UNC MINING AND MILLING

40-8907

Division of United Nuclear Corporation
A UNC RESOURCES Company

New Mexico Operations
P.O. Drawer QQ

Gallup, New Mexico 87305
Telephone 505/722-6651

RETURN ORIGINAL TO PDR, HQ.

CERTIFIED-RETURN RECEIPT REQUESTED

August 17, 1990

Mr. Ricky J. McCoy
Environmental Protection Agency
OK/NM Superfund Enforcement Section (6H-EO)
1445 Ross Avenue
Dallas, TX 75202-2733

Re: Semiannual Quality Assurance Report
Ground Water Monitoring - First Half 1990

Dear Mr. McCoy:

In accordance with Section V.A. 15 of the Administrative Order for the Churchrock site, I have enclosed a report regarding performance of ground water monitoring quality assurance procedures during the first half of 1990.

Two sampling episodes occurred in the first half of 1990 - in January and April.

Sincerely yours,

Edward M. Morales

Edward M. Morales
General Manager and
Radiation Safety Officer

EMM/v

Enclosure

cc: G. Konwinski - NRC
J. Velasquez - UNC
S. Barringer - Holland & Hart

90-0752

Semiannual Quality Assurance Report
Church Rock Site
First Half of 1990
January and April Events

August 1990

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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 on 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 Procedures

Copies of the field sampling report sheets for the first and second quarters of 1990 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, WY. 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 Quality Control

Copies of the Internal Quality Control report prepared by Energy Laboratories and the associated EPA performance evaluations are included in Appendix C. Also included are the results for a spiked GW-1 well sample submitted under fictitious Well #704. This sample was spiked and submitted by UNC.

5.0 Data Validation

Analytical reports are reviewed by the Church Rock General Manager/Radiation Safety Officer after receipt from Energy Labs. The reported values are compared to previous reports for each well. 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 the transcription for these items and, where necessary, repeats the analysis. A revised report is then issued for that sample if an error is discovered.

As a result of this screening process, 25 errors out of 3,410 laboratory determinations were discovered and corrected in the first half of 1990.

A laboratory comparison was performed as part of the second sampling event. A split of GW-1 sample was submitted to Data Chem Laboratories for analysis of cyanide and selenium using the same method used by Energy Laboratories. This was proposed for the first half of 1990 in our last Quality Assurance Report.

The Comparison Data is included in Appendix D.

Appendix A

Field Data Sheets

1990

	Well No.	Time	Date Blown	Water Depth	Field pH	Date Sampled	T.O.P.	Water Level	Cond. (Field: Temp, pH, Turb.) Remarks
1	* GW-1	10:20	1-9-90	48.2	6.4	1-10-90	6916.46	6868.3	4500 11° - 8.0
2	* G. -	10:46	1-9-90	43.2	6.7	1-10-90	6912.88	6869.7	4300 10.9° 8.0
3	GW-3	13:42	1-2-90	39.8	6.4	1-4-90	6910.04	6870.2	3700 11.2°
4	GW-4	11:03	1-2-90	44.6	7.2	1-4-90	6959.15	6914.6	3000 10.3° 3.0
5	EPA-1	09:14	pumped 1-15-90	231.3	6.4	1-16-90	7035.544	6804.2	3200 11.4°
6	EPA-2	14:22	1-15-90	174.7	6.5	1-17-90	7019.485	6844.8	2800 11.7°
7	* EPA-3	13:00	1-22-90	126.3	6.8	1-23-90	7019.070	6892.8	4000 13.1° not enough wtr. to sample
8	EPA-4	13:48	1-15-90	200.4	6.5	1-16-90	7069.798	6869.4	3500 11.9°
9	* EPA-5	11:18	1-15-90	175.8	6.1	1-16-90	7011.444	6895.6	4200 12.3°
10	EPA-7	10:50	1-15-90	103.7	4.2	1-16-90	7011.662	6908.0	6000 12.5°
11	* EPA-8	13:05	1-15-90	217.9	6.5	1-16-90	7076.402	6858.5	3400 12.5°
12	EPA-9	12:52	1-15-90	165.4	5.7	1-16-90	7076.612	6911.2	3500 11.2°
13	* EPA-11	09:37	1-15-90	149.0	5.6	1-16-90	7001.982	6853.0	3000 11.6°
14	* EPA-12	09:50	1-15-90	164.4	5.9	1-16-90	7029.215	6864.8	3400 11.2°
15	* EPA-13	10:30	1-15-90	152.0	5.1	1-16-90	7030.467	6879.5	3600 12° muddy water
16	EPA-14	14:32	1-17-90	76.1	5.6	1-17-90	6965.611	6889.5	2700 12.2° pump. cond. settled
17	* EPA-15	13:28	1-15-90	121.4	5.9	1-16-90	7002.932	6881.5	2100 12.1°
18	* EPA-17 Bailed	09:22	1-9-90	186.2	6.3	1-10-90	7072.495	6886.3	4500 12.1° Hand bailed 2.0
19	* EPA-18	10:13	1-15-90	163.4	5.2	1-16-90	7046.716	6883.3	3700 11.2°
20	* EPA-22A	14:45	1-15-90	41.6	6.8	1-17-90	6954.512	6912.9	1500 11.6° muddy water
21	EPA-23	14:00	1-17-90	30.0	6.4	1-17-90	6926.312	6896.3	3800 12.8° pump.cond. settled
22	EPA-25	12:54	1-17-90	41.9	6.6	1-17-90	6903.383	6861.5	2700 12.8° Sandy pump. cond. settled - wtr.
23	EPA-27	13:43	1-22-90	45.9	8.0	1-23-90	6910.946	6865.0	3700 12.2°
24	EPA-28	13:52	1-22-90	50.2	6.6	1-23-90	6917.861	6867.7	3600 11°
25	* 411	10:49	1-2-90	116.7	6.0	1-3-90	6980.40	6863.7	2000 11.2° 3.0
26	* 420	10:25	1-2-90	104.2	5.9	1-3-90	6982.48	6878.3	2000 10° 3.0
27	* 501-B	08:57	1-9-90	163.1	3.7	1-10-90	7048.44	6885.3	3600 10.9° Hand bailed 2.5
28	* 502-B	10:01	1-2-90	140.0	4.9	1-3-90	7025.70	6885.7	3400 11.3° 2.0
29	* 504-B	09:41	1-2-90	135.8	5.7	1-3-90	7001.71	6865.9	3000 10.4° 1.5

	Well No.	Time	Date Blown	Water Depth	Field pH	Date Sampled	T.O.P.	Water Level	Remarks (Field Temp. Cond.)
30	509-D	11:30	1-2-90	34.1	6.1	1-4-90	6949.44	6915.3	3700 10.7° 15.0
31	5-A	11:09	1-9-90	89.1	4.0	1-10-90	7008.68	6919.6	6800 12.9°
32	516-A	11:31	1-9-90	84.6	4.4	1-10-90	7002.44	6917.8	8200 12°
33	517	10:35	1-2-90	76.8	5.4	1-3-90	6971.62	6894.8	2900 11.2° 2.5
34	518	10:13	1-2-90	119.5	3.0	1-3-90	7009.68	6890.2	6200 11.2° 2.0
35	604	11:15	1-9-90	88.0	3.9	1-10-90	7005.83	6917.8	4400 12.1°
36	614	10:59	1-9-90	83.9	6.4	1-10-90	7011.91	6928.0	6400 12°
37	619	11:40	1-9-90	125.4	6.5	1-10-90	7012.99	6887.6	3800 12.5°
38	624	10:34	1-9-90	38.5	7.2	1-10-90	6898.57	6860.1	3700 13.1°
39	627	14:39	1-2-90	45.5	6.8	1-4-90	6892.22	6846.7	3500 11.2° 20.0
40	632	08:25	1-9-90	31.2	6.4	1-10-90	6903.49	6872.3	6000 10.8° Hard bailed 3.0
41	639	13:10	1-9-90	34.2	6.7	1-11-90	6973.82	6939.6	3700 12.5° Bailed (S.T.) 6.0
42	642	13:24	1-9-90	45.3	6.8	1-11-90	6971.80	6926.5	3300 13.7° Bailed (S.T.) 13.0
43	644	13:38	1-9-90	43.0	6.7	1-11-90	6978.01	6935.5	4100 11.7° Bailed (S.T.) 9.0
44	645	13:51	1-9-90	42.8	6.7	1-11-90	6983.56	6940.8	7500 12.2° Bailed (S.T.) Dry 5.0
45	TWQ-9D	11:11	1-2-90	67.0	4.4	1-4-90	6969.86 Bailed Time	6902.3	4800 10.5° 2.0 Need to be Surveyed
46	TWQ-29A	13:36	1-2-90	53.8	6.9	1-4-90	6932.37	6878.6	3000 11.5° 1.0
47	TWQ-106D	11:18	1-2-90	52.6	4.3	1-4-90	6958.53 Bailed Time	6905.9	3800 10° 1.5
48	TWQ-141	08:44	1-2-90	213.2	7.9	1-3-90	6978.46	6765.2	7200 12.5° 10.0
49	TWQ-142	09:07	1-2-90	223.5	7.6	1-3-90	6983.32	6759.8	1300 11.5° 12.0
50	TWQ-143	09:20	1-2-90	230.0	7.5	1-3-90	6989.59	6759.6	1200 11.6° 15.0
51	801	—	—	Pumping	6.5	1-11-90	6904.13		7700 12.8°
52	802	—	—	"	6.5	1-11-90	6907.25		6300 12.4°
53	803	—	—	"	6.6	1-11-90	6924.74		4400 15°
	804	10:43	1-18-90	34.6			6906.76	6872.2	
	805	10:51	1-18-90	37.6			6915.65	6878.1	
	06	10:53	1-18-90	37.5			6916.04	6878.5	
	807	10:51	1-18-90	39.8			6923.39	6883.6	
	Field Blank	—	—	—	4.6	—	—	—	30 16.1° 0.0 15.00

1Q90

Well No.	Time	Date Blown	Water Depth	Field pH	Date Sampled	T.O.P.	Water Level	Remarks (Est. Vol. Purged, Gal.)
G-1	10:20	1-9-90	48.2	6.4	1-10-90	6916.46		8.0
GW-2	10:46	1-9-90	42.2	6.7	1-10-90	6912.88		8.0
GW-3	13:42	1-2-90	39.8	6.4	1-4-90	6910.04		5.0
GW-4	11:03	1-2-90	44.6	7.2	1-4-90	6959.15		3.0
EPA-1	09:14	1-15-90 Pumped	231.3	6.4	1-16-90	7035.544		
EPA-2	14:22	1-15-90	171.7	6.5	1-17-90	7019.485		
EPA-3	13:00 13:12	1-22-90 1-15-90	126.3 126.2	6.8	1-23-90	7019.070		Not enough water to sample
EPA-4	13:48	1-15-90	200.4	6.5	1-16-90	7069.798		
EPA-5	11:18	1-15-90	115.8	6.1	1-16-90	7011.444		
EPA-7	10:50	1-15-90	103.7	4.2	1-16-90	7011.662		
EPA-8	13:05	1-15-90	212.9	6.5	1-16-90	7076.402		
EPA-9	12:52	1-15-90	165.4	5.7	1-16-90	7076.612		
EPA-11	09:37	1-15-90	149.0	5.6	1-16-90	7001.982		
E.-12	09:50	1-15-90	164.4	5.9	1-16-90	7029.215		
EPA-13	10:30	1-15-90	180.0	5.1	1-16-90	7030.467		Muddy Water
EPA-14	14:32	1-17-90	76.1	5.6	1-17-90	6965.611		Pumped Cont. Settled
EPA-15	13:28	1-15-90	121.4	5.9	1-16-90	7002.932		
EPA-17 Bailed	09:22	1-9-90	188.2	6.3	1-10-90	7072.495		Hand Bailed 2.0
EPA-18	10:13	1-15-90	163.4	5.2	1-16-90	7046.716		
EPA-22A	14:45	1-15-90	41.6	6.8	1-17-90	6954.512		Muddy Water
EPA-23	14:00	1-17-90	20.0	6.4	1-17-90	6926.312		Pump Cont. Settled
EPA-25	12:54	1-17-90	41.7	6.6	1-17-90	6903.383		Pump Cont. Settled Sandy Wet
EPA-27	13:43	1-22-90	459	8.0	1-23-90	6910.946		
EPA-28	13:52	1-22-90	50.2	6.6	1-23-90	6917.861		
411	10:49	1-2-90	116.7	6.0	1-3-90	6980.40		3.0
420	10:25	1-2-90	104.2	5.9	1-3-90	6982.48		3.0
501-B	08:57	1-9-90	162.1	3.7	1-10-90	7048.44		Hand Bailed 2.5
502-B	10:01	1-2-90	140.0	4.9	1-3-90	7025.70		2.0
504-B	09:41	1-2-90	135.8	5.7	1-3-90	7001.71		1.5

1990

	Well No.	Time	Date Blown	Water Depth	Field pH	Date Sampled	T.O.P.	Water Level	Remarks	Est. Vol. Purged, GA
*	[illegible]-D	11:30	1-2-90	34.1	6.1	1-4-90	6949.44			15.0
*	515-A	11:09	1-9-90	89.1	4.0	1-10-90	7008.68			3.0
*	516-A	11:31	1-9-90	84.6	4.4	1-10-90	7002.44			4.0
*	517	10:35	1-2-90	76.8	5.4	1-3-90	6971.62			2.5
*	518	10:13	1-2-90	119.5	3.0	1-3-90	7009.68			2.0
*	604	11:15	1-9-90	88.0	3.9	1-10-90	7005.83			15.0
*	614	10:59	1-9-90	83.9	6.4	1-10-90	7011.91			11.0
*	619	11:40	1-9-90	125.4	6.5	1-10-90	7012.99			14.0
	624	10:34	1-9-90	38.5	7.2	1-10-90	6898.57			25.0
	627	14:39	1-2-90	45.5	6.8	1-4-90	6892.22			20.0
*	632	08:25	1-9-90	31.2	6.4	1-10-90	6903.49		Hand Bailed	20
*	639	13:10	1-9-90	34.2	6.7	1-11-90	6973.82		Bailed (S.T.)	6.0
*	642	13:34	1-9-90	45.3	6.8	1-11-90	6971.80		Bailed (S.T.)	13.0
*	[illegible]	13:38	1-9-90	43.0	6.7	1-11-90	6978.01		Bailed (S.T.)	9.0
	645	13:51	1-9-90	42.8	6.7	1-11-90	6983.56		Bailed (S.T.) DTP	5.0
*	TWQ-9D	11:11	1-2-90	67.0	4.4	1-4-90	6969.26 ~~6968.18~~		(Bailed Twice) need to be Surveyed	2.0
	TWQ-29A	12:36	1-2-90	53.8	6.9	1-4-90	6932.37			1.0
*	TWQ-106D	11:18	1-2-90	52.6	4.3	1-4-90	6958.53		(Bailed twice)	1.5
	TWQ-141	08:44	1-2-90	212.2	7.9	1-3-90	6978.46			10.0
	TWQ-142	09:07	1-2-90	223.5	7.6	1-3-90	6983.32			12.0
*	TWQ-143	09:20	1-2-90	230.0	7.5	1-3-90	6989.59			15.0
	801			Pumping	6.5	1-11-90				
	802			"	6.5	1-11-90				
	803			"	6.6	1-11-90				
	804	10:47	1-18-90	34.6						
*	805	10:51	1-18-90	37.6						
*	[illegible]6	10:53	1-18-90	37.5						
*	807	10:57	1-18-90	39.8						
	[illegible]									

[illegible] 4.6 30 16.1

EPA WELLS 1990 PURGING

19__ Date	Well No.	H.P.	Elevation T.O.P.	Depth To Water	pH	Cond.	Est. Vol. Purged Temp. °C	Water Elevation
1-15-90	EPA-1	½	7035.544	24,611.4	—	24,625.7	= 14.0	2 Min 6 Sec
1-15-90	EPA-2	1/3	7019.485	25,062.1	- 25	080.4	= 18.3	3 Min 39 Sec.
1-22-90	EPA-3	1/3	7019.070	25,328.2	- 25	697.0	= 23.8	5 Min 30 Sec.
1-16-90	EPA-4	½	7069.798	25,010.7	—	25,062.1	= 52.0	2 Min 35 Sec
1-15-90	EPA-5	1/3	7011.444	24,870.1	-	24,931.2	= 61.1	8 Min 24 Sec
	EPA-6	1/3	7068.063					
1-15-90	EPA-7	1/3	7011.662	24,729.4	-	24,870.1	= 140.7	19 Min 2 Sec.
1-16-90	EPA-8	½	7076.402	24,947.0	-	25,010.1	= 63.1	Min Sec
1-15-90	EPA-9	1/3	7076.612	24,931.2	-	24,947.0	= 15.8	2 Min 27 Sec
	EPA-10	1/3	7007.842					
1-15-90	EPA-11	3/4	7001.982	24,625.4	-	24,629.0	= 3.6	27 Sec.
1-15-90	EPA-12	1/3	7029.215	24,629.0	-	24,652.7	= 23.7	2 Min 18 Sec
1-15-90	EPA-13	½	7030.467	24,692.9	-	24,729.4	= 36.5	3 Min 45 Sec.
1-17-90	EPA-14	½	6965.611	25,311.3	-	25,568.2	= 256.9	16 Min 20 Sec
1-15-90	EPA-15	5-30	7002.932	EST.	300	gal.	—	2 Min 55 Sec
	EPA-16	?	7030.619					
	EPA-17		7072.495					
1-15-90	EPA-18	1/3	7046.716	24,652.7	-	24,692.9	= 40.2	8 Min 24 Sec.
	EPA-19	1/3	7062.242					
	EPA-20	½	6987.837					
	EPA-21	2	6955.923					
	EPA-22	½	6957.960					
1-17-90	EPA-22A	½	6954.512	25,080.4	—	25,115.7	= 35.3	2 Min 40 Sec.
1-17-90	EPA-23	2	6926.312	EST	300	gal.		10 Min 47 Sec
	EPA-24	½	6902.779					
1-17-90	EPA-25	½	6903.383	25,254.3	-	25,311.3	= 57.0	19 Min. — Sampling Water
	EPA-26	½	6911.377					
1-22-90	EPA-27	1/3	6910.946	1,918,026.1	-	1,918,031.1	= 5.0	36 Sec.
1-22-90	EPA-28	1	6917.861	1,918,031.1	-	1,918,123.8	= 92.7	6 Min. Sampling

GROUND WATER MONITORING FIELD DATA SHEET

SAMPLING

2ND QUARTER 19 90

Well No.	Month /Day	Time	Sampling Method	pH	Cond.	Temp. C°	Comments
GW-1	4-5-90	13:39	Hand Bail	6.3	4,500	10.8	
GW-2	4-5-90	14:10	" "	6.5	4,200	10.2	
GW-3	4-3-90	15:04	Hand Bail	6.8	3,900	12.0	
GW-4	4-3-90	15:22	" "	7.1	3,300	12.5	
EPA-1	4-17-90	09:25	Pumped	6.3	3,300	11.2	
EPA-2	4-18-90	14:40	"	6.5	2,900	11.6	
EPA-3	4-18-90	14:20	"	6.4	4,000	12.8	
EPA-4	4-17-90	11:35	"	6.5	3,400	10.2	
EPA-5	4-17-90	13:56	"	6.0	4,000	13.7	
EPA-7	4-17-90	13:28	"	4.2	6,600	11.7	
EPA-8	4-17-90	11:05	"	6.4	3,400	12.9	
EPA-9	4-17-90	11:22	"	5.5	3,500	12.0	
EPA-11	4-17-90	09:45	"	6.0	3,200	12.2	
EPA-12	4-17-90	10:11	"	5.9	3,300	10.8	
EPA-13	4-17-90	10:53	"	5.0	3,500	12.4	
EPA-14	4-18-90	11:45	"	5.7	2,700	11.8	
EPA-15	4-18-90	13:04	"	6.1	1,800	11.8	
EPA-17	4-10-90	09:49	Hand Bailed	6.3	4,200	12.2	
EPA-18	4-17-90	10:34	Pumped	5.2	3,600	11.8	
EPA-22A	4-19-90	08:13	"	6.9	1,400	11.0	
EPA-23	4-19-90	08:48	"	6.5	3,700	12.0	
EPA-25	4-18-90	10:52	"	6.7	2,700	11.7	Sandy Water
EPA-27	4-18-90	15:00	"	7.9	3,700	11.8	
EPA-28	4-19-90	14:47	"	6.8	3,700	11.2	
411	4-3-90	15:52	Hand Bail	6.0	2,100	13.1	
420	4-3-90	13:37	" "	5.9	2,200	12.2	

EPA #23 4-24-90 10:50 Pumped 6.4 3,700 11.9 Resample Due To Shipment Breakage

GROUND WATER MONITORING FIELD DATA SHEET

SAMPLING

2ND QUARTER 19 90

Well No.	Month /Day	Time	Sampling Method	pH	Cond.	°C Temp.	Comments
501-B	4-10-90	09:24	Hand Bail	4.4	3,400	11.5	
502-B	4-3-90	11:44	Hand Bail	4.7	3,500	11.3	
504-B	4-3-90	11:18	" "	6.0	3,300	12.1	
509-D	4-3-90	15:36	" "	6.2	4,000	11.8	
515-A	4-5-90	14:53	" "	3.9	6,700	12.2	
516-A	4-6-90	08:42	" "	4.5	7,800	11.0	
517	4-3-90	13:17	Hand Bail	6.6	3,100	12.3	
518	4-2-90	12:51	" "	2.9	6,800	12.8	
604	4-5-90	15:10	" "	4.2	4,400	12.1	
614	4-5-90	14:37	" "	6.4	6,200	12.1	
619	4-6-90	09:02	" "	6.8	3,300	11.8	
624	4-5-90	13:50	Hand Bail	7.1	3,600	11.1	
627	4-3-90	14:26	Hand Bail	6.8	3,600	12.8	
632	4-10-90	13:10	" "	6.3	4,900	12.3	
639	4-10-90	10:16	" "	6.7	3,500	12.0	Very little water (mud)
2	4-10-90	10:34	" "	6.8	3,000	11.6	
644	4-10-90	10:50	" "	6.8	4,100	11.7	
645	4-10-90	11:04	" "	6.9	2,000	11.9	Only 1gal Water (15:05)
TWQ-90	4-10-90	12:41	" "	4.4	4,200	11.8	only 1 gal. Water (14:08 *
TWQ-29A	4-3-90	14:48	Hand Bail	7.0	4,000	12.8	Bailed dry To Stay
TWQ-106D	4-10-90	13:28	" "	4.3	2,900	11.8	Only ½ gal Water (15:28
TWQ-141	4-3-90	09:49	Hand Bail	7.9	1,100	10.9	
TWQ-142	4-3-90	10:20	" "	7.8	1,400	12.1	
TWQ-143	4-3-90	10:46	" "	7.7	1,200	12.8	
801	4-5-90	09:56	Pumping	6.8	6,200	13.7	
802	4-5-90	10:11		6.5	6,000	12.3	
803	4-5-90	10:21	"	6.7	4,200	13.4	
FIELD BLANK	4-5-90	10:51	—	6.9	25	17.7	
RINSATE	4-10-90	12:55	—	4.7	600	15.3	

645-90-106D { * 106-90 - 08:09 - 4-11-90 Bailed another ½ gal * Bailed again later time }

GROUND WATER MONITORING FIELD DATA SHEET

WATER DEPTH AND PURGING

2nd QUARTER 19 90

	Well No.	Month /Day	Time	Water Depth	Purging Method	Est. Vol. Purged
	GW-1	4-4-90	13:33	48.3	Air Lift.	8
	GW-2	4-4-90	13:58	42.5	" "	6
1 - *	GW-3	4-2-90	13:42	40.4	Air Lift -	3
1 - *	GW-4	4-2-90	13:57	45.6	" "	2
C.V. -	EPA-1	4-16-90	09:20	231.7	Pumped Dry. -	13
C.V. -	EPA-2	4-17-90	14:17	174.5	" "	14
C.V. - 1 - *	EPA-3	4-17-90	14:00	127.4	" "	24
	EPA-4	4-16-90	11:32	200.5	" "	57
	EPA-5	4-16-90	13:49	115.9	" "	59
1 - *	EPA-7	4-16-90	13:20	104.0	" "	138
C.V. -	EPA-8	4-16-90	11:02	217.7	" "	65
C.V. -	EPA-9	4-16-90	11:18	166.5	" "	15
1 - *	EPA-11	4-16-90	09:39	150.0	" "	19
C.V. - 1 - *	EPA-12	4-16-90	10:00	166.3	" "	22
	EPA-13	4-16-90	10:18	152.8	" "	35
1 - *	EPA-14	4-18-90	12:24	77.4	Conduct. Settled	236
1 - *	EPA-15	4-17-90	12:59	122.6	Pumped Dry.	200
	EPA-17	4-9-90	09:40	186.3	1½" Bailer S.T.	2 gal.
C.V. - 1 - *	EPA-18	4-16-90	10:24	164.0	Pumped Dry -	37
1 - *	EPA-22A	4-17-90	14:39	42.6	"	33
	EPA-23	4-19-90	08:35	30.7	Cond. Settled	300
1 *	EPA-25	4-18-90	10:31	42.2	- Cond. Settled -	112
1 - *	EPA-27	4-17-90	14:58	46.2	Pumped Dry.	7
	EPA-28	4-18-90	14:24	50.6	Conduct Settled	208
2 - *	411	4-2-90	11:50	118.1	air lift.	3.5
1 - *	420	4-2-90	11:38	105.7	" "	3
	126	4-2-90	11:30	80.4		

EPA 11 - Gals dry in 30 Sec. Had to choke volume down & pump very slow. Water in well does not full drop dia.

GROUND WATER MONITORING FIELD DATA SHEET

WATER DEPTH AND PURGING

2nd QUARTER 19 90

	Well No.	Month /Day	Time	Water Depth	Purging Method	Est. Vol. Purged	
	501-B	4-9-90	09:00	168.8	Hand Bail.	3	
1-*	502-B	4-2-90	10:19	141.8	air Lift.	2	
2-*	504-B	4-2-90	10:06	137.1	" "	2	
1-*	509-D	4-2-90	14:15	35.1	" "	15	
	515-A	4-4-90	14:26	89.9	" "	3	
1-*	516-A	4-4-90	14:48	85.0	" "	4	
3-*	517	4-2-90	10:47	79.0	air Lift.	3	
2-*	518	4-2-90	10:33	121.5	" "	2	
	604	4-4-90	14:33	88.6	"	15	
1-*	614	4-4-90	14:16	84.4	" "	10	
	619	4-4-90	14:58	125.4	" "	14	
	624	4-4-90	13:44	38.2	air Lift.	30	
	627	4-2-90	13:02	45.8	air Lift.	20	
2-*	632	4-9-90	11:40	33.1	Hand Bailed	3	
	639	4-9-90	10:15	34.8	Bailed S.T.	6	
1-*	642	4-9-90	10:32	46.1	" "	12	
	644	4-9-90	10:44	43.7	" "	8	
1-*	645	4-9-90	10:55	43.0	" "	4	
	TWQ-9D	4-9-90	11:14	59.3	Hand Bailed	2.5	bailed dry.
1-*	TWQ-29A	4-2-90	13:35	64.3	air Lift.	1	
2-*	TWQ-106D	4-9-90	11:26	54.3	Hand Bailed	.5	Bailed dry
	TWQ-141	4-2-90	09:08	213.3	air Lift	11	"
	TWQ-142	4-2-90	09:33	223.7	" "	12	
	TWQ-143	4-2-90	09:47	230.1	" "	11	"
	804	4-3-90	13:14	36.1			
	805	4-3-90	13:10	38.5			
	806	4-3-90	13:06	38.4			
	807	4-3-90	13:00	40.5			
	FIELD BLANK	—	—	—	—	—	
	RINSATE	—	—	—	—	—	

EPA WELLS 2990

19__ Date	Well No.	H.P.	Elevation T.O.P.	Depth To Water	pH	Cond.	Temp. C°	Est Vol Purged gal.	Water Elevation
4-16-90	EPA-1	½	7035.544	25,614.3 - [illegible]			B. 0.13		2 Min 65 Sec.
4-17-90	EPA-2	1/3	7019.485	26,128.5	26,142.5 =		14.0		3 Min. 19 Sec
4-17-90	EPA-3	1/3	7019.070	26,104.5	- 26,128.5 =		24.0		3 min 40 Sec
4-16-90	EPA-4	½	7069.798	25,793.7	- 25,850.8 =		57.1		8 Min 38 Sec
4-16-90	EPA-5	1/3	7011.444	25,988.9	- 26,047.5 =		58.6		8 Min 35 Sec
	EPA-6	1/3	7068.063						
4-16-90	EPA-7	1/3	7011.662	25,850.8	- 25,988.9 =		138.1		18 Min 51 Sec
4-16-90	EPA-8	½	7076.402	25,712.4	- 25,778.3 =		65.4		9 Min - 38 Sec
4-16-90	EPA-9	1/3	7076.612	25,778.3	- 25,793.7 =		15.4		2 Min. 26 Sec
	EPA-10	1/3	7007.842						
4-16-90	* EPA-11	3/4	7001.662	25,610.2	- 25,619.2 =		9.0		½ Min.
4-16-90	EPA-12	1/3	7029.215	25,619.2	- 25,641.8 =		22.6		2 Min 16 Sec
4-16-90	EPA-13	½	7030.467	25,678.4	- 25,712.9 =		34.5		3 Min 30 Sec
4-18-90	EPA-14	½	6965.611	26,384.6	- 26,520.7 =		236.1		18 Min
4-17-90	EPA-15	5-30	7002.932	EST 200 gal.					4 Min 26 Sec
	EPA-16	?	7030.619						
	EPA-17		7072.495						
4-16-90	EPA-18	1/3	7046.716	25,641.8	- 25,678.4 =		36.6		8 Min 6 Sec
	EPA-19	1/3	7062.242						
	EPA-20	½	6987.837						
	EPA-21	2	6955.923						
	EPA-22	½	6957.960						
4-17-90	EPA-22A	½	6954.512	26,142.5	- 26,175.1 =		32.6		2 Min 30 Sec
4-19-90	EPA-23	2	6926.312	EST. 300 gal.					12 Min
	EPA-24	½	6902.779						
4-18-90	EPA-25	½	6903.383	26,182.3	- 26,194.6 =		112.3		15 Min
	EPA-26	½	6911.377						
4-17-90	EPA-27	1/3	6910.546	26,175.1	- 26,182.2 =		7.1		30 Sec.
4-18-90	EPA-28	1	6917.861	26,537.2	- 26,745.1 =		207.9		18 Min.
EPA	(#11)								
	* Checked well down and pumped						9 gal.		

UNC MINING AND MILLING: CHURCHROCK OPERATIONS
GROUNDWATER MONITORING PROGRAM: SOUTHWEST ALLUVIUM MONITOR WELLS

WELL NUMBER:	Field Blank
LAB I.D.:	90-0203
SAMPLE DATE:	01-04-90
REPORT DATE:	02-26-90
QUARTER REPRESENTED:	First
UNC SUBMITTAL #:	TE-2-1-90

MAJOR IONS:		ANALYTICAL RESULT	L.L.D.	UNITS	GROUNDWATER PROTECTION STANDARDS NRC	ARAR
Calcium	(Ca)	0.50	0.05	mg/l		
Magnesium	(Mg)	0.29	0.01	mg/l		
Sodium	(Na)	2.0	0.05	mg/l		
Potassium	(K)	0.10	0.10	mg/l		
Carbonate	(CO3)		0.10	mg/l		
Bicarbonate	(HCO3)	3.4	0.10	mg/l		
Sulfate	(SO4)	1.0	1.0	mg/l		2160
Chloride	(Cl)	0.4	0.10	mg/l		250
Ammonium	(NH4)	0.10	0.05	mg/l		
Nitrate	(NO3)	0.02	0.01	mg/l		30.0
Dissolved Solids @ 180 C	(TDS)	6.0	1	mg/l		3170
pH	(units)	5.26	1-14	s.u.		
Cyanide	(CN)	<0.005	0.005	mg/l	0.005	
TRACE METALS:						
Aluminum	(Al)	<0.10	0.10	mg/l		5.0
Arsenic	(As)	<0.001	0.001	mg/l	0.05	0.05
Beryllium	(Be)	<0.05	0.05	mg/l	0.05	0.017
Cadmium	(Cd)	<0.01	0.01	mg/l	0.01	0.01
Cobalt	(Co)	<0.01	0.01	mg/l		0.05
Lead	(Pb)	<0.05	0.05	mg/l	0.05	0.05
Manganese	(Mn)	<0.01	0.01	mg/l		2.6
Molybdenum	(Mo)	<0.10	0.10	mg/l		1.0
Nickel	(Ni)	<0.05	0.05	mg/l	0.05	0.2
Selenium	(Se)	<0.001	0.001	mg/l	0.01	0.01
Vanadium	(V)	<0.10	0.10	mg/l	0.10	0.70
RADIOMETRIC:						
Uranium	(U)	0.0008	0.0003	mg/l	0.30	5.0
Radium-226	(Ra226)	<0.2	0.2	pCi/l	5.0*	5.0*
Ra-226 precision +/-				pCi/l		
Radium-228	(Ra228)	<1.0	1.0	pCi/l	5.0*	5.0*
Ra-228 precision				pCi/l		
Thorium-230	(Th230)	<0.2	0.2	pCi/l	5.0	15.0
Th-230 precision +/-				pCi/l		
Lead-210	(Pb210)	<1.0	1.0	pCi/l	1.0	
Pb-210 precision +/-				pCi/l		
Gross Alpha - U-nat and Rn-222		<1.0	1.0	pCi/l	15.0	
Gross Alpha precision +/-				pCi/l		

* Radium protection standards refer to combined Ra-226 and Ra-228

TRACE ORGANIC:					
Chloroform	<1.0	1.0	ug/l	1.0	
Napthalene	<1.0	1.0	ug/l	1.0	

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UNC MINING AND MILLING: CHURCHROCK OPERATIONS
GROUNDWATER MONITORING PROGRAM: SOUTHWEST ALLUVIUM MONITOR WELLS

WELL NUMBER:	Field Blank
LAB I.D.:	90-4801
SAMPLE DATE:	04-05-90
REPORT DATE:	05-27-90
QUARTER REPRESENTED:	Second
UNC SUBMITTAL #:	TE-9-4-90

MAJOR IONS:		ANALYTICAL RESULT	L.L.D.	UNITS	GROUNDWATER PROTECTION STANDARDS NRC	ARAR
Calcium	(Ca)	<1.0	0.05	mg/l		
Magnesium	(Mg)	<0.1	0.01	mg/l		
Sodium	(Na)	1.4	0.05	mg/l		
Potassium	(K)	<1.0	0.10	mg/l		
Carbonate	(CO3)		0.10	mg/l		
Bicarbonate	(HCO3)	6.8	0.10	mg/l		
Sulfate	(SO4)	3.1	1.0	mg/l		2160
Chloride	(Cl)	<1.0	0.10	mg/l		250
Ammonium	(NH4)	<0.05	0.05	mg/l		
Nitrate	(NO3)	0.04	0.01	mg/l		30.0
Dissolved Solids @ 180 C	(TDS)	<1.0	1	mg/l		3170
pH	(units)	6.50	1-14	s.u.		
Cyanide	(CN)	<0.005	0.005	mg/l	0.005	
TRACE METALS:						
Aluminum	(Al)	<0.10	0.10	mg/l		5.0
Arsenic	(As)	<0.001	0.001	mg/l	0.05	0.05
Beryllium	(Be)	<0.05	0.05	mg/l	0.05	0.017
Cadmium	(Cd)	<0.01	0.01	mg/l	0.01	0.01
Cobalt	(Co)	<0.01	0.01	mg/l		0.05
Lead	(Pb)	<0.05	0.05	mg/l	0.05	0.05
Manganese	(Mn)	<0.01	0.01	mg/l		2.6
Molybdenum	(Mo)	<0.10	0.10	mg/l		1.0
Nickel	(Ni)	<0.05	0.05	mg/l	0.05	0.2
Selenium	(Se)	<0.001	0.001	mg/l	0.01	0.01
Vanadium	(V)	<0.10	0.10	mg/l	0.10	0.70
RADIOMETRIC:						
Uranium	(U)	<0.0003	0.0003	mg/l	0.30	5.0
Radium-226	(Ra226)	<0.2	0.2	pCi/l	5.0*	5.0*
Ra-226 precision +/-				pCi/l		
Radium-228	(Ra228)	<1.0	1.0	pCi/l	5.0*	5.0*
Ra-228 precision				pCi/l		
Thorium-230	(Th230)	<0.2	0.2	pCi/l	5.0	15.0
Th-230 precision +/-				pCi/l		
Lead-210	(Pb210)	<1.0	1.0	pCi/l	1.0	
Pb-210 precision +/-				pCi/l		
Gross Alpha - U-nat and Rn-222		<1.0	1.0	pCi/l	15.0	
Gross Alpha precision +/-				pCi/l		

* Radium protection standards refer to combined Ra-226 and Ra-228

TRACE ORGANIC:					
Chloroform	1.5 ✓	1.0	ug/l	1.0	
Napthalene	<1.0	1.0	ug/l	1.0	

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UNC MINING AND MILLING: CHURCHROCK OPERATIONS
GROUNDWATER MONITORING PROGRAM

WELL NUMBER:	Rinsate
LAB I.D.:	90-0331
SAMPLE DATE:	01-10-90
REPORT DATE:	02-14-90
QUARTER REPRESENTED:	First
UNC SUBMITTAL #:	TE-3-1-90

MAJOR IONS:		ANALYTICAL RESULT	L.L.D.	UNITS	GROUNDWATER PROTECTION STANDARDS NRC	ARAR
Calcium	(Ca)	4.4	0.05	mg/l		
Magnesium	(Mg)	2.5	0.01	mg/l		
Sodium	(Na)	1.0	0.05	mg/l		
Potassium	(K)	<1.0	0.10	mg/l		
Carbonate	(CO3)		0.10	mg/l		
Bicarbonate	(HCO3)	0.5	0.10	mg/l		
Sulfate	(SO4)	32.5	1.0	mg/l		2160
Chloride	(Cl)	<0.1	0.10	mg/l		250
Ammonium	(NH4)	0.14	0.05	mg/l		
Nitrate	(NO3)	0.05	0.01	mg/l		30.0
Dissolved Solids @ 180 C	(TDS)	62.0	1	mg/l		3170
pH	(units)	4.96	1-14	s.u.		
Cyanide	(CN)	<0.005	0.005	mg/l	0.005	
TRACE METALS:						
Aluminum	(Al)	0.12	0.10	mg/l		5.0
Arsenic	(As)	<0.001	0.001	mg/l	0.05	0.05
Beryllium	(Be)	<0.05	0.05	mg/l	0.05	0.017
Cadmium	(Cd)	<0.01	0.01	mg/l	0.01	0.01
Cobalt	(Co)	0.03	0.01	mg/l		0.05
ead	(Pb)	<0.05	0.05	mg/l	0.05	0.05
anganese	(Mn)	0.05	0.01	mg/l		2.6
Molybdenum	(Mo)	<0.10	0.10	mg/l		1.0
Nickel	(Ni)	0.05	0.05	mg/l	0.05	0.2
Selenium	(Se)	<0.001	0.001	mg/l	0.01	0.01
Vanadium	(V)	<0.10	0.10	mg/l	0.10	0.70
RADIOMETRIC:						
Uranium	(U)	0.002	0.0003	mg/l	0.30	5.0
Radium-226	(Ra226)	0.5	0.2	pCi/l	5.0*	5.0*
Ra-226 precision +/-		0.2		pCi/l		
Radium-228	(Ra228)	<1.0	1.0	pCi/l	5.0*	5.0*
Ra-228 precision				pCi/l		
Thorium-230	(Th230)	<0.2	0.2	pCi/l	5.0	15.0
Th-230 precision +/-				pCi/l		
Lead-210	(Pb210)	2.8	1.0	pCi/l	1.0	
Pb-210 precision +/-		1.1		pCi/l		
Gross Alpha - U-nat and Rn-222		1.0	1.0	pCi/l	15.0	
Gross Alpha precision +/-		0.9		pCi/l		

* Radium protection standards refer to combined Ra-226 and Ra-228

TRACE ORGANIC:					
Chloroform	<1.0	1.0	ug/l	1.0	
Napthalene	<1.0	1.0	ug/l	1.0	

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UNC MINING AND MILLING: CHURCHROCK OPERATIONS
GROUNDWATER MONITORING PROGRAM

WELL NUMBER:	Rinsate
LAB I.D.:	90-4917
SAMPLE DATE:	04-10-90
REPORT DATE:	05-15-90
QUARTER REPRESENTED:	Second
UNC SUBMITTAL #:	TE-10-4-90

MAJOR IONS:		ANALYTICAL RESULT	L.L.D.	UNITS	GROUNDWATER PROTECTION STANDARDS NRC	ARAR
Calcium	(Ca)	75.8	0.05	mg/l		
Magnesium	(Mg)	13.1	0.01	mg/l		
Sodium	(Na)	3.6	0.05	mg/l		
Potassium	(K)	<1.0	0.10	mg/l		
Carbonate	(CO3)		0.10	mg/l		
Bicarbonate	(HCO3)	4.4	0.10	mg/l		
Sulfate	(SO4)	241.0	1.0	mg/l		2160
Chloride	(Cl)	2.2	0.10	mg/l		250
Ammonium	(NH4)	0.13	0.05	mg/l		
Nitrate	(NO3)	0.57	0.01	mg/l		30.0
Dissolved Solids @ 180 C	(TDS)	381.0	1	mg/l		3170
pH	(units)	5.82	1-14	s.u.		
Cyanide	(CN)	<0.005	0.005	mg/l	0.005	
TRACE METALS:						
Aluminum	(Al)	<0.10	0.10	mg/l		5.0
Arsenic	(As)	<0.001	0.001	mg/l	0.05	0.05
Beryllium	(Be)	<0.05	0.05	mg/l	0.05	0.017
Cadmium	(Cd)	<0.01	0.01	mg/l	0.01	0.01
Cobalt	(Co)	<0.01	0.01	mg/l		0.05
Lead	(Pb)	<0.05	0.05	mg/l	0.05	0.05
Manganese	(Mn)	0.25	0.01	mg/l		2.6
Molybdenum	(Mo)	<0.10	0.10	mg/l		1.0
Nickel	(Ni)	<0.05	0.05	mg/l	0.05	0.2
Selenium	(Se)	<0.001	0.001	mg/l	0.01	0.01
Vanadium	(V)	<0.10	0.10	mg/l	0.10	0.70
RADIOMETRIC:						
Uranium	(U)	0.001	0.0003	mg/l	0.30	5.0
Radium-226	(Ra226)	1.2	0.2	pCi/l	5.0*	5.0*
Ra-226 precision +/-		0.3		pCi/l		
Radium-228	(Ra228)	<1.0	1.0	pCi/l	5.0*	5.0*
Ra-228 precision				pCi/l		
Thorium-230	(Th230)	<0.2	0.2	pCi/l	5.0	15.0
Th-230 precision +/-				pCi/l		
Lead-210	(Pb210)	<1.0	1.0	pCi/l	1.0	
Pb-210 precision +/-				pCi/l		
Gross Alpha - U-nat and Rn-222		1.6	1.0	pCi/l	15.0	
Gross Alpha precision +/-		1.3		pCi/l		

* Radium protection standards refer to combined Ra-226 and Ra-228

TRACE ORGANIC:					
Chloroform	<1.0	1.0	mg/l	1.0	
Napthalene	<1.0	1.0	ug/l	1.0	

Q.A. MANAGER: R.A. Starling
Energy Laboratories, Inc.
P.O. Box 3258
Casper, Wyoming 82602

Appendix B

Chain of Custody Forms

UNC MI[illegible] & MILLING
(St. Rd. 566 - [illegible] iles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
aboratory

254 N. Center St.
ddress

Casper WY 82601
ity State Zip

(307) 235-0515
hone No.

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

UNC Submittal No. TE-1-1-90

Sample escription	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
141 ✓	1-3-90	09:41	✓	✓	✓	✓	✓	✓	H.H.	As, Be, Ca, Cd, Cl, HCO_3
142 ✓	1-3-90	10:16	✓	✓	✓	✓	✓	✓	H.H.	K, Mg, Mn, Na, NH_3, Ni,
143 ✓	1-3-90	10:40	✓	✓	✓	✓	✓	✓	H.H.	NO_3, Pb, Pb-210, pH, Se,
504-B/3	1-3-90	11:13	✓	✓	✓	✓	✓	✓	H.H.	SO_4, TDS, Th-230, U, V,
502-B/3	1-3-90	12:48	✓	✓	✓	✓	✓	✓	H.H.	Chloroform, Cyanide,
518 ✓3	1-3-90	13:12	✓	✓	✓	✓	✓	✓	[illegible]	Gross Alpha (-) U & Rn,
420 ✓ 3	1-3-90	13:32	✓	✓	✓	✓	-	-	H.H.	Naphthalene, Combined
517 ✓ 3	1-3-90	13:52	✓	✓	✓	✓	✓	✓	[illegible]	Ra-226 & Ra-228, Al, Co,
411 ✓3	1-3-90	14:13	✓	✓	✓	✓	✓	✓	H.H.	Mo

Sampled By: Hany Hall
Dispatched By: R. Borgelt
Carrier: UPS
4 - Coolers
Method of Shipment

Received By: Hany Hall
1-4-90 Date
1:20pm Time

1-4-90 Date
12:20pm Time
Lab Receipt Signature: Susan Hunter
1/8/90 Date
2:00 pm Time

The above analysis to be performed is authorized by:
Signature: Marshall J. Fletcher
1-4-90 Date

UNC MIN[illegible] & MILLING
(St. Rd. 566 - [illegible] Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-2-1-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
* GW-4 ✓	1-4-90	11:16	✓	✓	✓	✓	✓	✓	H. H.	As, Be, Ca, Cd, Cl, HCO_3
* 9-D ✓	1-4-90	11:32	✓	✓	✓	✓	✓	✓	H. H.	K, Mg, Mn, Na, NH_3, Ni,
* 106-D ✓	1-4-90	11:52	✓	✓	✓	✓	✓	✓	H. H.	NO_3, Pb, Pb-210, pH, Se,
* 509-D ✓	1-4-90	13:04	✓	✓	—	✓	✓	—	H. H.	SO_4, TDS, Th-230, U, V,
29-A ✓	1-4-90	13:26	✓	—	✓	✓	✓	✓	H. H.	Chloroform, Cyanide,
GW-3 ✓	1-4-90	13:41	✓	✓	✓	✓	✓	✓	H. H.	Gross Alpha (-) U & Rn,
* 627 ✓	1-4-90	14:07	✓	✓	✓	✓	✓	—	H. H.	Naphthalene, Combined
* Field Blank ✓	1-4-90	15:26	✓	✓	✓	✓	✓	✓	H. H.	Ra-226 & Ra-228, Al, Co,
										Mo

Sampled By: Hans Hall
Dispatched By: R. Borgelt
Carrier: UPS
Coolers - 4
Method of Shipment

Received By: Hans Hall
1-5-90 Date
1:27pm Time

1-5-90 Date
11:50 Am Time
S. Hunter
Lab Receipt Signature
1/9/90 Date
1:50 Time

The above analysis to be performed is authorized by:
Signature
1-5-90
Date

UNC MI' ; & MILLING
(St. Rd. 566 - Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-3-1-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
* 632	1-10-90	08:52	✓	0330 ✓	✓	✓	✓	✓	T.B	As, Be, Ca, Cd, Cl, HCO_3
* 501-B	1-10-90	09:28	✓	0331 —	✓	✓	—	✓	T.B	K, Mg, Mn, Na, NH_3, Ni,
* RINSATE	1-10-90	09:53	✓	0332 ✓	—	✓	✓	✓	T.B	NO_3, Pb, Pb-210, pH, Se,
* EPA # 17	1-10-90	10:11	✓	0333 ✓	✓	✓	✓	✓	T.B	SO_4, TDS, Th-230, U, V,
* GW-1	1-10-90	10:43	✓	0334 ✓	✓	✓	✓	✓	T.B	Chloroform, Cyanide,
~~704~~	~~1-10-90~~	~~10:64~~	~~✓~~	~~0335~~ ✓	✓	✓	—	✓	T.B	Gross Alpha (-) U & Rn,
* 624	1-10-90	11:11	✓	0336 ✓	✓	✓	✓	~	T.B	Naphthalene, Combined
* GW-2	1-10-90	11:29	✓	0336 ✓	✓	✓	✓	✓	TB	Ra-226 & Ra-228, Al, Co,
* 614	1-10-90	13:36	✓	0338 ✓	—	/	—	—	H.A.	Mo
* 515-A	1-10-90	13:53	✓	0338 ✓	✓	✓	✓	/	H.A.	
* 604	1-10-90	14:10	✓	0339 ✓	/	✓	—	✓	H.A.	
* 516-A	1-10-90	14:27	/	0340 ✓	✓	✓	✓	—	H.A.	
* 619	1-10-90	14:44	✓	0341 ✓	/	/	✓	/	H.A.	

Sampled By: Harry L. Hall
Dispatched By: R. Borgelt
Date: 1-11-90 Time: 1:30 pm
Carrier: UPS
Coolers
Method of Shipment

Received By: Harry L. Hall
Date: 1-11-90 Time: 11:30 Am
Lab Receipt Signature: S. Hunter
Date: 1/15/90 Time: 1:30 pm

The above analysis to be performed is authorized by:
Signature: Ed Thiede
Date: 1-11-90

UNC MI G & MILLING
(St. Rd. 566 · Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-4-1-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
* 639	1-11-90	12:50	✓	✓	✓	✓	✓	✓	H.H.	As, Be, Ca, Cd, Cl, HCO
* 642	1-11-90	13:07	✓	✓	✓	✓	✓	✓	H.H.	K, Mg, Mn, Na, NH_3, Ni,
* 644	1-11-90	13:24	✓	✓	✓	✓	✓	✓	H.H.	NO_3, Pb, Pb-210, pH, Se,
* 645	1-11-90	13:40	✓	✓	✓	✓	✓	✓	H.H.	SO_4, TDS, Th-230, U, V,
* 801	1-11-90	14:05	✓	✓	✓	✓	✓	✓	H.H.	Chloroform, Cyanide,
* 802	1-11-90	14:16	✓	✓	✓	✓	✓	✓	H.H.	Gross Alpha (-) U & Rn,
* 803	1-11-90	14:31	✓	✓	✓	✓	✓	✓	H.H.	Naphthalene, Combined
										Ra-226 & Ra-228, Al, Co,
										Mo

Sampled By: Harry Hall
Dispatched By: R. Borgelt
Carrier: UPS
Coolers
Method of Shipment

Received By: Harry Hall
1-12-90 Date
1:25 pm Time

1-12-90 Date
11:00 Am Time
L. Hunter
Lab Receipt Signature
1:45 Date
1/16/90 Time

The above analysis to be performed is authorized by:
Signature
1-12-90
Date

UNC MIN[illegible] & MILLING
(St. Rd. 366 - [illegible] Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-0651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-5-1-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
EPA #1	1-16-90	09:19	✓	✓	✓	3 ✓	✓	✓	H.H.	As, Be, Ca, Cd, Cl, HCO_3
EPA #11	1-16-90	09:40	✓	✓	✓	3 ✓	✓	✓	H.H.	K, Mg, Mn, Na, NH_3, Ni,
EPA #12	1-16-90	10:06	✓	✓	✓	3 ✓	✓	✓	H.H.	NO_3, Pb, Pb-210, pH, Se,
EPA #18	1-16-90	10:24	✓	✓	✓	3 ✓	✓	✓	H.H.	SO_4, TDS, Th-230, U, V,
EPA #13	1-16-90	10:54	✓	✓	✓	3 ✓	✓	✓	H.H.	Chloroform, Cyanide,
EPA #7	1-16-90	11:08	✓	✓	✓	1 ✓	✓	✓	H.H.	Gross Alpha (-) U & Rn,
EPA #5	1-16-90	11:32	✓	✓	✓	1 ✓	✓	✓	H.H.	Naphthalene, Combined
EPA #9	1-16-90	13:08	✓	✓	✓	3 ✓	✓	✓	H.H.	Ra-226 & Ra-228, Al, Co,
EPA #8	1-16-90	13:32	✓	✓	✓	1 ✓	✓	✓	H.H.	Mo
EPA #15	1-16-90	13:40	✓	✓	✓	3 ✓	✓	✓	H.H.	
EPA #4	1-16-90	14:02	✓	✓	✓	1 ✓	✓	✓	H.H.	1

Sampled By: Harry L. Hall

Dispatched By: R. Borgett — Date: 1-17-90 — Time: 1:55 pm

Carrier: UPS

Method of Shipment: Coolers

Received By: Harry L. Hall

Date: 1-17-90 — Time: 3:45 pm

Lab Receipt Signature: L. Hunter

Date — Time

The above analysis to be performed is authorized by:

Signature: Ed Hoch

Date: January 17, 1990

Coolers #1, 2, 3 rec'd 2:00 pm 1/19/90
Coolers #4 & 5 rec'd 1:45 1/22/90

UNC MIN[illegible] & MILLING
(St. Rd. 566 - [illegible] Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-6-1-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed
EPA #21	1-17-90	10:43	1 ✓	N.P. ✓	✓	✓	N.P. ✓	✓	TB	As, Be, Ca, Cd, Cl, HCO
EPA #22A	1-17-90	11:05	A ✓	N.P. ✓	✓	✓	N.P. ✓	✓	TB	K, Mg, Mn, Na, NH_3, Ni,
EPA #25	1-17-90	13:13	A ✓	N.P. ✓	✓	✓	N.P. ✓	✓	TB	NO_3, Pb, Pb-210, pH, Se
EPA #23	1-17-90	14:11	A ✓	✓	✓	✓	✓	✓	N. H.	SO_4, TDS, Th-230, U, V,
EPA #14	1-17-90	14:48	3 ✓	✓	✓	✓	✓	✓	N. H.	Chloroform, Cyanide,
										Gross Alpha (-) U & Rn,
										Naphthalene, Combined
										Ra-226 & Ra-228, Al, Co
										Mo

Sampled By: Harry L Hall
Dispatched By: Elvira Stah
Carrier: UPS
Coolers
Method of Shipment

Received By: Harry L Hall
1-18-90 Date
1:37 PM Time

1-18-90 Date
10:00 Time
S. Hunter
Lab Receipt Signature

1/23/90 Date
2:15 pm Time

The above analysis to be performed is authorized by:
Marshall J Fletcher
Signature
1-18-90
Date

UNC MINI[illegible], MILLING
(St. Rd. 566 - [illegible]iles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
aboratory

254 N. Center St.
ddress

Casper WY 82601
ity State Zip

(307) 235-0515
ione No.

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

UNC Submittal No. TE-7-1-90

Sample escription	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
EPA #31	1-23-90	13:20	✓	✓	✓	—	✓	✓	H.H.	As, Be, Ca, Cd, Cl, HCO_3
EPA #27	1-23-90	13:54	✓	✓	✓	✓	✓	✓	H.H.	K, Mg, Mn, Na, NH_3, Ni,
EPA #28	1-23-90	14:08	✓	✓	✓	✓	✓	✓	H.H.	NO_3, Pb, Pb-210, pH, Se,
										SO_4, TDS, Th-230, U, V,
										Chloroform, Cyanide,
										Gross Alpha (-) U & Rn,
										Naphthalene, Combined
										Ra-226 & Ra-228, Al, Co,
										Mo

Sampled By: Harry J. Hall

Dispatched By: R. Borgelt

Carrier: UPS

Coolers
Method of Shipment

Received By: Harry J. Hall

1-24-90 1:25pm
Date Time

1-24-90 9:45 Am
Date Time

Lab Receipt Signature

Date Time

The above analysis to be performed is authorized by:

Signature

1-24-90
Date

UNC MIN[illegible] & MILLING
(St. Rd. 566 - [illegible] Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-8-4-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
141	4-3-90	09:49	✓	✓ NH	✓	✓	✓ NH	✓	T.G	As, Be, Ca, Cd, Cl, HCO_3
142	"	10:20	✓	✓ NH	✓	✓	✓ NH	✓	T.G	K, Mg, Mn, Na, NH_3, Ni,
143	"	10:46	✓	✓ NH	✓	✓	✓ NH	✓	T.G	NO_3, Pb, Pb-210, pH, Se,
504-B	"	11:18	✓	✓ NH	✓	✓	✓ NH	✓	T.G.	SO_4, TDS, Th-230, U, V,
502-B	"	11:44	✓	✓ NH	✓	✓	✓ NH	✓	T.G.	Chloroform, Cyanide,
518	"	12:51	✓	✓	✓	✓	✓	✓	N.H	Gross Alpha (-) U & Rn,
517	"	13:17	✓	✓	✓	✓	✓	✓	N.H	Naphthalene, Combined
420	"	13:34	✓	✓	✓	✓	✓	✓	N.H	Ra-226 & Ra-228, Al, Co,
411	"	13:52	✓	✓	✓	✓	✓	✓	N.H	Mo
627	"	14:26	✓	✓	✓	✓	✓	✓	N.H	
29-A	"	14:48	✓	✓	✓	✓	✓	✓	N.H.	
GW-3	"	15:04	✓	✓	✓	✓	✓	✓	N.H.	
GW-4	"	15:22	✓	✓	✓	✓	✓	✓	N.H.	
509-D	"	15:36	✓	✓	✓	✓	✓	✓	N.H.	

Sampled By: Harry S. Hall

Dispatched By: R. Borgelt

Carrier: UPS

Coolers
Method of Shipment

Received By: Harry S. Hall
4-4-90 Date
1:55pm Time

4-4-90 Date
11:00Am Time
S. Hunter
Lab Receipt Signature

4/6/90 Date
12:15 pm Time

The above analysis to be performed is authorized by:
Ed Mueller
Signature
4/7/90 Date

UNC MIN[illegible] & MILLING
(St. Rd. 566 - [illegible] Miles NE of Gallup)
P. O. [illegible]rawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-9-4-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
801 ✓	4-5-90	09:56	✓	✓	✓	✓	✓	✓	H.H	As, Be, Ca, Cd, Cl, HCO_3
802 ✓	4-5-90	10:11	✓	✓	T.B	✓	✓	✓	H.H	K, Mg, Mn, Na, NH_3, Ni,
803 ✓	4-5-90	10:21	✓	✓	T.B	✓	✓	✓	H.H	NO_3, Pb, Pb-210, pH, Se,
Field Blank ✓	4-5-90	10:51	✓	✓	✓	✓	✓	✓	H.H	SO_4, TDS, Th-230, U, V,
GW-1 ✓	4-5-90	12:39	✓	✓	✓	✓	✓	✓	H.H	Chloroform, Cyanide,
624 ✓	4-5-90	12:50	✓	✓	✓	✓	✓	✓	H.H	Gross Alpha (-) U & Rn,
GW-2 ✓	4-5-90	14:10	✓	✓	✓	✓	✓	✓	H.H	Naphthalene, Combined
614 ✓	4-5-90	14:37	✓	✓	✓	✓	✓	✓	H.H	Ra-226 & Ra-228, Al, Co,
515-A ✓	4-5-90	14:53	✓	✓	✓	✓	✓	✓	H.H	Mo
604 ✓	4-5-90	15:10	✓	✓	✓	✓	✓	✓	H.H	
516-A ✓	4-6-90	08:42	✓	✓	✓	✓	✓	✓	H.H	
619 ✓	4-6-90	09:02	✓	✓	✓	✓	✓	✓	H.H	

Sampled By: Hans S. Hall
Dispatched By: R. Borgelt
Carrier: UPS
Coolers
Method of Shipment

Received By: Hans S. Hall
4-6-90 Date
1:50 pm Time

4-6-90 Date
12:00 pm Time
S. Hunter
Lab Receipt Signature
4/10/90 Date
1:45 pm. Time

The above analysis to be performed is authorized by:
Marshall J Fletcher
Signature
4-6-90
Date

UNC MI[illegible] & MILLING
(St. Rd. 566 - [illegible] Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-10-4-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed
501-B	4-10-90	09:24	TB	#2	TB	TB	NH	TB		As, Be, Ca, Cd, Cl, HCO
EPA #17	4-10-90	09:49	TB	#1	TB	TB	NH	TB		K, Mg, Mn, Na, NH_3, Ni,
639	4-10-90	10:16	TB	#2	TB	TB	NH	TB		NO_3, Pb, Pb-210, pH, Se
642	4-10-90	10:34	TB	#2	TB	TB	NH	TB		SO_4, TDS, Th-230, U, V,
644	4-10-90	10:50	TB	#2	TB	TB	NH	TB		Chloroform, Cyanide,
645	4-10-90	11:04	TB	#2		TB	NH	TB		Gross Alpha (-) U & Rn,
9D	4-10-90	12.41		#2			NH		H.P	Naphthalene, Combined
Rinsate	4-10-90	12:55	TB	#2	TB	TB	NH	TB	H.P	Ra-226 & Ra-228, Al, Co
632	4-10-90	13.10		#2			NH		H.P	Mo
106-D	4-10-90	13:28		#2			NH		H.P	

Sampled By: Hans J. Hall
Dispatched By: R. Borgelt
Carrier: UPS
Coolers
Method of Shipment

Received By: Hans J. Hall
4-11-90 Date
1:30pm Time

4-11-90 Date
10:30 AM Time
L. Hunter
Lab Receipt Signature
4/13/90 Date
1:15 pm Time

The above analysis to be performed is authorized by:
Ed Mondragon
Signature
4/11/90 Date

UNC MIN[illegible] & MILLING
(St. Rd. 566 Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-11-4-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed
* EPA # 1	4-17-90	09:25	✓	✓	✓	✓	✓	✓	TA	As, Be, Ca, Cd, Cl, HCO
* EPA #11	"	09:45	✓	✓	✓	—	✓	✓	T.A	K, Mg, Mn, Na, NH_3, Ni,
* EPA #12	"	10:11	✓	✓	✓	✓	✓	✓	TA	NO_3, Pb, Pb-210, pH, Se
* EPA #18	"	10:34	✓	✓	✓	✓	✓	✓	TA	SO_4, TDS, Th-230, U, V,
* EPA #13	"	10:53	✓	✓	✓	✓	✓	✓	TA	Chloroform, Cyanide,
* EPA # 8	"	11:05	✓	✓	✓	✓	✓	✓	TA	Gross Alpha (-) U & Rn,
* EPA # 9	"	11:22	✓	✓	✓	✓	✓	✓	TA	Naphthalene, Combined
* EPA #4	"	11:35	✓	✓	✓	✓	✓	✓	TA	Ra-226 & Ra-228, Al, Co
* EPA #7	"	13:28	✓	✓	✓	✓	✓	✓	TA	Mo
* EPA #5	"	13:56	✓	✓	✓	✓	✓	✓	TA	

Sampled By: Harry J. Hall

Dispatched By: R. Borgelt

Carrier: UPS

Coolers
Method of Shipment

Received By: Harry J. Hall
4-18-90 Date
1:15pm Time

4-18-90 Date
9:00 AM Time
Susan Hunter
Lab Receipt Signature
4/20/90 Date
1:45 Time

The above analysis to be performed as authorized by:
Marshall J. Fletcher
Signature
4-18-90
Date

UNC MIN & MILLING
(St. Rd. 566 Miles NE of Gallup)
P. O. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Energy Laboratories, Inc.
Laboratory

254 N. Center St.
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-12-4-90

Sample Description	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required (For all samples listed)
EPA # 25	4-18-90	10:52	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	As, Be, Ca, Cd, Cl, HCO_3
EPA #14	"	11:45	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	K, Mg, Mn, Na, NH_3, Ni,
EPA #15	"	13:04	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	NO_3, Pb, Pb-210, pH, Se,
EPA # 3	"	14:20	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	SO_4, TDS, Th-230, U, V,
EPA # 2	"	14:40	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	Chloroform, Cyanide,
EPA #28	"	14:47	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	Gross Alpha (-) U & Rn,
EPA #27	"	15:00	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	Naphthalene, Combined
EPA #23	4-19-20	08:48	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	Ra-226 & Ra-228, Al, Co,
EPA #22A	4-19-20	08:13	✓	✓ N.P.	✓	✓	✓ N.P.	✓	TD	Mo

Sampled By: Harry J. Hall
Dispatched By: R. Borgelt
Carrier: UPS
Coolers
Method of Shipment

Received By: Harry J. Hall
4-19-90 Date
1:55pm Time

4-19-90 Date
10:30AM Time
Susan Hunter
Lab Receipt Signature
4/23/90 Date
1:50 pm Time

The above analysis to be performed is authorized by:
Charles D. Johnson
Signature
4-19-90
Date

UNC MINING & MILLING
(ST. RD. 566 1 Miles NE of Gallup)
P. Drawer QQ
Gallup, NM 87301
(505) 722-6651

CHAIN OF CUSTODY

Data - Chem
aboratory

960 West LeVoy Drive
ddress

Salt Lake City Utah 84123
ity/State/Zip Phone No.

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

UNC Submittal No. _____

Sample escription	Date	Time	Filter 0.45u	PRESERVATION plain	HNO_3	H_2SO_4	$Na_2S_2O_3$	NaOH	Preserved By	Analysis Required
GW 1	4/5/90	1339	✓		✓			✓	H Hall	Se & CN
										Methods
										EPA 270.3 & 335.3

ampled By: H Hall
ispatched By: _____
arrier: UPS
ddress: _____
ity/State/Zip: _____
ethod of Shipment: UPS Courier

Received By: _____
Date/Time: _____
Laboratory: _____
Address: _____
City/State/Zip: _____

Date/Time: _____
Lab Receipt Signature: [signature]
Date/Time: 4-13-90 0841

The above analysis to be performed is authorized by:

_____
_____
_____

[signature]
Signature

4/10/90
Date

CHAIN OF CUS_ ODY RECORD

Date Extracted: _____
Date Digested: _____
Date Analyzed: _____

Account:	DCL Set ID:	Sponsor:	SPLITS					
3018	S90-0298	UNC Mining & Milling		(CN)	Se			
Field Comment:								

Date Sampled	Field ID Number	DCL Sample Number(s)	Sample Matrix	Number of Containers	Remarks
4-5-90	GW-1	E31649	Water	4	

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
[signature] UNC	4-13-90 1230	Sample Storage	Sample Storage	4/24/90 12:00	Carlos A. Arroyo
Carlos A. Arroyo	4/24/90 13:50	L Perkins	L Perkins	4/24/90 2255	Sample Storage L.P.
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)

Final Disposition: _____ Signature: _____

Appendix C

Laboratory Quality Control
and
Performance Reports

Energy Laboratories, Inc.
Internal Quality Control Audit
First Quarter Report for 1990

Introduction:

This report is the first internal quality control audit of 1990. The purpose of this report, therefore, is to assure the continued precision and accuracy of data reported by Energy Laboratories', Casper Wyoming Branch.

This report also functions as the documentation for several areas. First, that the data reported lie within a certain confidence range (usually 95%). Second, that the system is checked periodically to assess the effectiveness of the program. Third, that the staff is in fact following the guidelines of the program. And, lastly, for the updates and modifications that the quality assurance guidelines may have required when it was necessary to adapt to the ever changing conditions of the laboratory.

To satisfy the above stated purpose this report will also discuss such things as continuing performance (certification) study status, equipment and/or personnel changes, and overall laboratory environments. Certain specific data relating to each area can be found in this report. The time frame for this report is the first quarter of 1990.

Performance (Certification) Status:

The Radiochemistry Department continued in the first quarter of 1990 with no data outside the acceptance limits of the EMSL at La Vegas. The Trace Organics Department has become independently listed by the USEPA to receive the next rounds of performance and study samples, the first step in becoming independently certified by the agency. The Inorganics Department noted a generally acceptable report on the last two studies (one WP and one WS). The marginal parameters have resulted in several modifications in sample logging, preservation, chain of custody, data transfer and SOP requirements.

Instrumentation:

New instrumentation obtained by the laboratory during the first quarter of 1990 included a Perkin-Elmer P-40 Inductively Coupled Argon Plasma (ICAP) spectrometer with an AS-51 autosampler, and a Tekmar 2016 autosampler addition to the gas chromatography equipment. This new instrumentation further increases the laboratory's capabilities in trace inorganic analysis as well as trace organic analysis. The decrease in turnaround time for these types of samples has already proven to be an asset to clients.

The software for the P-40 allows different methods for differing sample matrices as well as it allows for the analysis of up to 88 metallic elements, this makes it more versatile than the 20 to 30 element fixed wavelength ICAP. The software for the PE Nelson system (GC data handling) has been upgraded to level 5.1.2 with many "bugs" fixed. Any remaining "bugs" should be removed when version 5.1.5 arrives in the second quarter. This added instrumentation demonstrates a continuing commitment by the laboratory and the laboratory's suppliers to the analytical community and will enhance the laboratory's analytical capabilities. Projected for future acquisition are auto-analyzers for NO_3^-, NO_2^-, NH_4^+.

Quality Control Practices:

Overall the quality control practices employed by the laboratory have been quite effective during the first quarter of 1990. Few parameters have been determined to be out of control. The methods accepted for analytical use by the certifying agencies are being followed with no method changes made by any member of the staff. The internal audit showed that the standard operating procedures have been followed effectively and that the general data quality from the laboratory has been acceptable. For the quarter (Jan-Mar 1990), duplication of samples occurred at 11.9 % and spiking occurred at 7.1 % for the entire sample load. Control charts for duplicate and spike samples have been used routinely (attached) and instrument performance tracking has been documented (filed).

Personnel and Training:

As demonstration of our commitment to continuing education, David Blaida was sent to the Canberra class in Radiochemical Techniques and Alpha Spectroscopy. This allows the Casper Branch to remain current in new techniques in the ever growing Radioanalysis area. It is also planned to send Steven Dobos to the class required for hazardous waste identification, safety, sampling, and testing.

There were several changes in personnel during the first quarter of 1990. One was the addition of Connie Tucker to our radiochemistry group. She comes from an extensive analytical chemistry background which includes experience at a Radiochemical laboratory in the Casper market. Also Casper experienced the loss of it's past QC Coordinator, Kurt Slentz, to a promotion to the post of Branch Manager of the newly opened Rapid City, South Dakota Division. This change has necessitated the restructuring of QC data collection process with Steven Carlston responsible for the coordination of QC/QA as well as record keeping. The laboratory has also undertaken the groundwork (please pardon the pun) necessary to put both it's TLD program and it's soil lab into full service operation through the addition of Dan Rea to the staff. Shirley Morava has continued to remain an asset to the Casper Branch since Permitting is still in progress at the Crow Butte Mine.

ENERGY LABORATORIES, INC.
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254 NORTH CENTER, SUITE 100 • CASPER, WY 82601 • FAX (307) 234-1639

EMSL-LV Radiochemistry Results Update 01-12-90
10-21-87 thru 05-12-89
Chronological Listing by Parameter

Parameter	Date	Known Value	Reported Value	Std	Diff	
Alpha	10-21-87	28.00	24.33	-0.91	-3.67	10-87
Alpha	01-22-88	4.00	3.33	-0.23	-0.67	01-88
Alpha	03-18-88	6.00	5.00	-0.35	-1.00	03-88
Alpha	04-24-88	46.00	46.00	0.00	0.00	04-88
Alpha	01-20-89	8.00	10.00	0.69	2.00	01-89
Alpha	03-31-89	21.00	20.33	-0.23	-0.67	03-89
Alpha	04-18-89	29.00	22.67	-1.57	-0.67	04-89
Alpha	05-12-89	30.00	28.00	-0.43	-2.00	05-89
Alpha	09-22-89	4.00	10.33	2.19	6.33	09-89
Beta	10-21-87	72.00	80.00	2.77	8.00	10-87
Beta	01-22-88	8.00	37.00	10.05	29.00	01-88
Beta	03-18-88	13.00	13.33	0.12	0.33	03-88
Beta	04-24-88	57.00	62.67	1.96	5.67	04-88
Beta	01-20-89	4.00	9.00	1.73	5.00	01-89
Beta	03-31-89	62.00	57.00	-1.73	-5.00	03-89
Beta	05-12-89	50.00	38.00	-4.16	-12.00	05-89
Beta	09-22-89	6.00	9.33	1.15	3.33	09-89
Ra226	10-21-87	4.80	2.83	-4.73	-1.97	10-87
Ra226	12-11-87	4.80	2.40	-5.77	-2.40	12-87
Ra226	03-11-88	7.60	7.60	0.00	0.00	03-88
Ra226	10-18-88	5.00	5.57	1.23	0.57	10-88
Ra226	12-16-88	3.50	3.23	-0.92	-0.27	12-88
Ra226	03-10-89	4.90	3.70	-2.97	-1.20	03-89
Ra226	04-18-89	3.50	3.17	-1.15	-1.20	04-89
Ra226	07-14-89	17.70	13.83	-2.48	-3.87	07-89
Ra228	10-21-87	3.60	7.70	13.15	4.10	10-87
Ra228	12-11-87	5.30	4.47	-1.80	-0.83	12-87
Ra228	03-11-88	7.70	9.77	2.79	1.87	03-88
Ra228	10-18-88	5.20	5.93	1.59	0.73	10-88
Ra228	12-16-88	10.30	11.27	1.12	0.97	12-88
Ra228	03-10-89	1.70	1.20	-2.89	-0.50	03-89
Ra228	04-18-89	3.60	4.47	3.00	-0.50	04-89
Ra228	07-14-89	18.30	10.83	-4.79	-7.47	07-89
Unat	02-19-88	3.00	2.67	0.10	-0.33	02-88
Unat	04-24-88	6.00	6.00	0.00	0.00	04-88
Unat	10-18-88	5.00	5.00	0.00	0.00	10-88
Unat	03-17-89	5.00	4.30	-0.19	-0.70	03-89
Unat	04-18-89	3.00	3.00	0.00	-0.70	04-89
Unat	07-21-89	41.00	40.00	-0.29	-1.00	07-89

PERFORMANCE EVALUATION REPORT DATE: 7/28/8

WATER SUPPLY STUDY NUMBER WS024

LA RATORY WY002

ANALYTES	SAMPLE NUMBER	REPORTED VALUE	TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
TRACE METALS IN MICROGRAMS PER LITER:					
ARSENIC	1	10.1	10.2	7.08- 11.6	ACCEPTABLE
	2	88.1	80.7	67.1- 92.4	ACCEPTABLE
BARIUM	1	839	853	729- 944	ACCEPTABLE
	2	36.2	41.0	31.7- 49.7	ACCEPTABLE
CADMIUM	1	14.6	15.4	13.5- 17.5	ACCEPTABLE
	2	9.0	10.4	8.40- 11.8	ACCEPTABLE
CHROMIUM	1	123	127	111- 144	ACCEPTABLE
	2	27.5	25.5	21.4- 29.8	ACCEPTABLE
COPPER	1	325	330	292- 368	ACCEPTABLE
	2	33.0	33.0	27.7- 37.6	ACCEPTABLE
LEAD	1	15.4	15.0	11.7- 18.6	ACCEPTABLE
	2	3.5	3.20	1.45- 5.37	ACCEPTABLE
MERCURY	1	6.5	5.76	4.65- 6.75	ACCEPTABLE
	2	2.0	2.16	1.42- 2.69	ACCEPTABLE
NICKEL	3	< 10	2.00	0.977- 3.03	UNUSABLE DATA
	4	16.0	14.0	11.6- 16.3	ACCEPTABLE
SELENIUM	1	46.2	49.0	37.2- 57.1	ACCEPTABLE
	2	11.2	12.0	8.79- 14.4	ACCEPTABLE
SILVER	1	106	103	88.4- 117	ACCEPTABLE
	2	6.7	6.45	5.22- 8.04	ACCEPTABLE
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:					
NITRATE AS N	1	0.91	0.600	0.433-0.920	ACCEPTABLE
	2	9.3	8.50	7.21- 10.0	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.

PERFORMANCE EVALUATION REPORT DATE: 7/28/8

WATER SUPPLY STUDY NUMBER WS024

L? RATORY WY002

ANALYTES	SAMPLE NUMBER	REPORTED VALUE		TRUE VALUE*	ACCEPTANCE LIMITS	PERFORMANCE EVALUATIONS
NITRATE/NITRITE/FLUORIDE IN MILLIGRAMS PER LITER:						
FLUORIDE	1	1.37		1.30	1.17- 1.43	ACCEPTABLE
	2	1.98		1.72	1.55- 1.89	NOT ACCEPTABLE
MISCELLANEOUS ANALYTES:						
?AL FILTERABLE RESIDUE (MILLIGRAMS PER LITER)	1	246		273	170- 360	ACCEPTABLE
CALCIUM (MG. CACO3/L)	1	123.7		120	109- 128	ACCEPTABLE
PH-UNITS	1	9.01		9.12	8.84- 9.34	ACCEPTABLE
ALKALINITY (MG. CACO3/L)	1	37.0	**	34.8	32.0- 40.5	ACCEPTABLE
CORROSIVITY (L GELIER IND. AT 20C)	1	0.73		0.811	0.429- 1.15	ACCEPTABLE
SODIUM (MILLIGRAMS PER LITER)	1	16.5		16.0	14.6- 18.0	ACCEPTABLE
SULFATE (MILLIGRAMS PER LITER)	1	5.4		5.30	3.01- 7.48	ACCEPTABLE
	2	50.7		51.0	43.5- 56.2	ACCEPTABLE

* BASED UPON THEORETICAL CALCULATIONS, OR A REFERENCE VALUE WHEN NECESSARY.
** SIGNIFICANT GENERAL METHOD BIAS IS ANTICIPATED FOR THIS RESULT.

1Q90 QA/QC
EL

ENERGY LABORATORIES, INC.
P. O. BOX 3258 • CASPER, WY 82602 • PHONE (307) 235-0515
254 NORTH CENTER, SUITE 100 • CASPER, WY 82601 • FAX (307) 234-1639

UNC MINING AND MILLING, INC.
Churchrock Operations
P.O. Drawer QQ
Gallup, NM 87305

March 30, 1990

RE: First Quarter 1990 Analytical Results

ATTN: E.M. Morales
C.G. Johnson

Gentlemen;

The following information is intended to answer questions raised by Ed Morales and others concerning specific data points generated by Energy Laboratories, Inc. during UNC's first quarter 1990 environmental sampling period. It should be noted that the Casper Branch of ELI maintains records of specific well historical data, and all data generated during first quarter was checked against this record prior to submitting data to UNC. As a result, a number of data rechecks were performed before UNC received any analytical data, this being performed in addition to the stringent quality assurance crosschecks that are necessary to maintain ELI-Casper's EPA certification (information concerning the present status of ELI certification and USEPA reviews was submitted to your organization within first quarter 1990). The attached tables and specific information are provided in order to acquaint UNC personnel with acceptable analytical variation (per USEPA) at or near detection limits for radionuclides and trace metals. It should also be noted that this information is only valid for low solids drinking water (TDS <500 mg/l) and that greater variation should be expected for complex, high solids matrices.

The questioned quarterly data was subjected to the following tests and results of these comparisons are available on the attached table (#1). Where analytical rechecks were warranted by the statistical tests, they were logged for analysis if the sample had not passed the holding time for the analyte required. If significant changes are noted on the rechecks, replacement reports will be forwarded. The statistical tests which were performed include;

COMPARISON TO 1989 ANALYTICAL VALUES AND VARIATION

Table 1 reviews four quarters of analytical data on each requested analyte and generates a statistical mean and standard deviation. Generally, a 2 sigma error +\- (95% confidence interval) is accepted as good analytical or statistical data quality. Each questioned analyte was subjected to this test, and any which fell outside this range or the range of test 2 (below) was logged for recheck, if possible.

COMPARISON TO USEPA DATA ACCEPTANCE RANGES FOR DRINKING WATER ANALYTICAL DATA (USEPA-THIRD QUARTER 1989)

Table #2 identifies the true values and acceptance limits for laboratories participating in the USEPA Clean Drinking Water Act Certification Program. Again, it should be noted that these samples are ideally suited for precise work at or near detection limits, as opposed to mine waters which often contain significant concentrations of species which provide a variety of analytical interferences. This table demonstrates that normal, acceptable, variation under USEPA regulations may exceed +/-80% of the true analyte value at or near the analyte detection limit. This, for instance, should help eliminate questions about analytes that previously were below required detection limits, and at first quarter equalled the LLD. An example of this is found on some questioned cadmium and cobalt analyses which equalled their appropriate LLDs during first quarter. With an LLD of 0.01mg/l (10ppb), a result of <0.01mg/l could, in reality, equal 0.0099mg/l (9.9ppb). With usual EPA acceptance ranges of +/-5 to 10 ppb for trace metals at detection limits, analytical data should be expected to vary from <0.01 to 0.02mg/l on any particular analyte with an LLD of 0.01 (assuming drinking water quality sample was being analyzed).

Other questions on data quality which cannot be addressed by the analytical facility include such things as;

- Well installation techniques, materials of construction, and development
- Presampling decontamination and volume of water production from each sampled well or location (preferably 2+ casing displacements and pH and conductance stability)
- Sample filtration and preservation techniques and methods employed to prevent sample contamination
- Quality of preservatives used

Energy Laboratories, Inc. appreciates your careful review of our data and we continue to pledge our best efforts in providing as reliable data as can be achieved with advanced analytical equipment. Due to the nature of UNC samples (high TDS and complex matrices), a certain amount of natural variation in the data must be expected. I realize that very minor changes in analytical values can have a profound effect on certain regulators and sympathize with your positions. ELI will continue to review all analytical data presented to your organization, and will attempt to eliminate any errors or identify confirmed trends prior to submitting reports. I hope you find the following data analysis acceptable and usable and hope delays caused by the noted rechecks do not create uncomfortable delays in your schedule.

Very truly yours;

R.A. Garling

Roger A. Garling

Attachment 3/30/90 letter E.L. R.G.

TABLE 1

UNC MINING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat max	1st Qtr 90
EPA-23	Th-230	na	1.6	<0.2	9.8	3.9	5.2	0.0	14.2	1.3
	Gross A	na	<1.0	<1.0	10.2	4.1	5.3	0.0	14.7	1.5
COMMENTS: VALUES REPORTED MEET STATISTICAL TEST										
EPA-25	pH	7.58	6.89	6.66	7.54	7.17	0.46	6.24	8.09	6.70
	Co	na	na	<0.01	<0.01	<0.01	0.00	0.01	0.01	0.02
	Ra228	na	<1.0	<1.0	<1.0	<1.0	0.0	1.0	1.0	2.0
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
EPA-22A	Se	na	<0.001	<0.001	<0.001	<0.001	0.000	0.001	0.001	0.001
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
EPA-26	Co	na	na	<0.01	<0.01	<0.01	0.00	0.01	0.01	0.01
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
EPA-27	Mo	na	na	0.03	0.03	0.03	0.00	0.03	0.03	<0.10
COMMENTS: Changed LLD to conform to UNC requirements - no change in value										
EPA-2	As	na	<0.001	<0.001	<0.001	<0.001	0.000	0.001	0.001	
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
EPA-3	Co	na	na	0.03	0.02	0.03	0.01	0.01	0.04	0.07
	Mo	na	na	<0.10	0.05	0.08	0.04	0.00	0.15	0.22
	Bi	na	<0.05	<0.05	<0.05	0.05	0.00	0.05	0.05	0.06
	Unat	na	0.0102	0.0103	0.0160	0.0122	0.0033	0.0055	0.0188	0.0540
COMMENTS: APPEARS TO BE GENERAL INCREASING TREND; ALL VALUES BEING CHECKED										
TWQ-9D	B03	3.7	0.4	2.5	2.4	2.3	1.4	0.0	5.0	0.6
	Cd	NA	<0.01	<0.01	<0.01	0.01	0.00	0.01	0.01	0.01
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										

TABLE 1

UNC MINING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat Max	1st Qtr 90
TWQ-106D	Pb	na	<0.05	<0.05	0.06	0.05	0.01	0.04	0.06	<0.05
	Mo	na	na	<0.10	0.06	0.08	0.03	0.02	0.14	0.03
	Se	na	<0.002	<0.001	0.031	0.011	0.017	0.000	0.045	<0.001
	Ra228	na	5.3	6.6	7.4	6.4	1.1	4.3	8.6	11.8

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST; RA228 RESULT CHECKED

RPA-14	Cl	20.7	24.2	26.8	31.9	25.9	4.7	16.5	35.3	75.4
	Bi	na	0.07	0.05	0.07	0.06	0.01	0.04	0.09	<0.05

COMMENTS: Bi VALUE REPORTED MEETS STATISTICAL OR TABLE 2 TEST; Cl RESULT CHECKED

GW-3	Th230	na	2.9	3.3	3.3	3.2	0.2	2.7	3.6	<0.2

COMMENTS: VALUE BEING CHECKED

GW-4	Ra226	na	0.3	1.6	1.2	1.0	0.7	0.0	2.4	2.9

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

TWQ-29A	Rn	0.08	0.12	0.08	<0.05	0.08	0.03	0.03	0.14	0.05
	Pb210	na	<1.0	<1.0	<1.0	1.0	0.0	1.0	1.0	1.9 +/- 1.5

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

509D	Pb210	na	<1.0	2.8	2.3	2.0	0.9	0.2	3.9	3.6 +/- 1.6

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

627	Ra226	na	na	0.9	0.6	0.8	0.2	0.3	1.2	2.0 +/- 1.3
	Pb210	na	na	2.2	1.1	1.7	0.8	0.1	3.2	2.4 +/- 1.5

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

644	Th230	na	na	<0.2	0.7	0.5	0.4	0.0	1.2	3.9 +/- 1.7

COMMENTS: VALUE BEING CHECKED

TABLE 1

UNC RIBING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat Max	1st Qtr 90
645	NO3	na	na	na	798.0	na	na	na	na	1,100.0
	CN	na	na	na	0.05	na	na	na	na	<0.005
	Unat	na	na	na	0.0680	na	na	na	na	0.0400

COMMENTS: LIMITED PREVIOUS DATA FOR EVALUATION; VALUES BEING CHECKED

801	NO3	na	na	na	26.0	na	na	na	na	62.0

COMMENTS: LIMITED PREVIOUS DATA FOR EVALUATION; VALUES BEING CHECKED

802	Co	na	na	na	0.01	na	na	na	na	0.04

COMMENTS: LIMITED PREVIOUS DATA FOR EVALUATION; VALUES BEING CHECKED

517	pH	6.98	6.39	6.51	6.50	6.60	0.26	6.07	7.12	5.90
	Al	na	na	<0.10	<0.10	0.10	0.00	0.10	0.10	0.11
	Pb	na	<0.05	<0.05	0.06	0.05	0.01	0.04	0.06	<0.05
	Unat	na	0.3480	0.2520	0.1960	0.2653	0.0769	0.1116	0.4191	0.0880
	Pb210	na	<1.0	2.1	2.8	2.0	0.9	0.2	3.8	4.5 +/- 1.2

COMMENTS: DECREASING pH EXPLAINS INCREASING TREND IN TRACES AND Pb210; U APPROACHING PPT. RANGE

518	NH4	30.9	32.6	123.0	77.2	65.9	43.7	0.0	153.3	40.4
	Mn	22.0	36.0	41.0	44.0	35.8	9.7	16.3	55.2	41.0
	Se	na	<0.001	0.001	0.^06	0.003	0.003	0.000	0.008	<0.001
	Th230	na	40.3	17.9	55.8	38.0	19.1	0.0	76.1	6.1 +/- 1.4
	Pb210	na	2.8	4.1	5.0	4.0	1.1	1.8	6.2	9.2 +/-1.3
	GS A	na	127.0	120.0	70.1	105.7	31.0	43.6	167.8	18.3 +/- 4.3
	CHLOROFORM	na	16.0	43.0	42.0	33.7	15.3	3.1	64.3	23.7

COMMENTS: VALUES MEET STATISTICAL TESTS EXCEPT RADIONUCLIDES; RD'S BEING CHECKED

EPA-18	pH	6.27	6.02	5.46	5.97	5.93	0.34	5.25	6.61	5.46
	Mo	na	na	0.05	<0.01	0.03	0.03	-0.03	0.09	0.66
	Pb210	na	<1.0	<1.0	2.1	1.4	0.6	0.1	2.6	4.6 +/- 1.2

COMMENTS: Mo AND Pb210 BEING CHECKED; SAMPLE FOR pH EXPIRED

TABLE 1

UGC GIBIDG ADD HILLIBG - FIRST QUARTER 1990 - DATA ADALYSIS

BELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat max	1st Qtr 90
420	BO3	11.0	7.8	60.0	4.8	20.9	26.2	0.0	73.3	0.02
	pH	7.14	6.65	6.52	6.84	6.79	0.27	6.25	7.33	6.20
	As	na	0.004	0.012	0.029	0.015	0.013	0.000	0.041	0.093
	Pb210	na	<1.0	1.6	1.9	1.5	0.5	0.6	2.4	3.7 +/- 1.2

COMMENTS: As, BO3, Pb210 BEIBG CHECKED; pH SAMPLE EXPIRED

502B	Al	na	na	2.20	2.20	2.20	0.00	2.20	2.20	16.00

COMMENTS: VALUE BEIBG CHECKED

504B	Mo	na	na	24.00	9.90	16.95	9.97	0.00	36.89	4.20
	Unat	na	0.0960	0.1000	0.1220	0.1060	0.0140	0.0780	0.1340	0.2860
	GS A	na	117.0	66.1	27.5	70.2	44.9	0.0	160.0	18.1

COMMENTS: U BEIBG CHECKED; OTHER VALUES MEET TESTS

RPA-9	HCO3	249.0	18.3	122.0	92.5	120.5	96.2	0.0	312.8	214.0
	Ra226	na	7.2	5.0	6.0	6.1	1.1	3.9	8.3	2.1 +/- 0.3

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

RPA 12	pH	6.67	6.37	5.96	6.40	6.35	0.29	5.76	6.94	6.01
	Al	na	na	<0.10	0.11	0.11	0.01	0.09	0.12	<0.10

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

RPa-13	HCO3	35.6	26.8	31.7	86.1	45.1	27.6	0.0	100.3	14.4
	aO3	21.0	14.6	14.1	26.0	18.9	5.7	7.6	30.3	4.6
	pH	6.05	5.40	5.56	6.40	5.85	0.46	4.94	6.77	5.30
	Pb	na	<0.05	<0.05	<0.05	0.05	0.00	0.05	0.05	0.06
	Mn	3.93	4.90	6.20	3.40	4.61	1.23	2.15	7.07	6.40
	Ni	na	0.49	0.59	0.37	0.48	0.11	0.26	0.70	0.60
	Ra228	na	2.6	0.9	3.6	2.4	1.6	0.0	5.1	7.3

COMMENTS: BASED OB BUMBER OF PARAMETERS, VALUEMOST MEET STAT LIMITS

TABLE 1

UNC MINING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat max	1st Qtr 90
EPA-15	Co	na	na	<0.10	<0.10	0.10	0.00	0.10	0.10	0.10
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
516A	NH4	18.5	24.0	30.5	39.8	28.2	9.2	9.9	46.5	75.0
	Al	na	na	240.0	150.0	195.0	63.6	67.7	322.3	110.0
	Pb	na	<0.05	<0.05	<0.12	0.07	0.04	0.00	0.15	<0.05
COMMENTS: Al AND Pb MEET TESTS; NH4 BEING CHECKED										
604	Pb210	na	<1.0	1.7	<1.0	1.2	0.4	0.4	2.0	2.8 +/- 1.1
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
614	NH4	38.8	33.3	51.0	38.6	40.4	7.5	25.4	55.4	69.0
	Cd	na	<0.01	<0.01	<0.01	0.01	0.00	0.01	0.01	0.01
	CHLOROFORM	na	11.0	82.0	59.0	50.7	36.2	0.0	123.1	100.0
COMMENTS: CHLOROFORM AND NH4 TRENDING IN THE SAME DIRECTION EXPECTED; Cd MEETS TESTS										
EPA-7	Pb	na	<0.05	<0.05	0.09	0.06	0.02	0.02	0.11	<0.05
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
515A	Mn	5.90	11.00	7.70	8.50	8.28	2.12	4.06	12.51	23.00
	SO4	4916	4955	4982	4563	4859	186	4487	5231	6227
	Cl	86.7	46.1	52.5	77.8	65.8	19.5	26.7	104.9	36.8
	NO3	113	75	86	84	90	16	57	122	52
	TDS	6974	7146	7411	7650	7295	297	6701	7889	9350
	pH	5.03	3.95	4.63	4.60	4.55	0.45	3.66	5.45	3.94
	Al	na	na	12.00	15.00	13.50	2.12	9.26	17.74	110.00
	Co	na	na	0.07	0.09	0.08	0.01	0.05	0.11	0.26
	Se	na	0.020	<0.001	0.019	0.013	0.011	0.000	0.035	<0.001
COMMENTS: RELATIVELY OBVIOUS WELL TREND OR INCORRECT SAMPLE DESIGNATION										

TABLE 1

UBC MINING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat Max	1st Qtr 90
RPA-5	BO3	5.90	3.10	15.80	29.00	13.45	11.71	0.00	36.87	40.00
	Co	na	na	0.02	0.04	0.03	0.01	0.00	0.06	<0.01
COMMENTS: BO3 BEING CHECKED										
RPA-8	pH	7.06	6.25	5.89	6.96	6.54	0.56	5.41	7.67	6.40
	As	na	0.001	<0.001	<0.001	0.001	0.000	0.001	0.001	0.001
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
TBQ-141	NH4	0.27	0.45	0.42	0.37	0.378	0.079	0.220	0.535	0.72
	Ra226	na	<0.20	<0.20	6.50	2.300	3.637	0.000	9.575	0.60
	Ra228	na	<1.00	2.90	<1.00	1.633	1.097	0.000	3.827	5.80
	Pb210	na	1.80	<1.00	1.20	1.333	0.416	0.501	2.166	2.00
COMMENTS: Ra228 AND NH4 BEING CHECKED; OTHER VALUES BEING CHECKED										
TBQ-142	Pb210	na	<1.00	<1.00	3.10	1.700	1.212	0.000	4.125	2.90
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										
501B	Al	na	na	100.00	70.00	85.000	21.213	42.574	127.426	29.00
	Co	na	na	1.10	0.83	0.965	0.191	6.583	1.347	0.59
	Ra226	na	28.30	22.10	16.50	22.300	5.903	10.495	34.105	9.20
	Ra228	na	8.80	11.00	5.90	8.567	2.558	3.451	13.683	7.20
	Pb210	na	2.00	<1.00	<1.00	1.333	0.577	0.179	2.488	<1.00
	GS A	na	36.50	96.30	34.70	55.833	35.057	0.000	125.947	11.20
COMMENTS: APPEARS TO BE A CONTINUING DOWNWARD TREND										
GS-2	Ra226	na	0.50	1.50	1.00	1.000	0.500	0.000	2.000	<0.20
	Ra228	na	<1.00	2.80	2.80	2.200	1.039	0.122	4.278	<1.00
	Pb210	na	<1.00	<1.00	1.50	1.167	0.289	0.589	1.744	<1.00
	GS A	na	11.00	6.00	15.00	10.667	4.509	1.648	19.685	2.30
COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST										

TABLE 1

UNC MINING AND MILLING - FIRST QUARTER 1990 - DATA ANALYSIS

WELL #	SPECIE	1st Qtr 89	2nd Qtr 89	3rd Qtr 89	4th Qtr 89	'89 Mean	'89 Std Dev	Stat Min	Stat max	1st Qtr 90
624	Ra226	na	na	0.60	1.60	1.100	0.707	0.000	2.514	0.20
	Ra228	na	na	<1.00	<1.00	1.000	0.000	1.000	1.000	1.20
	Th230	na	na	6.90	0.50	3.700	4.525	0.000	12.751	<0.20
	Pb210	na	na	<1.00	<1.00	1.000	0.000	1.000	1.000	<1.00
	GS A	na	na	6.00	1.80	3.900	2.970	0.000	9.840	<1.00

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

GW-1	pH	7.20	7.09	7.32	7.02	7.158	0.131	6.895	7.420	6.54

COMMENTS: POSSIBLE SAMPLE CONTAMINATION; pH SAMPLE EXPIRED

EPA-17	Al	na	na	0.18	<0.10	0.140	0.057	0.027	0.253	0.16
	Cd	na	<0.01	<0.01	<0.01	0.010	0.000	0.010	0.010	0.01

COMMENTS: VALUES REPORTED MEET STATISTICAL OR TABLE 2 TEST

632	Co	na	na	<0.01	<0.01	0.010	0.000	0.010	0.010	0.04
	Ni	na	<0.05	<0.05	<0.05	0.050	0.000	0.050	0.050	0.07

COMMENTS: VALUES BEING CHECKED

TABLE 2: USEPA DRINKING WATER ANALYTICAL PROFICIENCY STUDIES
ACCEPTANCE LIMITS FOR TRACE METALS AND RADIONUCLIDES

PARAMETER	TRUE VALUE	UNITS	ACCEPTANCE RANGE	PERCENTAGE RANGE
Arsenic	7.20	ug/l	4.06 - 10.1	-43.6 to +40.3
Cadmium	3.55	ug/l	1.42 - 5.43	-60.0 to +53.0
Cobalt	8.48	ug/l	2.73 - 14.9	-67.8 to +75.9
Chromium	6.65	ug/l	2.17 - 10.5	-67.4 to +57.9
Copper	16.00	ug/l	11.6 - 20.5	-27.5 to +28.1
Iron	14.00	ug/l	2.76 - 25.8	-80.3 to +84.3
Manganese	16.30	ug/l	9.00 - 22.2	-44.8 to +36.2
Nickel	12.40	ug/l	3.83 - 21.5	-69.1 to +73.4
Lead	16.30	ug/l	10.6 - 23.7	-35.0 to +45.4
Selenium	11.10	ug/l	5.81 - 15.2	-47.7 to +36.9
Vanadium	22.40	ug/l	13.6 - 31.0	-39.3 to +38.4
Zinc	11.00	ug/l	7.71 - 16.8	-29.9 to +52.7
Molybdenum	28.20	ug/l	15.5 - 38.4	-45.0 to +36.2
Radium-226	17.70	pCi/l	13.02 - 22.38	-26.4 to +26.4
Radium-228	18.30	pCi/l	13.62 - 22.98	-25.7 to +25.6
Uranium-nat	41.00	pCi/l	30.61 - 51.39	-25.3 to +25.3

Date 1-11-90

REPORT OF ANALYSIS
1090

Sample ID	Amount of Spiking	Unspiked GW-1 Analysis	Spiked 704 Analysis			
Aluminum (mg/1)	1.66	<0.1	10.2			
Ammonia (mg/1)		0.25	0.19			
Arsenic (mg/1)	0.002	<0.001	0.001			
Barium (mg/1)						
Bicarbonate (mg/1)		1903	1940			
Beryllium (mg/1)		<0.05	<0.05			
Cadmium (mg/1)	0.03	<0.01	0.04			
Calcium (mg/1)		774	774			
Chloride (mg/1)	20.0	239	259			
Chromium (mg/1)						
Cobalt (mg/1)	0.016	<0.01	0.02			
Conductivity umhos/cm						
Chloroform (mg/1)	900	<1.0	345	) Evaporation during spiking		
Naphthalend (mg/1)	450	<1.0	326	) could cause low results - EM		
Cyanide (mg/1)		<0.005	<0.005			
Iron (mg/1)						
Lead (mg/1)	0.066	<0.05	0.07			
Magnesium (mg/1)		408	396			
M. ganese (mg/1)	0.166	0.09	0.20			
Mercury, Total (mg/1)						
Molybdenum (mg/1)	0.133	<0.10	<0.10	Mo not detected?		
Nickel (mg/1)	0.166	<0.05	0.14			
Nitrate (mg/1)		111	113			
Nitrite (mg/1)						
pH		6.54	6.94			
Potassium (mg/1)	6.66	2.8	9.49			
Selenium (mg/1)	0.016	0.002	0.021			
Silver (mg/1)						
Sodium (mg/1)	2.16	349	340			
Sulfate (mg/1)		2079	2164			
Vanadium (mg/1)		<0.10	<0.10			
Zinc (mg/1)						
Lead-210 (pCi/1)	3.2	1.3	3.6			
Radium-226 (pCi/1)	7.0	1.0	7.5			
Thorium-230 (pCi/1)	16.6	<0.2	9.9			
Uranium (mg/1)	0.5	0.09	0.611			
Radium-228 (pCi/1)	9.37	1.1	9.4			
Gross Alpha(-)U & Rn (pCi/1)	19	1.2	16.0			
TDS		5658	5522			

Appendix D

Laboratory Comparison

Date 4-5-90

REPORT OF ANALYSIS

Sample ID GW-1	Data Chem	Energy Labs				
Aluminum (mg/1)						
Ammonia (mg/1)						
Arsenic (mg/1)						
Barium (mg/1)						
Bicarbonate (mg/1)						
Boron (mg/1)						
Cadmium (mg/1)						
Calcium (mg/1)						
Chloride (mg/1)						
Chromium (mg/1)						
Cobalt (mg/1)						
Conductivity umhos/cm						
Copper (mg/1)						
Cyanide (mg/1)	0.006	<0.005				
Fluoride (mg/1)						
Iron (mg/1)						
Lead (mg/1)						
Magnesium (mg/1)						
Manganese (mg/1)						
Mercury, Total (mg/1)						
Molybdenum (mg/1)						
Nickel (mg/1)						
Nitrate (mg/1)						
Nitrite (mg/1)						
pH						
Potassium (mg/1)						
Selenium (mg/1)		0.002				
Silver (mg/1)						
Sodium (mg/1)						
Sulfate (mg/1)						
Vanadium (mg/1)						
Zinc (mg/1)						
Lead-210 (pCi/1)						
Radium-226 (pCi/1)						
Thorium-230 (pCi/1)						
Uranium (mg/1)						
Radium-228 (pCi/1)						
Polonium-210 (pCi/1)						
TDS						

DATA CHEM LABORATORIES

ENVIRONMENTAL WATER REPORT

Form EPRW-A
Page 1 of 2
Part 1 of 1

Date 5/3/90
Agency Identification Number S90-0298-AB
Account No. 03018

UNC Mining and Milling
P.O. Box QQ
Gallup, NM 87305
Attention: Ed Morales

Telephone (505) 722-6651

Sampling Collection and Shipment

Sampling Site GW 1 Date of Collection April 05, 1990

Date Samples Received at DataChem April 13, 1990

Analytical Results

Parameter Name / Analysis Date / Method / Prep Method	Units	Lab Number	GW-1 EJ 1649							Limit of Detection
Cyanide (CN) 04/26/1990 335.2 [1]	µg/L		6.							5.
As per telephone conversation with Data Chem could not run analysis for Se by method required.										

† See comment on last page.
ND Parameter not detected.
NR Parameter not requested.
‡ Analyses completed on or before this date.

** Parameter not analyzed (See comment page).
( ) Parameter between LOD and LOQ.
[ ] Method Reference (See comments page.)

Le Moyne Perkins
Analyst: Lemoyne Perkins

Reviewer: Mike P Beesley

Norman K. Christensen
Laboratory Supervisor: Norman K. Christensen

960 West LeVoy Drive / Salt Lake City, Utah 84123-2500 / (801) 266-7700

DATA CHEM LABORATORIES

ENVIRONMENTAL WATER REPORT

Date 5/3/90

Agency Identification Number S90-0298-AB

Method Index -- Method Reference --

[1] EPA-600/4-79-020 "Methods for Chemical Analysis of Water and Wastes", March 1983.

960 West LeVoy Drive / Salt Lake City, Utah 84123-2500 / (801) 266-7700

☐ **RUSH Status Requested**
(Additional 50% Charge)

DataChem
ANALYTICAL REQUEST FORM

Purchase Order No. ORA

Date 4/10/90

Corporate/Agency Name UNC Mining & Milling

Address P.O. Drawer 99

Gallup, N. Mex 87305

Person to Contact Ed Morales Telephone 505-722-6651

Billing Address Same as above

Sample Collection

Sampling Site GWA1

Industrial Process

Date of Collection 4/5/90 Time Collected 1339 Date of Shipment 4/10/90

Q.C. REQUIRED

Request for Analyses

Data Chem Use Only	Client Sample Number	Media Type*	Sample Volume (Liters)	Analyses Requested
EJ1644	GW-1			Cyanide
1	1			Selenium

*Specify: Solid sorbent tube, e.g. Charcoal; Filter type; Impinger solution; Bulk Sample; Blood; Urine; Tissue; Soil; Water; Other

Comments: Please used Method CN 335.3 EPA
Se 270.3 EPA

Possible Interfering Compounds

Requested by Ed Morales

960 West LeVoy Drive / Salt Lake City, Utah 84123 / 1-800-356-9135 or 801-266-7700 / FAX: 801-268-9992
4388 Glendale-Milford Road / Cincinnati, OH 45242 / 1-800-458-1493 or 513-733-5336 / FAX: 513-733-5347

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UNC MINING AND MILLING: CHURCHROCK OPERATIONS
GROUNDWATER MONITORING PROGRAM: SOUTHWEST ALLUVIUM MONITOR WELLS

WELL NUMBER:	GW-1
LAB I.D.:	90-4798
SAMPLE DATE:	04-05-90
REPORT DATE:	05-27-90
QUARTER REPRESENTED:	Second
UNC SUBMITTAL #:	TE-9-4-90

MAJOR IONS:		ANALYTICAL RESULT	L.L.D.	UNITS	GROUNDWATER PROTECTION STANDARDS NRC	ARAR
Calcium	(Ca)	818	0.05	mg/l		
Magnesium	(Mg)	430	0.01	mg/l		
Sodium	(Na)	350	0.05	mg/l		
Potassium	(K)	2.8	0.10	mg/l		
Carbonate	(CO3)		0.10	mg/l		
Bicarbonate	(HCO3)	2001	0.10	mg/l		
Sulfate	(SO4)	2118	1.0	mg/l		2160
Chloride	(Cl)	243	0.10	mg/l		250
Ammonium	(NH4)	0.13	0.05	mg/l		
Nitrate	(NO3)	119	0.01	mg/l		30.0
Dissolved Solids @ 180 C	(TDS)	5732	1	mg/l		3170
pH	(units)	6.98	1-14	s.u.		
Cyanide	(CN)	<0.005	0.005	mg/l	0.005	
TRACE METALS:						
Aluminum	(Al)	<0.10	0.10	mg/l		5.0
Arsenic	(As)	<0.001	0.001	mg/l	0.05	0.05
Beryllium	(Be)	<0.05	0.05	mg/l	0.05	0.017
Cadmium	(Cd)	<0.01	0.01	mg/l	0.01	0.01
Cobalt	(Co)	<0.01	0.01	mg/l		0.05
Lead	(Pb)	<0.05	0.05	mg/l	0.05	0.05
Manganese	(Mn)	0.10	0.01	mg/l		2.6
Molybdenum	(Mo)	<0.10	0.10	mg/l		1.0
Nickel	(Ni)	<0.05	0.05	mg/l	0.05	0.2
Selenium	(Se)	0.002	0.001	mg/l	0.01	0.01
Vanadium	(V)	<0.10	0.10	mg/l	0.10	0.70
RADIOMETRIC:						
Uranium	(U)	0.087	0.0003	mg/l	0.30	5.0
Radium-226	(Ra226)	0.5	0.2	pCi/l	5.0*	5.0*
Ra-226 precision +/-		0.2		pCi/l		
Radium-228	(Ra228)	<1.0	1.0	pCi/l	5.0*	5.0*
Ra-228 precision				pCi/l		
Thorium-230	(Th230)	<0.2	0.2	pCi/l	5.0	15.0
Th-230 precision +/-				pCi/l		
Lead-210	(Pb210)	1.2	1.0	pCi/l	1.0	
Pb-210 precision +/-		1.1		pCi/l		
Gross Alpha - U-nat and Rn-222		0.8	1.0	pCi/l	15.0	
Gross Alpha precision +/-		0.8		pCi/l		

* Radium protection standards refer to combined Ra-226 and Ra-228

TRACE ORGANIC:					
Chloroform	<1.0	1.0	ug/l	1.0	
Napthalene	<1.0	1.0	ug/l	1.0	

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