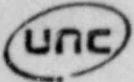


UNC MINING AND MILLING

WM-28
DDR



Division of United Nuclear Corporation
A **UNC RESOURCES** Company

Church Rock Operations
PO Drawer QQ

Gallup, New Mexico 87301
Telephone 505-722-6651

August 22, 1979

AUG 22 1979

Dir's Office

Thomas E. Baca, Director
NMEID
P. O. Box 968
Santa Fe, New Mexico 87503

RECEIVED
AUG 24 1979
RADIATION PROTECTION SECTION

Dear Mr. Baca;

In compliance with element three (3) of your letter dated August 13, 1979, to Mr. D. D. Turberville, Vice-President, UNC Mining & Milling, please find attached the complete results of the analyses on the crystallized salt samples taken July 18, 1979.

Also attached are the results of analyses on surface water samples which have been taken on a weekly basis since the dam breach.

If any other information is required, please contact me.

Sincerely,

R. D. Wooten, Jr.
Radiation Safety Coordinator

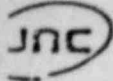
RDW/cr

Attachments (7)

cc: H. J. Abbiss, Vice-President
Environmental and Safety Services
UNC Mining & Milling

THIS DOCUMENT CONTAINS
POOR QUALITY PAGES

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Division of United Nuclear Corporation
 AUNUC RESOURCES Company

PO Box 3951
 Albuquerque, New Mexico 87190

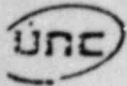
4801 Indian School Road, N.E.
 Albuquerque, New Mexico 87110

Telephone 505/265-4421

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CRYSTALIZED SALTS ANALYSES

PARAMETER		BACKGROUND COMPOSITE	BELOW PUERCO CONFLUENCE (7-18-79)	566 BRIDGE (7-18-79)	WHITEROCK BRIDGE (7-18-79)
Aluminum	Z	1.889	2.556	1.222	1.667
Boronic	Z	0.0109	0.0121	0.0102	0.0093
Benic	Z	0.0008	0.0011	0.0014	0.0012
Barium	Z	0.1080	0.0740	0.0700	0.0760
Carbonate	Z	1.054	7.612	2.489	1.610
Cadmium	Z	<0.0001	<0.0001	<0.0001	<0.0001
Calcium	Z	0.0008	0.0008	0.0006	0.0003
Cesium	Z	0.800	0.630	0.410	0.410
Chloride	Z	0.273	0.328	0.218	0.218
Cobalt	Z	0.0016	0.0026	0.0012	0.0014
Copper	Z	0.0008	0.0009	0.0007	0.0008
Fluoride	Z	0.0010	0.0037	0.0008	0.0008
Iron	Z	0.0076	0.0061	0.0088	0.0076
Iodide	Z	0.0106	0.0209	0.0219	0.0182
Lead	Z	1.417	1.380	0.833	0.861
Lithium	Z	0.0013	0.0008	0.0290	0.0007
Magnesium	Z	0.310	0.320	0.170	0.230
Manganese	Z	0.1250	0.0500	0.0500	0.0500
Mercury, Total	Z	<0.0001	<0.0001	<0.0001	<0.0001
Neodymium	Z	0.0016	0.0017	0.0016	0.0016
Nickel	Z	0.0152	0.0313	0.0782	0.0090
Nitrate	Z	0.005	0.004	0.005	0.005
Strontium	Z	<0.01	<0.01	<0.01	<0.01
Potassium	Z	1.690	1.660	1.130	1.250
Radium	Z	0.0007	0.0007	0.0006	0.0006
Silver	Z	<0.0001	<0.0001	<0.0001	<0.0001
Sulfur	Z	0.584	0.365	0.942	0.604
Sulfate	Z	0.183	3.060	1.069	1.587
Sodium	Z	0.0047	0.0075	0.0043	0.0057
Strontium	Z	0.0116	0.0180	0.0092	0.0094
Th-210 pCi/g		9.5	36.9	10.8	5.0
Th-226 pCi/g		4.0	9.4	3.3	6.6
Th-230 pCi/g		2.8	71.4	26.5	39.9
Uranium	Z	0.0019	0.0045	0.0009	0.0013



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CRYSTALIZED SALTS ANALYSES

PARAMETER		ABOVE PUERCO CONFLUENCE (8-14-79)
Aluminum	%	3.000
Ammonia	%	0.007
Arsenic	%	0.0010
Barium	%	0.0940
Bicarbonate	%	1.069
Boron	%	<0.0001
Cadmium	%	0.0009
Calcium	%	0.011
Chloride	%	0.328
Chromium	%	0.0036
Cobalt	%	0.0014
Copper	%	0.0061
Cyanide	%	0.0084
Fluoride	%	0.0039
Iron	%	1.889
Iodine	%	0.0004
Magnesium	%	0.300
Manganese	%	0.2750
Mercury, Total	%	<0.0001
Molybdenum	%	0.0009
Nickel	%	0.0053
Nitrate	%	0.003
Nitrite	%	0.01
Potassium	%	0.363
Selenium	%	0.0007
Silver	%	<0.0001
Sulfur	%	0.693
Sulfate	%	8.534
Sodium	%	0.0089
Zinc	%	0.0164
Radium-210	pCi/g	38.4
Plutonium-226	pCi/g	15.9
Uranium-230	pCi/g	124.4
Strontium	%	0.0079

TAILINGS DAM BREACH
SURFACE WATER SAMPLES

Sampling Date: 7-18-77	1.5 mi. upstream At Ford Jr. Road	.5 mi. upstream at State Road	4.5 mi. upstream at Pinedale Road Crossing 566 Bridge	5 mi. downstream North East of El Paso Refinery	13 mi. downstream North East of El at Hogback East of Gallup	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Velgh Station E. of Arlions Border
Aluminum (mg/l)	50.2	1073.0	1037.0	781.0	788.3	<0.2	<0.2
Arsenic (mg/l)	0.008	0.008	0.010	0.012	0.010	0.007	0.007
Barium (mg/l)	1.67	0.88	0.89	0.35	0.59	0.88	0.88
Cadmium (mg/l)	0.004	0.002	0.058	0.063	0.067	0.015	0.015
Calcium (mg/l)	26.9	153.0	161.7	180.0	196.0	132.0	132.0
Chloride (mg/l)	19.4	5513.6	2322.7	3545.0	282.0	315.2	315.2
Chromium (mg/l)	0.02	1.57	1.51	1.20	1.01	<0.02	<0.02
Cobalt (mg/l)	0.09	0.785	0.619	0.593	0.633	0.432	0.432
Conductivity (microhm/cm) 25°C	650	35,000	20,400	13,500	12,800	1820	1820
Copper (mg/l)	<0.01	4.2	3.5	2.1	2.1	<0.01	<0.01
Cyanide (mg/l)	<0.01	0.13	0.23	0.12	0.35	0.01	0.01
Fluoride (mg/l)	0.30	27.3	22.5	14.0	11.7	0.95	0.95
Iron (mg/l)	<0.04	2218.0	1751.0	936.5	7025.0	<0.04	<0.04
Lead (mg/l)	<0.05	0.55	0.52	0.16	0.16	<0.05	<0.05
Magnesium (mg/l)	9.15	1038.00	959.0	879.0	929.0	32.3	32.3
Manganese (mg/l)	<0.01	73.00	75.00	92.00	96.00	0.44	0.44
Polytheneum (mg/l)	0.17	0.56	0.50	0.14	0.08	0.22	0.22
Mercury, Total (ng/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen (Nitrate) (mg/l)							
Phosphorus (mg/l)	4.61	95.9	96	87.6	88.5	13.8	13.8
pH	8.87	8.90	1.41	2.49	2.69	8.18	8.18
Selenium (mg/l)	0.016	0.001	0.051	0.013	0.011	0.015	0.015
Silver (mg/l)	<0.01	0.15	0.12	0.09	0.09	0.02	0.02
Sodium (mg/l)	2364.0	7701.0	11,755.0	6309.0	10,660.0	3083.0	3083.0
Sulfate (mg/l)	125.9	27,372.6	20,018	16,164.0	14,540.0	1170.0	1170.0
Total Dissolved Solids (mg/l)	438.0	41,100.0	43,291.0	29,410.0	25,676.0	2452.0	2452.0
nickel (mg/l)	<0.04	3.00	3.00	3.60	2.90	<0.04	<0.04
Vanadium (mg/l)	<0.1	58.8	56.3	27.0	7.5	<0.01	<0.01
Zinc (mg/l)	0.026	10.400	11.560	8.500	8.850	0.009	0.009
Total Uranium (mg/l)	0.71	6.49	7.49	6.81	6.37	0.51	0.51
Radium-226 (pCi/l)	2.5	100.2	545.9	53.0	23.0	3.4	3.4
Thorium-230 (pCi/l)	NA	8095.5	10.1	7428.8	47,862.9	29.7	29.7
Gross Alpha (pCi/l)	381	122	4351.0	4087.5	4528.0	105	105
Hardness (mg/l)	104.8	4654.4	4331.0	4067.5	4528.0	462.5	462.5

TAILINGS DAM BREACH
SURFACE WATER SAMPLES

Sampling Date: 7-19-79
PARAMETERS
1.5 mi. upstream at Ford In Road
0.5 mi. upstream at Waterfall
4.5 mi. downstream at Pinedale Road Crossing
5 mi. downstream at State Road 566 Bridge
13 mi. downstream North East of El Paso Refinery
16 mi. downstream at Hogback East of Gallup
36 mi. downstream at Yelgh Station E. of Arizona Border

Aluminum (mg/l)	0.3	<0.2	0.4	1.7	0.2	<0.2	<0.2
Arsenic (mg/l)	0.008	0.007	0.005	0.009	0.005	0.005	0.005
Barium (mg/l)	1.7	1.2	1.4	0.7	0.5	0.7	1.0
Cadmium (mg/l)	<0.001	<0.004	<0.004	<0.004	<0.004	<0.005	<0.004
Calcium (mg/l)	10.0	6.0	134.0	154.0	282.0	212.0	134.0
Chloride (mg/l)	21.8	10.9	27.3	49.1	43.7	92.0	49.1
Chromium (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	1.05
Cobalt (mg/l)	0.005	0.005	0.069	0.116	0.256	0.233	0.116
Conductivity (microhm/cm) 25°C	600	680	1800	1950	3260	3580	3600
Copper (mg/l)	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01
Cyanide (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride (mg/l)	0.27	0.32	0.22	0.33	0.17	0.17	0.24
Iron (mg/l)	2.83	2.83	242.5	450.9	532.1	29.75	4.7
Lead (mg/l)	0.05	0.10	0.09	0.09	0.10	0.10	0.06
Magnesium (mg/l)	11.1	17.0	33.6	43.0	90.3	123.0	100.0
Manganese (mg/l)	1.1	0.53	3.2	4.2	15.8	31.1	14.7
Polybromine (mg/l)	0.19	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Mercury Total (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen (Nitrate) (mg/l)							
Potassium (mg/l)	4.44	2.83	9.70	10.91	20.20	31.52	23.54
pH	8.66	8.68	5.07	4.48	5.62	6.28	6.00
Selenium (mg/l)	0.017	0.012	0.011	0.014	0.011	0.010	0.011
Silver (mg/l)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium (mg/l)	4007	2523	3121	3403	3515	3587	3623
Sulfate (mg/l)	123.0	165.0	1168	1304	2353	2566	2425
Total Dissolved Solids (mg/l)	442.6	443.0	1748.6	2014.2	3601.6	4015.8	3709.2
Nickel (mg/l)	<0.04	0.08	<0.04	<0.04	0.15	0.10	0.08
Vanadium (mg/l)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (mg/l)	0.035	0.047	0.035	0.035	0.129	0.031	0.020
Total Uranium (mg/l)	0.81	0.80	0.02	0.03	0.01	0.04	0.01
Radium-226 (pCi/l)	12.2	17.8	9.4	11.0	4.6	4.8	4.6
Thorium-230 (pCi/l)	9.3	10.9	5.6	70.7	50.6	50.6	50.6
Gross Alpha (pCi/l)	360	365	25	10	10	5	12
Hardness (mg/l)	70.7	85.0	72.7	553.3	1108.6	1210.4	395.1

TAILINGS DAM BREACH
SURFACE WATER SAMPLES

Sampling Date: 7-27-79	1.5 mi. upstream at Ford in Road	5 mi. upstream at Waterfall	4.5 mi. downstream at Pinedale Road Crossing	5 mi. downstream at State Road 566 Bridge	13 mi. downstream North East of El Paso Refinery	16 mi. downstream at Hoopack East of Gallup	36 mi. downstream at Veigh Station E. of Arizona border
Aluminum (mg/l)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arsenic (mg/l)	0.0224	0.0239	0.0129	0.6178	<0.001	<0.001	<0.001
Barium (mg/l)	1.4	1.6	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Calcium (mg/l)	1.97	2.15	12.12	18.18	46.97	45.45	50.91
Chloride (mg/l)	36.2	30.1	18.1	36.2	48.2	48.2	132.6
Chromium (mg/l)	<0.02	<0.02	<0.02	<0.02	<0.02	0.5	0.5
Cobalt (mg/l)	<0.01	<0.01	<0.01	<0.01	0.44	0.12	0.12
Conductivity (umhos/cm) 25°C	556	670	1130	1200	2800	2690	3000
Copper (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cyanide (mg/l)							
Fluoride (mg/l)	0.296	0.319	0.500	0.605	0.166	0.138	0.765
Iron (mg/l)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Lead (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Magnesium (mg/l)	1.15	1.01	2.30	3.31	22.01	23.60	18.56
Manganese (mg/l)	<0.01	<0.01	0.36	0.44	0.95	0.47	1.75
Polychlorinated (mg/l)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Mercury Total (ug/l)							
Nitrogen (Nitrate) (mg/l)							
Potassium (mg/l)	1.47	1.57	3.21	2.75	6.88	9.17	13.76
pH	6.73	6.78	7.49	7.43	6.83	5.94	7.81
Selenium (ug/l)	0.1252	0.1219	0.1254	0.1232	0.1055	0.0902	0.1124
Silver (ug/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium (mg/l)							
Sulfate (mg/l)	134.3	141.2	465.0	513.6	1938.2	2024.6	1917.6
Total Dissolved Solid (mg/l)	436.0	486.0	902.0	976.0	3274.0	3350.0	3328.0
Nickel (mg/l)	<0.01	<0.01	<0.01	<0.01	0.13	0.08	<0.01
Vanadium (ug/l)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Zinc (mg/l)	<0.01	<0.01	0.01	0.03	0.04	0.04	0.03
Total Uranium (ug/l)	0.90	0.86	0.58	0.56	<0.01	<0.01	0.19
Radium-226 (pCi/l)	2.5	3.0	2.8	3.0	2.6	2.6	2.6
Thorium-230 (pCi/l)	21.5	21.5	11.0	7.0	<0.6	<0.6	4.0
Gross Alpha (pCi/l)	9.7	9.5	21.6	59.0	207.9	200.6	178.5
Hardness (mg/l)							

TAILINGS DPM BREACH

Sampling Date: 8-04-79

	1.5 mi. upstream at Ford in Road	.5 mi. upstream at Water...	4.5 mi. downstream at Pinedale Road Crossing	5 mi. downstream at State Road 566 Bridge	13 mi. downstream North East of El Paso Refinery	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Veigh Station E. of Arizona Border
Fluorine (mg/l)	0.737	0.588	0.379	0.740	0.271	0.328	0.723
Arsenic (mg/l)	0.065	<0.001	0.064	0.003	0.025	0.005	0.003
Boron (mg/l)	0.755	0.866	0.444	1.212	1.212	0.463	0.131
Cadmium (mg/l)	0.0067	0.0007	0.0010	0.0012	0.0019	0.0021	0.0021
Calcium (mg/l)	3.24	2.32	14.11	17.41	42.93	41.12	31.78
Chloride (mg/l)	25.0	30.0	20.0	20.0	25.0	30.0	45.0
Chromium (mg/l)	0.016	0.011	0.018	0.024	0.036	0.086	0.091
Cobalt (mg/l)	0.041	0.003	0.076	0.002	0.092	0.045	0.022
Conductivity (umhos/cm) 25°C	580	590	940	1010	1830	2000	2620
Copper (mg/l)	0.0073	0.0002	0.0290	0.0083	0.0006	0.0021	0.0138
Cyanide (mg/l)	43.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride (mg/l)	0.39	0.35	0.80	0.35	0.43	0.57	0.29
Iron (mg/l)	0.152	0.121	0.353	0.209	0.507	0.057	0.235
Lead (mg/l)	0.0231	0.0258	0.0264	0.0400	0.0635	0.0568	0.0828
Magnesium (mg/l)	3.12	3.04	2.45	6.41	26.78	29.11	20.40
Manganese (mg/l)	0.0014	0.0012	0.0121	0.0035	0.3612	0.1322	0.7610
Mercury, Total (mg/l)	0.393	0.357	0.417	0.418	0.374	0.397	0.077
Mercury, Total (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Molybdenum (mg/l)	3.52	2.31	3.44	4.13	7.86	10.31	9.78
Nickel (mg/l)	8.89	8.87	7.65	7.71	7.43	7.52	7.73
Nitrogen (mg/l)	0.061	0.012	0.012	0.013	0.037	0.006	0.016
Silver (mg/l)	0.0030	0.0051	0.0012	0.0023	0.0041	0.0076	0.0065
Sulfur (mg/l)	3593.0	4063.0	2742.0	2436.0	2572.0	1318.0	3371.0
Sulfate (mg/l)	136.8	150.4	603.4	671.7	1176.5	1374.4	1506.0
Total Dissolved Solids (mg/l)	1294	1320	1690	1792	2750	3122	3560
Total (mg/l)	0.037	0.012	0.014	0.008	0.007	0.006	0.008
Zinc (mg/l)	0.006	0.012	0.007	0.009	0.005	0.008	0.008
Zinc (mg/l)	0.0071	0.0042	0.0034	0.0031	0.0031	0.0015	0.0020
Total Uranium (mg/l)	0.85	0.86	0.68	0.67	0.16	0.08	0.16
Radon-226 (pCi/l)	2.1	2.6	1.0	2.5	3.2	3.0	4.7
Radon-210 (pCi/l)	55.4	15.5	30.3	8.4	40.6	<0.6	14.8
U-235 Alpha (pCi/l)	210	306	103	87	12	10	7
U-238 (mg/l)	18.63	18.31	45.32	66.77	212.24	125.61	89.76

TAILINGS DAM BREACH

Sampling Dates: Aug. 2, 1972
 PARAMETERS

	1.5 mi. upstream at Ford In Road	5 mi. upstream at Waterfall	4.5 mi. downstream at Picadillo Road Crossing	5 mi. downstream at State Road 266 Bridge	13 mi. downstream North East of El Paso Refinery	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Veigh Station E. of Arizona Border
Aluminum (mg/l)	0.330	0.076	0.189	0.273	0.160	1.091	0.841
Arsenic (mg/l)	0.005	0.037	0.032	0.023	0.016	0.030	0.016
Barium (mg/l)	0.0372	0.668	0.231	1.031	1.605	0.312	0.079
Cadmium (mg/l)	0.0007	0.0004	0.0005	0.0007	0.0006	0.0007	0.0005
Calcium (mg/l)	7.6	6.7	71.4	44.9	267.2	193.3	97.4
Chloride (mg/l)	11.5	13.7	17.0	18.7	20.9	28.6	35.7
Chromium (mg/l)	0.007	0.009	0.063	0.007	0.005	0.009	0.010
Cobalt (mg/l)	0.013	0.015	0.029	0.023	0.021	0.026	0.052
Conductivity (micro/cm) 25°C	650	360	1110	1190	2150	2720	2010
Copper (mg/l)	0.008	0.010	0.017	0.019	0.013	0.019	0.017
Cyanide (mg/l)	0.10	0.59	0.07	0.28	0.13	0.04	0.06
Fluoride (mg/l)	0.36	0.39	0.72	0.70	0.51	0.44	0.39
Iron (mg/l)	0.114	0.011	0.004	0.024	0.018	0.024	0.011
Lead (mg/l)	0.024	0.025	0.037	0.042	0.065	0.058	0.055
Magnesium (mg/l)	6.1	5.3	15.1	15.1	36.9	41.6	31.1
Manganese (mg/l)	0.0015	0.0010	0.0055	0.0021	0.0210	0.0131	0.010
Polymerum (mg/l)	0.267	0.254	0.763	0.763	0.726	0.212	0.161
Mercury Total (mg/l)	0.001	0.001	0.001	0.001	0.001	0.001	0.001
Nitrogen (Nitrate) (mg/l)							
Potassium (mg/l)	0.6	1.1	8.3	1.7	9.1	3.4	3.8
pH	8.7	8.07	8.03	7.96	7.69	7.57	7.84
Selenium (mg/l)	0.058	0.067	0.035	0.030	0.034	0.043	0.023
Silver (mg/l)	0.0045	0.0055	0.0015	0.0038	0.0026	0.0046	0.0072
Sodium (mg/l)	2983.4	3173.0	2524.7	2136.5	2202.5	1695.0	1769.1
Sulfate (mg/l)	132.0	152.0	457.0	522.8	1384.6	1838.6	1178.8
Total Dissolved Solids (mg/l)	530	605	1010	1008	2217	3008	2024
Thiols (mg/l)	0.006	0.009	0.004	0.008	0.005	0.006	0.007
Zinc (mg/l)	0.022	0.044	0.059	0.045	0.043	0.074	0.061
Zinc (mg/l)	0.0041	0.0032	0.0084	0.0071	0.0035	0.0021	0.0031
Total Uranium (mg/l)	0.65	0.89	0.45	0.54	0.23	0.17	0.12
Radon-226 (pCi/l)	2.6	4.1	0.6	0.9	0.8	2.7	1.3
Radon-230 (pCi/l)	23.6	25.4	11.8	14.7	9.3	0.6	11.8
Cross Alpha (pCi/l)	293	364	167	73	24	12	7
Radon-222 (pCi/l)	41.8	38.5	20.4	173.5	806.6	653.9	371.2