

Semi-Annual Effluent and
Environmental Monitoring Report

July - December, 1999

UNITED NUCLEAR CORPORATION



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CERTIFIED - RETURN RECEIPT REQUESTED

February 25, 2000

Thomas H. Essig, Branch Chief
U.S. Nuclear Regulatory Commission
Uranium Recovery and Low-Level Waste Branch
Division of Waste Management
Office of Nuclear Material Safety
and Safeguards
Mail Stop T-7J9
Washington, D.C. 20555

40-8907

Re: Final routine submittal of the Semi-Annual Effluent and Environmental Monitoring Reports from July through December, 1999.

In compliance with our Nuclear Regulatory Commission Radioactive Materials License No. SUA-1475, conditions Nos. 12 and 30, the attached final routine Effluent and Environmental Monitoring Reports are being presented as listed below. This limited and available data specifies the concentration of each principal radionuclide released to unrestricted areas in an air particulate and water effluent during the period of July 1, 1999 through December 31, 1999. This data is also reported on the format required in Regulatory Guide 4.14.

Data in this report are in the order listed below with the ending monitoring period.

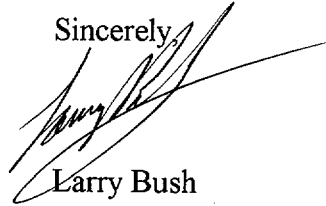
1. Environmental Inspection Reports (3rd to end of 4th Qr. 1999)
2. Air Particulate Results (End of 3rd Qr. 1999)
3. TLD gamma results (End of 2nd Half 1999)
4. Ground water Results (End of 3rd Qr. 1999)
5. Sample Location Maps

In addition, our routine Environmental Monitoring Program requirement level is greatly reduced (i.e. monitoring item no. 1, 2, 3, and 4 as listed above are no longer required and deleted)

IE17

pursuant to NRC approved License Amendment 29 dated 6-18-99 which deleted License Conditions No. 16, 22 and 28. But, these deleted items may be reimplemented under a future Radiation Work Permit (RWP).

Sincerely,

A handwritten signature in black ink, appearing to read "Larry Bush", written over the word "Sincerely,".

Larry Bush
Manager

cc: Dwight D. Chamberlain, NRC
Steve Cline, GE
Roy Blickwedel, GE

ENVIRONMENTAL INSPECTION REPORTS

ENVIRONMENTAL INSPECTION

DATE: 7-23-99

TIME START: 1105

INSPECTOR: Max Chisnelly Jr.

TIME END: 1204

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<input checked="" type="checkbox"/> *		<u>POST SLIGHTLY BENT BUT OK</u>
2. Air Monitors	<input checked="" type="checkbox"/>		
3. Radiation Warning Signs	<input checked="" type="checkbox"/>		
4. Locked Gates	<input checked="" type="checkbox"/>		

ACTION TAKEN: * FLASH FLOOD DUE TO YESTERDAY'S HEAVY RAINFALL CAUSED ABOUT 4 FENCE STEEL POST (≈ 80' OF FENCELINE IN THE NW PERIMETER OF TAILINGS AREA) TO BEND SLIGHTLY. HOWEVER, THE BARB WIRING AND POST ARE STILL UP AND IN PROPER POSITION TO PREVENT ACCESS. FENCE POST WILL BE STRAIGHTEN UP IN THE IMMEDIATE FUTURE.

ENVIRONMENTAL INSPECTION

DATE: 8-24-99

TIME START: 0830

INSPECTOR: May Chischilly Jr.

TIME END: 0940

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<u> </u>	<u> ✓ </u>	<u>DAMAGED FENCELINE BY FLASH FLOOD.</u>
2. Air Monitors	<u> ✓ </u>	<u> </u>	<u> </u>
3. Radiation Warning Signs	<u> ✓ </u>	<u> </u>	<u> </u>
4. Locked Gates	<u> ✓ </u>	<u> </u>	<u> </u>

ACTION TAKEN: ANOTHER FLASH FLOOD OVER THE WEEKEND OF 8-9-99 CAUSED FURTHER DAMAGE TO FENCELINE (≈ 150-200' OF FENCELINE IN THE NW PERIMETER OF TAILINGS AREA) TO FURTHER BEND ALMOST TO GROUNDLEVEL IN SOME AREAS. THIS PROBLEM WAS REPAIRED BY FENCELINE CREW ON 8/11-13 WHEN THE GROUND WAS DRY ENOUGH FOR REPAIR WORK. ANOTHER AREA IN THE NW PERIMETER NEAR THE MAIN ACCESS GATE (≈ 80' OF FENCELINE) IS ALSO SLIGHTLY BENT BUT THE GROUND IS STILL TOO MUDDY FOR REPAIR. THIS PROBLEM WILL ALSO BE CORRECTED IN THE IMMEDIATE FUTURE AND THIS FENCELINE IS STILL IN FAIR CONDITION TO PREVENT ACCESS.

ENVIRONMENTAL INSPECTION

DATE: 9-20-99

TIME START: 1045

INSPECTOR: Max Chischilly Jr.

TIME END: 1200

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
2. Air Monitors	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
3. Radiation Warning Signs	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
4. Locked Gates	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

ACTION TAKEN: DAMAGED FENCELINE BY FLASH FLOOD REPORTED ON
8-24-99 (i.e. ~ 80' OF FENCELINE IN THE NW PERIMETER NEAR
THE MAIN ACCESS GATE) IS REPAIRED BY CREW ON 8/30 -
9/3/99.

ENVIRONMENTAL INSPECTION

DATE: 10-19-99

TIME START: 1510

INSPECTOR: Max Chisilley Jr.

TIME END: 1600

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<u>✓</u>	<u> </u>	<u> </u>
2. Air Monitors	<u>NA</u>	<u> </u>	<u>NA- ROUTINE SAMPLING DELETED AS OF 10/4/99.</u>
3. Radiation Warning Signs	<u>✓</u>	<u> </u>	<u> </u>
4. Locked Gates	<u>✓</u>	<u> </u>	<u> </u>

ACTION TAKEN: _____

ENVIRONMENTAL INSPECTION

DATE: 11-23-99

TIME START: 1330

INSPECTOR: Max Chischilly Jr.

TIME END: 1425

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<u>✓</u>	<u>_____</u>	<u>_____</u>
2. Air Monitors	<u>NA</u>	<u>_____</u>	<u>NA - ROUTINE ENV. SAMPLING DELETED AS OF 10/4/99.</u>
3. Radiation Warning Signs	<u>✓</u>	<u>_____</u>	<u>_____</u>
4. Locked Gates	<u>✓</u>	<u>_____</u>	<u>_____</u>

ACTION TAKEN: _____

ENVIRONMENTAL INSPECTION

DATE: 12-22-99

TIME START: 1045

INSPECTOR: Max Chischilly Jr.

TIME END: 1145

<u>TAILINGS AREA:</u>	<u>OKAY</u>	<u>PROBLEM</u>	<u>COMMENTS</u>
1. Fences	<u>✓</u>	<u> </u>	<u> </u>
2. Air Monitors	<u>NA</u>	<u> </u>	<u>NA - ROUTINE ENV. SAMPLING DELETED AS OF 10/4/99.</u>
3. Radiation Warning Signs	<u>✓</u>	<u> </u>	<u> </u>
4. Locked Gates	<u>✓</u>	<u> </u>	<u> </u>

ACTION TAKEN: _____

AIR PARTICULATE RESULTS

3rd Quarter Sampling
AIR SAMPLES

<u>Sample Date</u>	<u>Location</u>	<u>Type and Air Volume</u>	<u>Radionuclide and Class</u>	<u>Concentration (uci/ml)</u>	<u>Error Est. (uci/ml)</u>	<u>LLD (uci/ml)</u>	<u>Eff. Conc. Limit (uci/ml)</u>	<u>Eff. Conc. of Limit (%)</u>
<u>6/29/99</u>	<u>- Site D</u>	<u>Continuous</u>	<u>U-Nat (year)</u>	<u><1.00E⁻¹⁶</u>	<u>N/A</u>	<u>1.0E⁻¹⁶</u>	<u>9.0E⁻¹⁴</u>	<u><1.11E⁻¹</u>
<u>10/4/99</u>		<u>and</u>	<u>Th-230 (year)</u>	<u><1.00E⁻¹⁶</u>	<u>N/A</u>	<u>1.0E⁻¹⁶</u>	<u>3.0E⁻¹⁴</u>	<u><3.33E⁻¹</u>
		<u>5.27 E⁺⁹ ml.</u>	<u>Ra-226 (week)</u>	<u><1.00E⁻¹⁶</u>	<u>N/A</u>	<u>1.0E⁻¹⁶</u>	<u>9.0E⁻¹³</u>	<u><1.11E⁻²</u>
		<u>Collected</u>	<u>Pb-210 (day)</u>	<u>8.58E⁻¹⁵</u>	<u>9.01E⁻¹⁶</u>	<u>2.0E⁻¹⁵</u>	<u>6.0E⁻¹³</u>	<u>1.43E⁺⁰</u>
<u>7/01/99</u>	<u>- Continuous For</u>	<u>Rn-222</u>	<u>Rn-222</u>	<u>5.00E⁻¹⁰</u>			<u>1.0E⁻⁸</u>	<u>5.00E⁺⁰</u>
<u>10/04/99</u>	<u>with Type F Track-etch</u>		<u>(Minus Daughters)</u>					
	<u>cups by Landauer, Inc.</u>							

COMMENT: Site D is the Background site located in the SE perimeter of tailings area.

3rd Quarter Sampling
AIR SAMPLES

<u>Sample Date</u>	<u>Location</u>	<u>Type and Air Volume</u>	<u>Radionuclide and Class</u>	<u>Concentration (uci/ml)</u>	<u>Error Est. (uci/ml)</u>	<u>LLD (uci/ml)</u>	<u>Eff. Conc. Limit (uci/ml)</u>	<u>Eff. Conc. of Limit (%)</u>
6/29/99	Site F	Continuous	U-Nat (year)	$1.21E^{-16}$	N/A	$1.0E^{-16}$	$9.0E^{-14}$	$1.34E^{-1}$
9/23/99		and	Th-230 (year)	$<1.00E^{-16}$	N/A	$1.0E^{-16}$	$3.0E^{-14}$	$<3.33E^{-1}$
		4.27 E ⁺⁹ ml.	Ra-226 (week)	$<1.00E^{-16}$	N/A	$1.0E^{-16}$	$9.0E^{-13}$	$<1.11E^{-2}$
		collected	Pb-210 (day)	$9.77E^{-15}$	$1.09E^{-15}$	$2.0E^{-15}$	$6.0E^{-13}$	$1.63E^{+0}$
7/01/99	Continuous for Rn-222		Rn-222 (Minus Daughters)	$9.00E^{-10}$			$1.0E^{-8}$	$9.00E^{+0}$
10/04/99	with Type F Track-etch cups by Landauer, Inc.							

COMMENT: Site F is located in the North end perimeter of tailings area, down wind direction.

3rd Quarter Sampling
AIR SAMPLES

<u>Sample Date</u>	<u>Location</u>	<u>Type and Air Volume</u>	<u>Radionuclide and Class</u>	<u>Concentration (uci/ml)</u>	<u>Error Est. (uci/ml)</u>	<u>LLD (uci/ml)</u>	<u>Eff. Conc. Limit (uci/ml)</u>	<u>Eff. Conc. of Limit (%)</u>
6/29/99	Site C	Continuous	U-Nat (year)	$< 1.00 E^{-16}$	N/A	$1.0E^{-16}$	$9.0 E^{-14}$	$< 1.11 E^{-1}$
10/04/99		and $5.42E^{+9}$ ml.	Th-230 (year)	$< 1.00 E^{-16}$	N/A	$1.0E^{-16}$	$3.0 E^{-14}$	$< 3.33 E^{-1}$
		Collected	Ra-226 (week)	$< 1.00 E^{-16}$	N/A	$1.0E^{-16}$	$9.0 E^{-13}$	$< 1.11 E^{-2}$
			Pb-210 (day)	$9.04 E^{-15}$	$8.94 E^{-16}$	$2.0E^{-15}$	$6.0E^{-13}$	$1.51 E^{+0}$
7/01/99	Continuous for Rn-222		Rn-222 (Minus Daughters)	$1.10 E^{-9}$			$1.0E^{-8}$	$11.00 E^{+0}$
10/04/99	with type F Track-etch cups by Landauer, Inc.							

COMMENT: Site C is located in the NE perimeter of central cell tailing area.

3rd Quarter Sampling
AIR SAMPLES

<u>Sample Date</u>	<u>Location</u>	<u>Type and Air Volume</u>	<u>Radionuclide and Class</u>	<u>Concentration (uci/ml)</u>	<u>Error Est. (uci/ml)</u>	<u>LLD (uci/ml)</u>	<u>Eff. Conc. Limit (uci/ml)</u>	<u>Eff. Conc. of Limit (%)</u>
<u>6/29/99</u>	<u>Site E</u>	<u>Continuous</u>	<u>U-Nat (year)</u>	<u>1.61 E⁻¹⁶</u>	<u>N/A</u>	<u>1.0E⁻¹⁶</u>	<u>9.0 E⁻¹⁴</u>	<u>1.79 E⁻¹</u>
<u>10/04/99</u>		<u>and</u>	<u>Th-230 (year)</u>	<u>< 1.00 E⁻¹⁶</u>	<u>N/A</u>	<u>1.0E⁻¹⁶</u>	<u>3.0 E⁻¹⁴</u>	<u>< 3.33 E⁻¹</u>
		<u>5.19 E⁺⁹ ml.</u>	<u>Ra-226 (week)</u>	<u>1.46 E⁻¹⁶</u>	<u>5.49 E⁻¹⁷</u>	<u>1.0E⁻¹⁶</u>	<u>9.0 E⁻¹³</u>	<u>1.63 E⁻²</u>
		<u>collected</u>	<u>Pb-210 (day)</u>	<u>1.21 E⁻¹⁴</u>	<u>9.88 E⁻¹⁶</u>	<u>2.0E⁻¹⁵</u>	<u>6.0 E⁻¹³</u>	<u>2.01 E⁺⁰</u>
<u>7/01/99</u>	<u>Continuous for Rn-222</u>		<u>Rn-222</u>	<u>9.00 E⁻¹⁰</u>			<u>1.0 E⁻⁸</u>	<u>9.00 E⁺⁰</u>
<u>10/04/99</u>	<u>with Type F Track-etch</u>		<u>(Minus Daughters)</u>					
	<u>cups by Landauer, Inc.</u>							

COMMENT: Site E is located in the south end perimeter of tailings area, upwind direction.



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: UNITED NUCLEAR CORPORATION
 PO #: EW - 7 - 10 - 99
 REPORT DATE: November 21, 1999
 SAMPLE ID: D (Background Site)

Quarter/Date Sampled Air Volume	Radionuclide	Conc. μCi/mL	Error Est. μCi/mL	L.L.D. μCi/mL	* Eff. Conc. μCi/mL	Eff. Conc. %
99-24662 01/04/99-04/05/99 Air Volume in mLs 5.07E+09	^{nat} U	3.30E-16	N/A	1.00E-16	9.00E-14	3.66E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.23E-14	7.87E-16	2.00E-15	6.00E-13	2.05E+00

99-34951 04/05/99-06/29/99 Air Volume in mLs 3.55E+09	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.01E-14	1.18E-15	2.00E-15	6.00E-13	1.68E+00

33724-004 06/29/99-10/04/99 Air Volume in mLs 5.27E+09	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	8.58E-15	9.01E-16	2.00E-15	6.00E-13	1.43E+00

1/04/98 - 4/05/99	Rn-222	1.50 E ⁻⁹		1.00E ⁻⁸	15.00E ⁺⁰
4/05/99 - 7/01/99	"	5.00E ⁻¹⁰		"	5.00E ⁺⁰
7/01/99 - 10/04/99	"	"		"	"

Also Note: 1999 Rn-222 annual average = 8.33E⁻¹⁰ uci/ml. And all Rn-222 analysis are done by Track-etch monitors of Landauer, Inc.

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW CFR10 Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium 230

Week for Radium 226

Day for Lead 210

With daughters removed for Rn-222 = 1.00E⁻⁸ uci/ml.



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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: UNITED NUCLEAR CORPORATION
PO #: EW - 7 - 10 - 99
REPORT DATE: November 21, 1999
SAMPLE ID: F

Quarter/Date Sampled Air Volume	Radionuclide	Conc. μCi/mL	Error Est. μCi/mL	L.L.D. μCi/mL	* Eff. Conc. μCi/mL	Eff. Conc. %
99-24661 01/04/99-04/05/99 Air Volume in mLs 4.84E+09	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.49E-14	8.64E-16	2.00E-15	6.00E-13	2.49E+00

99-34950 04/05/99-06/29/99 Air Volume in mLs 3.92E+09	^{nat} U	1.48E-16	N/A	1.00E-16	9.00E-14	1.64E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.29E-14	1.16E-15	2.00E-15	6.00E-13	2.14E+00

33724-003 06/29/99-09/23/99 Air Volume in mLs 4.27E+09	^{nat} U	1.21E-16	N/A	1.00E-16	9.00E-14	1.34E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	9.77E-15	1.09E-15	2.00E-15	6.00E-13	1.63E+00

1/04/99 - 4/05/99	Rn-222	1.00E ⁻⁹	1.0E ⁻⁸	10.00E ⁺⁰
4/05/99 - 7/01/99	"	"	"	"
7/01/99 - 10/4/99	"	9.00E ⁻¹⁰	"	9.00E ⁺⁰

Also Note: 1999 Rn-222 annual average = 9.67E⁻¹⁰ uci/ml.

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW CFR10 Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium 230

Week for Radium 226

Day for Lead 210

With daughters removed for Rn-222 = 1.00E⁻⁸ uci/ml.



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HIGH VOLUME AIR SAMPLING REPORT	
CLIENT:	UNITED NUCLEAR CORPORATION
PO #:	EW - 7 - 10 - 99
REPORT DATE:	November 21, 1999
SAMPLE ID:	C

Quarter/Date Sampled Air Volume	Radionuclide	Conc. μCi/mL	Error Est. μCi/mL	L.L.D. μCi/mL	* Eff. Conc. μCi/mL	Eff. Conc. %
99-24659 01/04/99-04/05/99 Air Volume in mLs 4.74E+09	^{nat} U	1.76E-16	N/A	1.00E-16	9.00E-14	1.96E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.40E-14	8.62E-16	2.00E-15	6.00E-13	2.33E+00

99-34948 04/05/99-06/29/99 Air Volume in mLs 4.61E+09	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.16E-14	9.89E-16	2.00E-15	6.00E-13	1.93E+00

33724-001 06/29/99-10/04/99 Air Volume in mLs 5.42E+09	^{nat} U	< 1.00E-16	N/A	1.00E-16	9.00E-14	< 1.11E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	9.04E-15	8.94E-16	2.00E-15	6.00E-13	1.51E+00

1/04/99 - 4/05/99	Rn-222	1.90E ⁻⁹	1.0E ⁻⁸	19.00E ⁺⁰
4/05/99 - 7/01/99	"	7.00E ⁻¹⁰	"	7.00E ⁺⁰
7/01/99 - 10/4/99	"	1.10E ⁻⁹	"	11.00E ⁺⁰

Also Note: 1999 Rn-222 annual average = 1.23E⁻⁹ uci/ml.

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW CFR10 Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium 230

Week for Radium 226

Day for Lead 210

With daughters removed for Rn-222=1.00E⁻⁸ uci/ml.

lmh r:\Reports\Clients.99\Unc_Mining_Milling\Air\3q99.xls

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33724R00001



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Helena • Rapid City

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HIGH VOLUME AIR SAMPLING REPORT

CLIENT: UNITED NUCLEAR CORPORATION
PO #: EW-7-10-99
REPORT DATE: November 21, 1999
SAMPLE ID: E

Quarter/Date Sampled Air Volume	Radionuclide	Conc. μCi/mL	Error Est. μCi/mL	L.L.D. μCi/mL	* Eff. Conc. μCi/mL	Eff. Conc. %
99-24660 01/04/99-04/05/99 Air Volume in mLs 4.18E+09	^{nat} U	1.23E-16	N/A	1.00E-16	9.00E-14	1.37E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	< 1.00E-16	N/A	1.00E-16	9.00E-13	< 1.11E-02
	²¹⁰ Pb	1.58E-14	9.77E-16	2.00E-15	6.00E-13	2.64E+00

99-34949 04/05/99-06/29/99 Air Volume in mLs 4.54E+09	^{nat} U	1.13E-16	N/A	1.00E-16	9.00E-14	1.26E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	7.11E-16	4.19E-17	1.00E-16	9.00E-13	7.91E-02
	²¹⁰ Pb	1.39E-14	1.07E-15	2.00E-15	6.00E-13	2.32E+00

33724-002 06/29/99-10/04/99 Air Volume in mLs 5.19E+09	^{nat} U	1.61E-16	N/A	1.00E-16	9.00E-14	1.79E-01
	²³⁰ Th	< 1.00E-16	N/A	1.00E-16	3.00E-14	< 3.33E-01
	²²⁶ Ra	1.46E-16	5.49E-17	1.00E-16	9.00E-13	1.63E-02
	²¹⁰ Pb	1.21E-14	9.88E-16	2.00E-15	6.00E-13	2.01E+00

1/04/99 - 4/5/99	Rn-222	1.30E ⁻⁹		1.0E ⁻⁸	13.00E ⁺⁰
4/05/99 - 7/01/99	"	8.00E ⁻¹⁰		"	8.00E ⁺⁰
7/01/99 - 10/4/99	"	9.00E ⁻¹⁰		"	9.00E ⁺⁰

Also Note: 1999 Rn-222 annual average=1.00E⁻⁹ uci/ml.

Final prep volume is 0.95 liter

LLD's are from Reg. Guide 4.14

*Effluent Concentration from the NEW CFR10 Part 20 - Appendix B - Table 2

Year for Natural Uranium

Year for Thorium 230

Week for Radium 226

Day for Lead 210

With daughters removed for Rn-222=1.00E⁻⁸ uci/ml.



RADIOCHEMICAL QUALITY ASSURANCE REPORT - UNITED NUCLEAR CORPORATION

Laboratory ID:	33724-001-004
Sample Matrix:	Air Filter
Sample Date / Time:	3rd Quarter 1999
Date Received:	10-14-99
Report Date:	November 21, 1999

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank $\mu\text{Ci/mL}$	Date Analyzed	Analyst
Laboratory #:	33563-001		33576-001				
Uranium:	200.8	1.6	101	-	<1.00E-16	10-27-99	TS
Laboratory #:	33367-090		33576-003		RA-244		
Radium-226:	903.0	6.3	99	103	<1.00E-16	11-09-99	RS
Laboratory #:	33601-005		33980-001		AS-96		
Thorium-230:	907.0	0.0	103	96	<1.00E-16	11-12-99	PH
Laboratory #:	33596-002		33596-001		PB-47		
Lead-210:	NERHL-65-4	0.0	103	97	<2.00E-15	11-12-99	LMH
Digestion:	SW3050	Volume 0.95	Units Liter			10-19-99	RCB

- (1) These values are an assessment of analytical precision. The acceptance range is 0-20% for sample results above 10 times the reporting limit. This range is not applicable to samples with results below 10 times the reporting limit.
- (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: *[Signature]*
 lmh r:\Reports\Clients.99\Unc_Mining_Milling\Air\3q99.xls

Reviewed By: *[Signature]*
 TRACKING NO. PAGE NO.
 33724R00005

Radon Monitoring Report

UNC MINING & MILLING
 21 MILES NE OF GALLUP
 STATE ROAD 566
 GALLUP, NM 87305

LANDAUER

Landauer, Inc. 2 Science Road Glenwood, Illinois 60425-1586
 Telephone: (708) 755-7911 Facsimile: (708) 755-7016

Acct. No. 0400216

Detector Number	Detector Type	Starting Date	Ending Date	Field Data / Comments	Exposure pCi/l-days	Avg. Radon Conc. pCi/l	CONC. (uCi/ml.)	% OF EFFL. CONC. (1E ⁻⁸ uCi/ml.)
4384852	DRNF	01-JUL-99	04-OCT-99	SITE C	100.7	1.1	$1.10 E^{-9}$	$11.00 E^{+0}$
4384853	DRNF	01-JUL-99	04-OCT-99	SITE D	46.9	0.5	$5.00 E^{-10}$	$5.00 E^{+0}$
4384854	DRNF	01-JUL-99	04-OCT-99	SITE E	86.7	0.9	$9.00 E^{-10}$	$9.00 E^{+0}$
4384855	DRNF	01-JUL-99	04-OCT-99	SITE F	86.7	0.9	$9.00 E^{-10}$	$9.00 E^{+0}$

Reviewed 10-25-99
M. Chubbly Jr.

1 2 3 4 5 6 7 8

Q.C. Release LMR	Process No. A19468	Report Date 14-OCT-99	Date Received 07-OCT-99
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GAMMA (TLD RESULTS)

DIRECT RADIATION MEASUREMENTS

<u>Exposure Date and Frequency</u>	<u>Location and Badge No.</u>	<u>Exposure Rate (mR/Qr.)</u>	<u>Error Estimate (mR/Qr.)</u>	<u>Above Background Exposure Rate (mR/Qr.)</u>
7/01/99 to 1/10/00 Semi-Annual	Site C 01013	32.0	2.6	+5.6
"	Site F 01016	28.3	5.5	+1.9
"	Site E 01015	17.4	7.9	-9.0
"	Site D 01014	26.4	7.1	Background Site

COMMENTS: Based on Eberline's 234 elapsed days.

Eberline Dosimetry Services

7021 Pan American Fwy NE

Albuquerque, NM 87109

(505) 345-9931 Voice (505) 761-5410 Fax

(888) 343-8537 Toll-Free

TLD ENVIRONMENTAL MONITOR REPORT

Customer No. 03812

Report Date February 15, 2000

Badge No		Dosimeter Readings (mrem)					Date Issued	Date Annealed
Type	Freq	Chip 1 Identification	Chip 2	Chip 3 Average	Chip 4 $\pm 2\sigma$	Chip 5 mrem Per Week	Date Returned	Date Read
01000		55	56	54	53	46	7/1/99	6/15/99
U	S	CONTROL		52.8	7.9	1.58	1/10/00	2/4/00
01013		81	78	83	87	81	7/1/99	6/15/99
U	S	SITE C		82.0	6.6	2.45	1/10/00	2/4/00
01014		64	65	83	59	68	7/1/99	6/15/99
U	S	SITE D		67.8	18.2	2.03	1/10/00	2/4/00
01015		28	42	51	52	50	7/1/99	6/15/99
U	S	SITE E		44.6	20.2	1.33	1/10/00	2/4/00
01016		67	78	78	63	77	7/1/99	6/15/99
U	S	SITE F		72.6	14.2	2.17	1/10/00	2/4/00

Frequency Code
 W - Weekly
 B - BiWeekly
 M - Monthly
 P - BiMonthly
 Q - Quarterly
 S - SemiAnnual
 A - Annual
 I - Irregular

Reviewed on 2-18-00.

M. Chiochilly J.

Company UNC MINING & MILLING CO.
 Attention ED MORALES
 Address P O BOX 3077
 ENVIRONMENTAL DEPT
 GALLUP, NM 87305-3077

GROUNDWATER RESULTS

QUARTERLY LIQUID SAMPLES

<u>Date/QR.</u>	<u>Location</u>	<u>Type</u>	<u>Radionuclide</u>	<u>Concentration</u>		<u>Error Est.</u> <u>uci/ml</u>	<u>LLD</u> <u>uci/ml</u>
				<u>Mg/l</u>	<u>uci/ml</u>		
<u>7-27-99</u>	<u>N. Perimeter</u>	<u>Dom. c</u>	<u>U-Nat (dissolved)</u>	<u> </u>	<u>1.02E⁻⁸</u>	<u> </u>	<u>2.0E⁻¹⁰</u>
<u>3rd Qtr.</u>	<u>of Mill Yard</u>	<u>Waterwell</u>	<u>U-Nat (suspended)</u>	<u> </u>	<u>1.62E⁻⁹</u>	<u> </u>	<u>2.0E⁻¹⁰</u>
			<u>Th-230(dissolved)</u>	<u> </u>	<u><2.00E⁻¹⁰</u>	<u> </u>	<u>2.0E⁻¹⁰</u>
			<u>Th-230(suspended)</u>	<u> </u>	<u><2.00E⁻¹⁰</u>	<u> </u>	<u>2.0E⁻¹⁰</u>
			<u>Ra-226(dissolved)</u>	<u> </u>	<u>1.20E⁻⁹</u>	<u>2.00E⁻¹⁰</u>	<u>2.0E⁻¹⁰</u>
			<u>Ra-226(suspended)</u>	<u> </u>	<u>1.10E⁻⁹</u>	<u>4.00E⁻¹⁰</u>	<u>2.0E⁻¹⁰</u>
UNC Field Data:	PH (STD. Units)	=	<u>8.48</u>	<u>Pb-210(dissolved)</u>	<u><1.00E⁻⁹</u>	<u> </u>	<u>1.0E⁻⁹</u>
	Cond. (u MHOS)	=	<u>3,320</u>	<u>Pb-210(suspended)</u>	<u><1.00E⁻⁹</u>	<u> </u>	<u>1.0E⁻⁹</u>
	Temp. (°C)	=	<u>25.0</u>	<u>Po-210(dissolved)</u>	<u><1.00E⁻⁹</u>	<u> </u>	<u>1.0E⁻⁹</u>
				<u>Po-210(suspended)</u>	<u><1.00E⁻⁹</u>	<u> </u>	<u>1.0E⁻⁹</u>

COMMENTS:

QUARTERLY LIQUID SAMPLES

<u>Date/Qt.</u>	<u>Location</u>	<u>Type</u>	<u>Radionuclide</u>	<u>Concentration</u>		<u>Error Est.</u> <u>uci/ml</u>	<u>LLD</u> <u>uci/ml</u>
				<u>Mg/l</u>	<u>uci/ml</u>		
<u>7-13-99</u>	<u>GW-3</u>	<u>Ground</u>	U-Nat(dissolved)		<u>3.18E⁻⁹</u>		<u>2.0E⁻¹⁰</u>
<u>3rd. Qtr.</u>		<u>Waterwell</u>					
			Th-230(dissolved)		<u><2.00E⁻¹⁰</u>		<u>2.0E⁻¹⁰</u>
			Ra-226(dissolved)		<u><2.00E⁻¹⁰</u>		<u>2.0E⁻¹⁰</u>
			Pb-210(dissolved)		<u><1.00E⁻⁹</u>		<u>1.0E⁻⁹</u>
			PO-210(dissolved)		<u><1.00E⁻⁹</u>		<u>1.0E⁻⁹</u>

UNC Field Data: PH(STD. Units) = 6.7
 Cond.(U MHOS) = 4.770
 Water Depth (Ft.) = 51.7
 Temp. (°C) = 16.2

COMMENTS:

QUARTERLY LIQUID SAMPLES

<u>Date/Qt.</u>	<u>Location</u>	<u>Type</u>	<u>Radionuclide</u>	<u>Concentration</u>		<u>Error Est.</u> <u>uci/ml</u>	<u>LLD</u> <u>uci/ml</u>
				<u>Mg/l</u>	<u>uci/ml</u>		
<u>7-13-99</u>	<u>GW-4</u>	<u>Ground</u>	U-Nat(dissolved)	_____	*	_____	<u>2.0E⁻¹⁰</u>
<u>3rd.Qtr.</u>	_____	<u>Waterwell</u>	_____	_____	_____	_____	_____
			Th-230(dissolved)	_____	*	_____	<u>2.0E⁻¹⁰</u>
			Ra-226(dissolved)	_____	*	_____	<u>2.0E⁻¹⁰</u>
UNC Field Data: PH(STD. Units) =	<u>7.2</u>						
Cond.(U MHOS) =	<u>3,920</u>		Pb-210(dissolved)	_____	*	_____	<u>1.0E⁻⁹</u>
Water Depth (Ft.) =	<u>49.9</u>						
Temp. (°C) =	<u>16.8</u>		PO-210(dissolved)	_____	*	_____	<u>1.0E⁻⁹</u>

COMMENTS: *Insufficient water volume or replenishment for analysis.



ENERGY LABORATORIES, INC.

SHIPPING: 2393 SALT CREEK HIGHWAY • CASPER, WY 82601

MAILING: P.O. BOX 3258 • CASPER, WY 82602

E-mail: energy@trib.com • FAX: (307) 234-1639 • PHONE: (307) 235-0515 • TOLL FREE: (888) 235-0515

LABORATORY ANALYSIS REPORT - UNITED NUCLEAR CORPORATION

Sample ID:
 Laboratory ID:
 Sample Matrix:
 Sample Date/Time:
 Date Received:
 Report Date:

3rd Quarter 1999 Domestic Waterwell
99-36502
Water
07-27-99 @ 15:30
07-30-99
August 23, 1999

Radiometric		Method	Detection Limit	Units	Results
Uranium	²³⁵ U	200.8	0.0003	mg/L	0.015
Radium-226	²²⁶ Ra	903.0	0.2	pCi/L	1.2
Radium Precision ±					0.2
Thorium-230	²³⁰ Th	907.0	0.2	pCi/L	< 0.2
Thorium Precision ±					-
Lead-210	²¹⁰ Pb	NERHL-65-4	1.0	pCi/L	< 1.0
Lead Precision ±					-
Polonium-210	²¹⁰ Po	Precipitation	1.0	pCi/L	< 1.0
Polonium Precision ±					-

Original volume of water is 1.88L

*Reviewed
8-31-99
r*



LABORATORY ANALYSIS REPORT - UNITED NUCLEAR CORPORATION

Sample ID:
Laboratory ID:
Sample Matrix:
Sample Date/Time:
Date Received:
Report Date:

3rd Quarter 1999 Domestic Waterwell
99-36503
Filter
07-27-99 @ 15:30
07-30-99
August 23, 1999

Radiometric		Method	Detection Limit	Units	Results
Uranium	²³⁸ U	200.8	0.0003	mg/L	0.0024
Radium-226	²²⁶ Ra	903.0	0.2	pCi/L	1.1
Radium Precision ±					0.4
Thorium-230	²³⁰ Th	907.0	0.2	pCi/L	<0.2
Thorium Precision ±					-
Lead-210	²¹⁰ Pb	NERHL-65-4	1.0	pCi/L	<1.0
Lead Precision ±					-
Polonium-210	²¹⁰ Po	Precipitation	1.0	pCi/L	<1.0
Polonium Precision ±					-

Original volume of water is 1.88L



RADIOCHEMICAL QUALITY ASSURANCE REPORT - UNITED NUCLEAR CORPORATION

Laboratory ID Range:
Sample Matrix:
Sample Date / Time:
Date Received:
Report Date:

99-36502-36503
Water & Filter
07-27-99 @ 15:30
07-30-99
August 23, 1999

	Method	Relative Percent Difference ¹	Spike Recovery (Percent) ²	LCS Recovery (Percent)	Method Blank (pCi/L)	Date Analyzed	Analyst
Laboratory #:		99-36465	99-36470	-			
*Uranium:	200.8	101	99	-	<0.0003	08-10-99	TS
Laboratory #:		99-36311D	99-36514D	RA-162	RA-162		
Radium-226:	903.0	84.6	87	96	<0.2	08-04-99	RS
Laboratory #:		99-36518	99-36595	AS-62	AS-62		
Thorium-230:	907.0	8	95	102	0.2	08-13-99	PH
Laboratory #:		99-35979	99-35980	PB-32	PB-32		
Lead-210:	NERHL-65-4	0	95	101	<1.0	08-04-99	LMH
Laboratory #:		99-36502	99-36502	PO-17	PO-17		
Polonium-210:	Precipitation	0	85	65	<1.0	08-05-99	RS

*Uranium method blank is reported in mg/L. Duplicate is in percent recovery, not relative percent difference.

- (1) These values are an assessment of analytical precision. The acceptance range is 0-20% for sample results above 10 times the reporting limit. This range is not applicable to samples with results below 10 times the reporting limit.
- (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: *[Signature]*
lmh r:\Reports\Clients.99\Unc_Mining&MillingWater\rc36502.xls

Reviewed By: *[Signature]*

Log In No. 54782



ENERGY LABORATORIES, INC.

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MAILING: P.O. BOX 3258 • CASPER, WY 82602

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

WELL ID:
LABORATORY ID:
SAMPLE DATE:
REPORT DATE:
QUARTER REPRESENTED:
UNC SUBMITTAL #:

GW-3	GW-3	GW-3
99-10597	99-24262	99-35515
01-05-99	04-06-99	07-13-99
February 13, 1999	April 30, 1999	August 17, 1999
First '99	Second '99	Third '99
TE-1-1-99	TE-3-4-99	TE-5-7-99

Major Ions		Method	Units	Reporting Limit	Results	Results	Results
Calcium	Ca	EPA 200.7	mg/L	0.05	671	811	824
Magnesium	Mg	EPA 200.7	mg/L	0.01	193	218	259
Sodium	Na	EPA 200.7	mg/L	0.05	163	202	205
Potassium	K	EPA 200.7	mg/L	0.10	8.9	8.4	12.3
Bicarbonate	HCO ₃	SM 2320 B.	mg/L	0.10	987	1170	1170
Sulfate	SO ₄	EPA 200.7	mg/L	1.0	1400	1710	1830
Chloride	Cl	EPA 200.7	mg/L	1.0	95.2	131	126
Ammonium as N	NH ₄	EPA 350.1	mg/L	0.05	0.21	0.11	0.09
Nitrate + Nitrite as N	NO ₃ + NO ₂	EPA 353.2	mg/L	0.10	85.9	103	119

Non-Metals		Method	Units	Reporting Limit	Results	Results	Results
Total Dissolved Solids @ 180°C	TDS	SM 2540 C. Mod.	mg/L	1.0	3810	4600	4610
pH		SM 4500-H B.	std. units	0.10	7.85	7.64	7.90

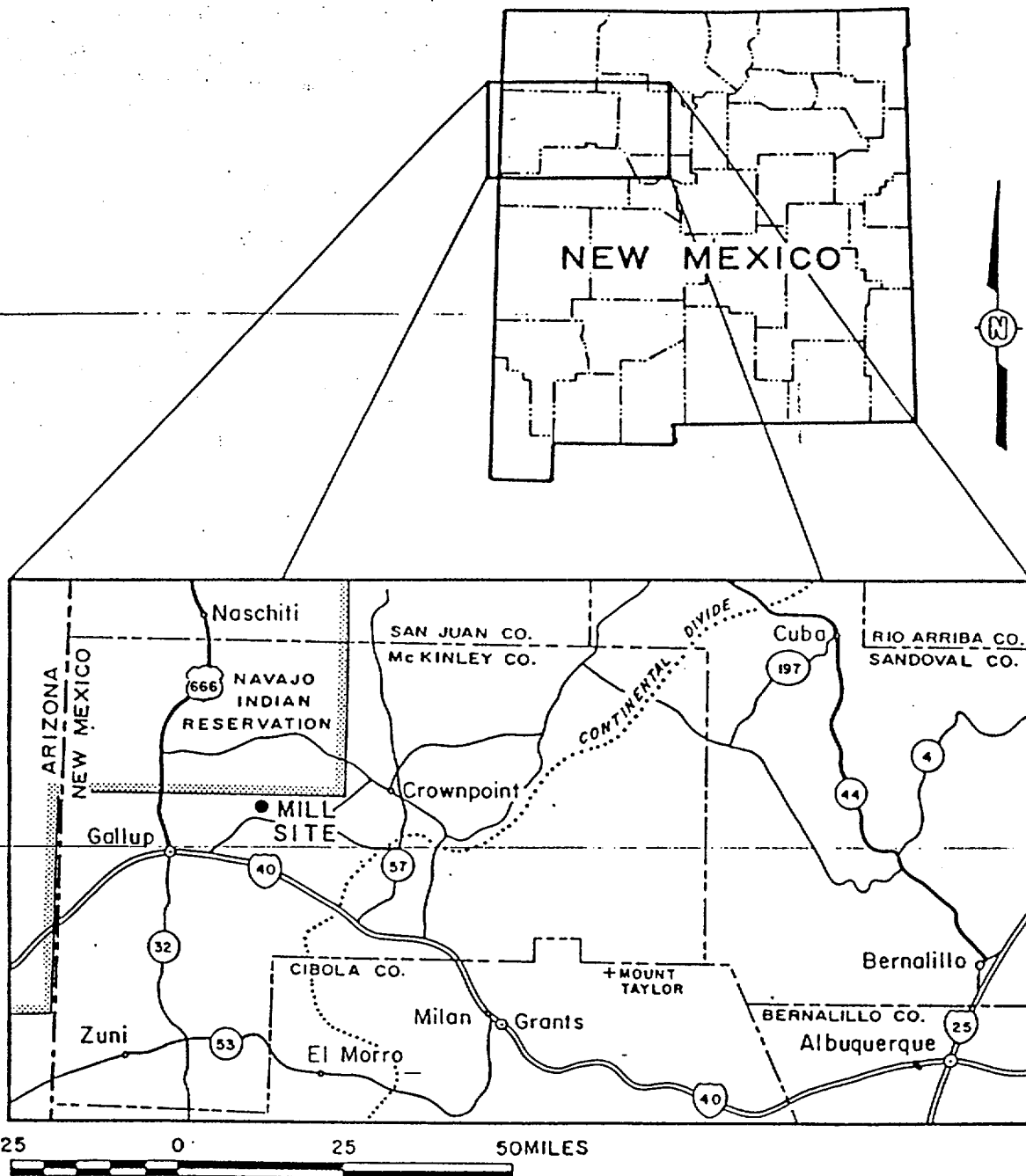
Trace Metals		Method	Units	Reporting Limit	Results	Results	Results
Aluminum	Al	EPA 200.7	mg/L	0.10	< 0.10	< 0.10	< 0.10
Arsenic III	As	EPA 206.3	mg/L	0.001	< 0.001	< 0.001	< 0.001
Beryllium	Be	EPA 200.7	mg/L	0.01	< 0.01	< 0.01	< 0.01
Cadmium	Cd	EPA 200.8	mg/L	0.005	0.007	< 0.005	< 0.005
Cobalt	Co	EPA 200.7	mg/L	0.01	< 0.01	< 0.01	< 0.01
Lead	Pb	EPA 200.7	mg/L	0.05	< 0.05	< 0.05	< 0.05
Manganese	Mn	EPA 200.7	mg/L	0.01	1.41	1.82	1.69
Molybdenum	Mo	EPA 200.7	mg/L	0.10	< 0.10	< 0.10	< 0.10
Nickel	Ni	EPA 200.7	mg/L	0.05	< 0.05	< 0.05	< 0.05
Selenium IV	Se	EPA 270.3	mg/L	0.001	< 0.001	< 0.001	< 0.001
Vanadium	V	EPA 200.7	mg/L	0.10	< 0.10	< 0.10	< 0.10

Radiometrics		Method	Units	Reporting Limit	Results	Results	Results
Uranium	²³⁸ U	EPA 200.8	mg/L	0.0003	0.0475	0.0518	0.0047
Radium 226	²²⁶ Ra	EPA 903.0	pCi/L	0.2	0.7	< 0.2	< 0.2
Radium Error Estimate ±					0.1		
Radium 228	²²⁸ Ra	EPA 904.0	pCi/L	1.0	< 1.0	< 1.0	< 1.0
Radium Error Estimate ±							
Thorium 230	²³⁰ Th	EPA 907.0	pCi/L	0.2	< 0.2	< 0.2	< 0.2
Thorium Error Estimate ±							
Lead 210	²¹⁰ Pb	NERHL-65-4	pCi/L	1.0	< 1.0	< 1.0	< 1.0
Lead Error Estimate ±							
Polonium 210	²¹⁰ Po	RMO-3008, USAEC	pCi/L	1.0	< 1.0	< 1.0	< 1.0
Polonium Error Estimate ±							
Gross Alpha		EPA 900.1	pCi/L	1.0	< 1.0	< 1.0	< 1.0
G. Alpha Error Estimate ±							

Trace Organics		Method	Units	Reporting Limit	Results	Results	Results
Chloroform		EPA 601	µg/L	1.0	< 1.0	< 1.0	< 1.0

Quality Assurance Data		Method	Units	Target Range	Results	Results	Results
Anion			meq		54.16	65.85	69.35
Cation			meq		57.05	67.83	72.12
WYDEQ A/C Balance			%	-5 - +5	2.60	1.48	1.96
Calc TDS			mg/L		3407	4124	4370
TDS A/C Balance			dec. %	0.80 - 1.20	1.12	1.12	1.05

SAMPLING LOCATION MAPS



SOURCE:
 URANIUM MILL LICENSE
 RENEWAL APPLICATION-
 ENVIRONMENTAL REPORT.
 LICENSE NO. NM-UNC-ML.
 JNC 1981

SKETCH I-1
 CHURCH ROCK PROJECT
 SITE LOCATION PLAN
 16674-000

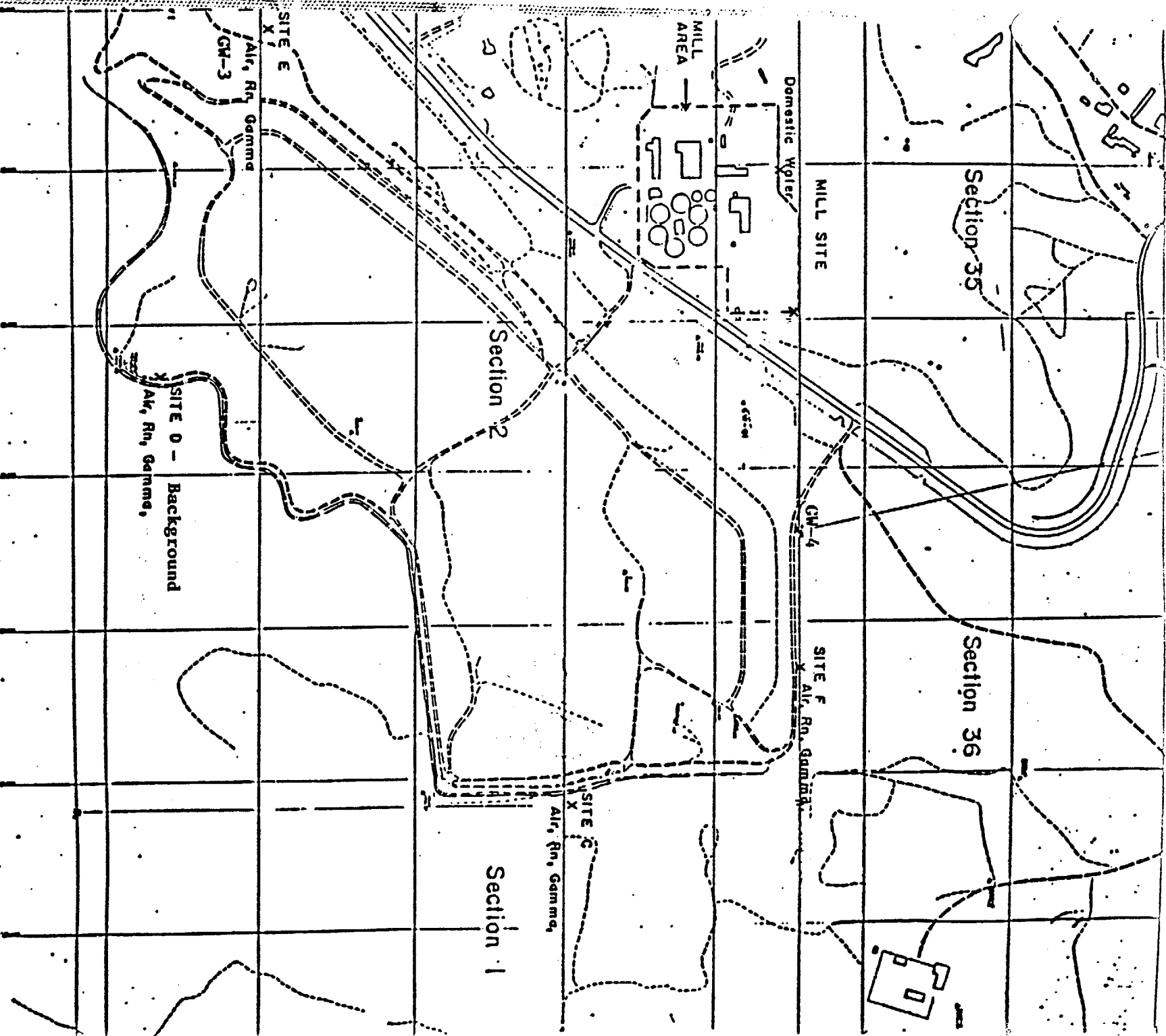


FIGURE 2

UNITED NUCLEAR CORPORATION
 CONSULTING AND
 ANALYTICAL SERVICES
 10000 W. 15th St., Suite 100
 Denver, Colorado 80202