK	10-08-96
Nitrite + Nitrate	EPA-353.2	96	-	100	-	RK	10-10-96

Non-Metals							
TDS @ 180 °C	EPA-160.1	100	-	-	-	LM	10-08-96
pH	EPA-150.1	100	-	-	-	LM	10-07-96

Trace Metals							
Aluminum	EPA-200.7	100	-	98	-	TS	11-07-96
Arsenic	EPA-206.3	100	-	94	-	MM	10-09-96
Beryllium	EPA-200.7	100	-	97	-	TS	11-07-96
Cadmium	EPA-200.7	100	-	98	-	TS	11-07-96
Cobalt	EPA-200.7	100	-	98	-	TS	11-07-96
Lead	EPA-200.7	100	-	98	-	TS	11-07-96
Manganese	EPA-200.7	100	-	97	-	TS	11-07-96
Molybdenum	EPA-200.7	100	-	98	-	TS	11-07-96
Nickel	EPA-200.7	100	-	96	-	TS	11-07-96
Selenium	EPA-270.3	100	-	88	-	MM	10-08-96
Vanadium	EPA-200.7	100	-	97	-	TS	11-07-96

Radiometrics							
Uranium	EPA-908.1	100	-	102	-	TL	10-21-96
Radium 226	EPA-903.0	70	-	97	-	RS	11-01-96
Radium 228	EPA-904.0	100	-	-	-	WD	11-08-96
Thorium 230	EPA-907.0	102	-	93	-	PH	11-05-96
Lead 210	NERHL-65-4	100	-	100	-	LH	11-13-96
Polonium 210	Precipitation	100	-	82	-	LH	11-12-96
Gross Alpha	EPA-900.0	109	-	99	-	LH	10-28-96

Trace Organics							
Chloroform	EPA-601	97	-	67	-	WD	10-09-96

## NOTES:

- (1) These values are an assessment of analytical precision. They are a percent recovery of the original result. ELI duplicates 10 percent of all samples for each analytical method.
- (2) These values are an assessment of analytical accuracy. They are a percent recovery of the spike addition. ELI performs a matrix spike on 10 percent of all samples for each analytical method.

Report Approved By: *x.a. Harting*  
PIM c:\data\unc96\54997\alv.xls

Reviewed by: *[Signature]*