

DEC 20 1979

Ref: SA/JFK

MEMORANDUM FOR: Douglas Sly, IE

FROM: G. Wayne Kerr, OSP

SUBJECT: UNC TAILINGS IMPOUNDMENT WEEKLY REPORTS, NOVEMBER 25-
DECEMBER 1, 1979, DECEMBER 2-8, 1979 CHURCH ROCK,
NEW MEXICO

Attached are the subject reports we recently received from New Mexico. Please advise OSP when you no longer wish to receive information from New Mexico on this subject.

G. Wayne Kerr, Assistant Director
for State Agreements Program
Office of State Programs

Attachments:
As stated

8104230656

W. J. Kevin, U.S. AEC.

It's a pleasure

to serve you . . .

We are happy to send you the attached material in response to your recent request.

Please feel free to call on us any time we might be of further service.

Ted Wolff
Environmental Manager

Environmental Improvement Division
Radiation Protection Section
P.O. Box 968, Crown Building
Santa Fe, New Mexico 87503

Telephone: (505) 827-5271 Ext. 279

UNC MINING AND MILLING

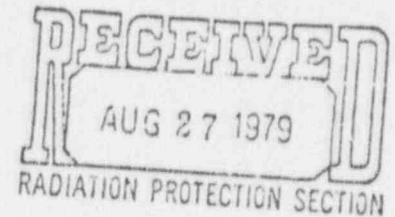


Division of United Nuclear Corporation
A UNC RESOURCES Company

Church Rock Operations
P.O. Drawer QQ

Gallup, New Mexico 87301
Telephone 505/722-6651

August 24, 1979



Dr. Ted Wolff
NMEID
Radiation Protection Section
Box 968
Santa Fe, New Mexico 87503

Dear Ted:

As required in Mr. Baca's letter of August 13, find enclosed the weekly follow-up report. If you have any questions about the format please let me know.

By way of explanation: sediment sampling to determine vertical and lateral movement was initiated on August 9; cleanup was limited by excess rainfall on August 10, 12, and 13, and by lack of direction due to confusion over cleanup criteria on the 17th; cleanup of all visible salts was completed on August 16 and no more have reappeared.

If you have any further questions please call me.

Regards,

Todd Miller,
Manager of Environmental Operations

TM/cr

Enclosures (2)

cc: H. J. Abbiss, UNC Mining & Milling
C. N. Ofelt, UNC Mining & Milling

*TOB 27
COP 284*

*27/s
Results of Sampling
urgently needed*



Division of United Nuclear Corporation
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PO Box 3951
Albuquerque, New Mexico 87190

4801 Indian School Road, N.E.
Albuquerque, New Mexico 87110
Telephone 505/265-4421

TAILINGS BREACH FOLLOW-UP REPORT

Week of 8-10-79 through 8-16-79

	<u>Material</u> <u>(salt, sediment, water)</u>	<u>Volume</u> ₃ <u>(gal or ft³)</u>	<u>Date Sampled</u> <u>or Removed</u>	<u>Manpower</u> <u>Utilized</u>
<u>Pools</u>	Surveyed and sampled water	45 samples	8-15-79	
<u>Salts</u>	Salts removed		8-14-79	42
	Salts removed	355 Ft. ³	8-15-79	47
	Salts removed	290 Ft. ³	8-16-79	58
<u>Sediments</u>	Trench samples taken four (4) locations		8-9-79	
<u>Runoff</u>	Water - Pinedale Bridge Water - 566 Bridge		8-14-79 8-15-79	
<u>Cleanup</u>	Sediment removal.	188 Ft. ³	8-11-79	7

ADD LOCATION



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TAILINGS BREACH FOLLOW-UP REPORT

Week of 8-17-79 through 8-23-79

	<u>Material</u> (salt, sediment, water)	<u>Volume</u> (gal or ft ³)	<u>Date Sampled</u> or Removed	<u>Manpower</u> <u>Utilized</u>
<u>Pools</u>	No further action due to low levels observed in initial survey.			
<u>Salts</u>	No further salt formation observed.			
<u>Sediments</u>	Trench samples in laboratory.			
<u>Runoff</u>	No precipitation events.			
<u>Cleanup</u>	Sediment removed.	261 ft. ³	8-17-79	5
	Sediment removed.	442 ft. ³	8-18-79	20
	Sediment removed.	341 ft. ³	8-19-79	19
	Sediment removed.	370 ft. ³	8-20-79	43
	Sediment removed.	370 ft. ³	8-21-79	46
	Sediment removed.	413 ft. ³	8-22-79	48
	Sediment removed.	638 ft. ³	8-23-79	47



The attached Fact Sheet presents current data on the Church Rock Mill's tailings pond breach, the actions undertaken by UNC as well as some of the results to date.

We will be pleased to discuss any of the numerous aspects and issues involved. Please address your inquiries to Charles Ofelt (telephone number 505-265-4421). They will be handled promptly.

August 23, 1979

This Fact Sheet has been prepared to provide the latest available information concerning the tailings dam breach on July 16, 1979 at the Church Rock Mill of United Nuclear Corporation near Gallup, New Mexico, its effects and remedial steps taken by UNC. Situated 15 miles northeast of Gallup, the Church Rock Mill has been in operation since May, 1977. It processes uranium ore from the nearby UNC Church Rock Mine and other mining properties. Waste materials from the mill are discharged into a tailings pond.

Background

Upon discovery of the breach and release of tailings liquid into the arroyo leading to the Rio Puerco, early in the morning on July 16, the New Mexico Environmental Improvement Division was notified and summoned to the area, while work crews erected a temporary secondary dam to stop the flow of liquid.

The leak was stopped within two to three hours of its discovery. Mill shutdown procedures by UNC were started immediately and discharging into the tailings pond was stopped. An estimated 100 million gallons of tailings liquid containing low-level radioactive waste materials were released by the breach.

The tailings liquid passed through Gallup downstream to a point near Chambers, Arizona. Arizona state officials were notified of the spill at Church Rock.

Tailings Dam

The cause of the breach continues to be under investigation by independent engineering firms retained by UNC who will present their findings directly to the Environmental Improvement Division and the Office of the New Mexico State Engineer. The tailings dam design conforms to established industry standards and received approval by the Office of the New Mexico State Engineer on April 7, 1976. The Church Rock Mill will not be reopened until the conclusive cause or causes of the breach are established and until authorization is received from the New Mexico Environmental Improvement Division, the New Mexico State Engineer and the U.S. Mine Safety and Health Administration. The mill employs about 150 workers, most of whom reside in the nearby Gallup area.

Analysis of the Tailings Spill

UNC follows a practice of periodically testing surface water conditions up and downstream from its Church Rock Mill.

Water samples taken on July 16, after the tailings dam breach, at various locations from Church Rock to a point 36 miles downstream, showed abnormally high concentrations of such chemical elements as total Uranium, Radium 226 and Thorium 230. However, readings taken for these chemicals at the same locations since the spill showed that concentrations have diminished sharply to levels approaching normal background intensities. These data have been supplied to the New Mexico Environmental Improvement Division and to officials of the Navajo Nation. (See attached test data.)

Action Taken By UNC

In addition to notifying the Environmental Improvement Division of the dam breach, UNC informed the City of Gallup, the NRC, Mine Safety and Health Administration and personal visits were made by UNC representatives to residents of local settlements who do not have telephones. As a precautionary measure, the residents were advised that drinking water would be made available to them by the UNC Mill.

Press and other media were advised by both Environmental Improvement Division and UNC and press statements were issued to the local media and national wire services. Concurrently with the plant shut down, UNC immediately dispatched sampling teams to track the spill and to sample the river waters and streambed soils for the length of the spill.

Using uranium readings as the basis, UNC began clean-up operations throughout the affected areas, particularly seeking out any possibly contaminated standing pools of water. These operations continue today in accordance with Environmental Improvement Division guidelines.

The clean-up process is slow of necessity since the soft riverbeds preclude the use of heavy equipment such as bulldozers. Clean-up crews must resort to shovels and buckets -- a procedure that is slow but considerably more thorough.

In compliance with the Environmental Improvement Division's directive of August 13th, UNC has on August 15th again surveyed and sampled standing pools of water using work crews and a helicopter. Of the 45 pools identified none contained significant amounts of uranium.

A soil sampling program to define the exact amount of soil contamination and the effectiveness of the clean-up operation is ongoing. Initially, elevated levels of Radium, a key radioactive element, were observed only within five miles downstream from the dam and not farther. To date, the arroyo has been sampled as far as Gallup, and findings are being forwarded to the Environmental Improvement Division.

A surface and ground water sampling program is also continuing, including a number of Navajo tribal water wells.

Signs in English, Spanish and Navajo, discouraging use the Rio Puerco, have been posted at half-mile intervals stretching from the mill to the Arizona border.

UNC has so far delivered over 100,000 gallons of drinking and livestock water to Navajo families and ranchers in potentially affected areas. Deliveries are being made on a continuing basis.

Effect on UNC

Notwithstanding the Mill shut-down, no employees have been laid off. The Church Rock Mine has continued in full production. Mill operation will resume when all regulatory agency approvals are received.

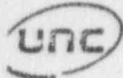
SPILL WATER SAMPLES
TAILINGS DAM BREACH

In Date: 08-09-79

ETERS

	*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 565 Bridge	13 mi. downstream North East of El Paso Refinery	16 mi. downstream at Hopback East of Gallup	36 mi. downstream at Weigh Station E. of Arizona Border
num (mg/l)	0.330	0.076	0.189	0.223	0.160	1.091	0.241
ic (mg/l)	0.005	0.007	0.032	0.023	0.014	0.079	0.015
m (mg/l)	0.0572	0.660	0.211	1.011	1.005	0.312	0.179
um (mg/l)	0.0003	0.0004	0.005	0.0007	0.0005	0.0007	0.0005
vm (mg/l)	7.6	6.7	71.6	44.9	262.2	193.1	97.3
ide (mg/l)	11.5	13.7	17.0	18.7	20.9	23.6	39.2
ium (mg/l)	0.007	0.009	0.003	0.007	0.005	0.007	0.013
t (mg/l)	0.013	0.015	0.029	0.023	0.031	0.025	0.052
activity (umhos/cm) 25°	650	560	1110	1190	2130	2720	2010
r (mg/l)	0.004	0.010	0.017	0.019	0.013	0.019	0.017
a (mg/l)	0.10	0.59	0.07	0.28	0.13	0.04	0.06
ide (mg/l)	0.36	0.39	0.72	0.79	0.51	0.44	0.39
um (mg/l)	0.114	0.011	0.004	0.024	0.018	0.024	0.011
um (mg/l)	0.074	0.025	0.037	0.042	0.065	0.054	0.055
sum (mg/l)	6.2	5.3	15.1	13.2	36.9	41.6	31.1
ness (mg/l)	0.0015	0.0010	0.0095	0.0021	0.0210	0.0131	0.010
denum (mg/l)	0.267	0.254	0.263	0.263	0.276	0.212	0.161
ry, Total (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
gen (nitrate) (mg/l)							
sum (mg/l)	0.6	1.1	0.3	1.0	9.1	3.4	3.8
ium (mg/l)	8.88	8.87	8.03	7.94	7.89	7.57	7.84
r (mg/l)	0.050	0.067	0.035	0.030	0.034	0.041	0.023
m (mg/l)	0.0045	0.0055	0.0015	0.0036	0.0026	0.0046	0.0037
ite (mg/l)	2980.4	3173.0	2524.7	2136.5	2202.5	1695.0	1769.1
Dissolved Solids (mg/l)	132.0	152.0	457.0	522.8	1386.6	1838.6	1178.8
l (mg/l)	520	604	1010	1068	2332	3008	2824
ium (mg/l)	0.006	0.009	0.004	0.008	0.005	0.006	0.007
um (mg/l)	0.022	0.060	0.059	0.045	0.048	0.094	0.091
l (mg/l)	0.0041	0.0032	0.0034	0.0071	0.0035	0.0121	0.0131
um-226 (pCi/l)	0.85	0.89	0.65	0.54	0.23	0.17	0.1
um-230 (pCi/l)	2.64	4.1	<0.6	0.2	0.8	2.7	1.3
5 Alpha (pCi/l)	20.6	25.4	11.8	14.7	9.8	<0.6	11.8
ness	293	364	167	73	34	12	7
	41.8	30.5	240.4	173.5	606.6	653.9	371.2

* Upstream data is the background against which downstream data is compared. Upstream is above the tailings dam and downstream is below the dam.



UNC MINING AND MILLING

Division of United Nuclear Corporation
A UNC RESOURCES Company

Church Rock Operations
P.O. Drawer QQ

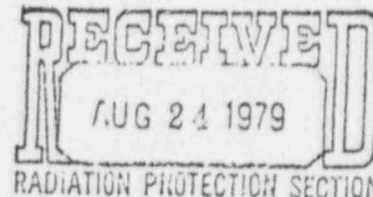
Gallup, New Mexico 87301
Telephone 505/722-6651

August 22, 1979

AUG 22 1979

Dir's Office

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



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



Division of United Nuclear Corporation
AUNC RESOURCES Company

PO Box 3951
Albuquerque, New Mexico 87190

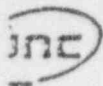
4801 Indian School Road, N.E.
Albuquerque, New Mexico 87110

Telephone 505/255-4421

CRYSTALIZED SALTS ANALYSES

1889

METER		BACKGROUND COMPOSITE	BELOW PUERCO CONFLUENCE (7-18-79)	566 BRIDGE (7-18-79)	WHITEROCK BRIDGE (7-18-79)
Inum	Z	1889 1.889	2.556	1.222	1.667
nia	Z	0.0109	0.0121	0.0102	0.0093
ifc	Z	0.0008	0.0011	0.0014	0.0012
um	Z	0.1080	0.0740	0.0700	0.0760
arbonate	Z	1.054	7.612	2.489	1.610
i	Z	<0.0001	<0.0001	<0.0001	<0.0001
ium	Z	0.0008	0.0008	0.0006	0.0003
ium	Z	0.800	0.630	0.410	0.410
ride	Z	0.273	0.328	0.218	0.218
ium	Z	0.0016	0.0026	0.0012	0.0014
lt	Z	0.0008	0.0009	0.0007	0.0008
er	Z	0.0010	0.0037	0.0008	0.0008
ide	Z	0.0076	0.0061	0.0088	0.0076
ride	Z	0.0106	0.0209	0.0219	0.0182
	Z	1.417	1.380	0.833	0.861
	Z	0.0013	0.0008	0.0290	0.0007
esium	Z	0.310	0.320	0.170	0.230
inese	Z	0.1250	0.0500	0.0500	0.0500
ary, Total	Z	<0.0001	<0.0001	<0.0001	<0.0001
denum	Z	0.0016	0.0017	0.0016	0.0016
l	Z	0.0152	0.0313	0.0782	0.0090
ite	Z	0.005	0.004	0.005	0.005
ite	Z	<0.01	<0.01	<0.01	<0.01
esium	Z	1.690	1.660	1.130	1.250
ium	Z	0.0007	0.0007	0.0006	0.0006
er	Z	<0.0001	<0.0001	<0.0001	<0.0001
um	Z	0.584	0.365	0.942	0.604
ite	Z	0.183	3.060	1.069	1.587
ium	Z	0.0047	0.0075	0.0043	0.0057
	Z	0.0116	0.0180	0.0092	0.0094
-210 pCi/g		9.5	36.9	10.8	5.0
-226 pCi/g		4.0	9.4	3.3	6.6
-230 pCi/g		2.8	71.4	26.5	39.9
um	Z	0.0019	0.0045	0.0009	0.0013



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AUC RESOURCES Company

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CRYSTALIZED SALTS ANALYSES

Telephone 505/265-4421

PARAMETER		ABOVE PUERCO CONFLUENCE (8-14-79)
minum	%	3.000
onia	%	0.007
enic	%	0.0010
ium	%	0.0940
arbonate	%	1.069
on	%	<0.0001
mium	%	0.0009
cium	%	0.011
cride	%	0.328
omium	%	0.0036
alt	%	0.0014
per	%	0.0061
nide	%	0.0084
oride	%	0.0039
n	%	1.889
d	%	0.0004
cesium	%	0.300
ganese	%	0.2750
cury, Total	%	<0.0001
ybdenum	%	0.0009
xel	%	0.0053
rate	%	0.003
rite	%	0.01
assium	%	0.363
anium	%	0.0007
ver	%	<0.0001
ium	%	0.693
ate	%	8.534
idium	%	0.0089
	%	0.0164
l-210	pCi/g	38.4
um-226	pCi/g	15.9
ium-230	pCi/g	124.4
ium	%	0.0079

TAILINGS DAM BREACH
SURFACE WATER SAMPLES

Sampling Date: 2-16-79	1.5 mi. upstream at Ford in Road	1.5 mi. upstream at Kitterfall	4.5 mi. downstream at Pinedale Road Crossing 565 Bridge	5 mi. downstream North East of El Paso Refinery	13 mi. downstream 16 mi. downstream at Hoback East of Gallup	36 mi. downstream at Veach Station E. of Arizona Border
Aluminum (mg/l)	<0.2	<0.2	1037.0	1037.0	781.0	789.3
Arsenic (mg/l)	0.008	0.005	0.008	0.010	0.012	0.010
Boron (mg/l)	1.67	1.47	0.88	0.69	0.39	0.59
Calcium (mg/l)	0.004	0.004	0.002	0.058	0.063	0.067
Chloride (mg/l)	26.9	24.1	151.0	161.7	190.0	196.0
Chloride (mg/l)	19.4	13.3	5513.6	2322.7	3515.0	282.0
Copper (mg/l)	<0.02	<0.02	1.57	1.51	1.20	1.01
Cobalt (mg/l)	0.09	0.08	0.785	0.619	0.593	0.632
Conductivity (umhos/cm) 25°C	650	620	35,000	20,400	13,500	12,800
Copper (mg/l)	<0.01	<0.01	4.2	3.5	2.1	2.1
Cyanide (mg/l)	<0.01	0.02	0.13	0.23	0.12	0.33
Fluoride (mg/l)	0.30	0.26	27.3	22.5	14.0	11.7
Iron (mg/l)	<0.04	<0.04	2218.0	1751.0	939.5	7025.0
Lead (mg/l)	<0.05	<0.05	0.55	0.52	0.16	0.16
Magnesium (mg/l)	9.15	10.23	1038.00	959.0	879.0	929.0
Manganese (mg/l)	<0.01	<0.01	73.00	75.00	92.00	96.03
Polythene (mg/l)	0.17	0.17	0.56	0.50	0.14	0.08
Mercury Total (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Nitrogen (Nitrate) (mg/l)						
Potassium (mg/l)	4.61	2.76	95.9	96	87.6	88.5
pH	8.87	8.90	1.40	1.41	2.59	2.59
Selenium (mg/l)	0.016	0.015	0.081	0.051	0.013	0.011
Silver (mg/l)	<0.01	<0.01	0.15	0.12	0.09	0.09
Sodium (mg/l)	7364.0	2406.0	7701.0	11,755.0	6369.0	10,660.0
Sulfate (mg/l)	125.9	133.5	27,372.6	20,018	16,164.0	14,540.0
Total Dissolved Solids (mg/l)	430.0	434.0	41,108.0	43,291.0	29,410.0	25,676.0
Nitric (mg/l)	<0.04	<0.04	3.00	3.00	3.06	2.90
Vanadium (mg/l)	<0.1	<0.1	58.3	55.3	27.0	7.3
Zinc (mg/l)	0.006	0.009	10.400	11.960	8.500	8.850
Total Uranium (mg/l)	0.71	0.79	6.49	7.49	6.81	6.37
Radium-226 (pCi/l)	2.5	5.5	100.2	545.9	53.0	23.0
Thorium-230 (pCi/l)	32.8	19.3	8095.5	10.1	7428.9	47,862.9
Gross Alpha (pCi/l)	303	209	122	4331.0	4067.5	4328.0
Hardness (mg/l)	104.8	10.2	4654.4	4351.0	4067.5	4528.0
						462.5

TAILINGS DAM BREACH
SURFACE WATER SAMPLES

Sampling Date: 7-19-79	1.5 mi. upstream at Ford In Road	3 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 21 Paso Refinery	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Veach 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)	0.009	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)	<0.004	<0.004	<0.004	<0.004	<0.004	0.005	<0.004
Calcium (mg/l)	10.0	6.0	134.0	153.0	202.0	212.0	134.0
Chloride (mg/l)	21.0	10.9	27.3	45.1	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	0.009	0.116	0.256	0.233	0.116
Conductivity (microhm/cm) 25°C	600	680	1800	1950	3200	3500	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)	2.03	2.83	242.5	450.9	532.1	29.25	4.7
Lead (mg/l)	0.05	0.10	0.09	0.09	0.10	0.10	0.08
Magnesium (mg/l)	11.1	17.0	33.6	41.0	90.3	123.0	100.0
Manganese (mg/l)	1.1	0.53	3.2	4.2	15.8	31.1	14.7
Nitrate (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	8.63	5.07	4.48	5.62	6.28	6.00
Selenium (mg/l)	0.017	0.012	0.011	0.014	0.011	0.019	0.011
Silver (mg/l)	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sodium (mg/l)	4607	2523	3121	3403	3515	3587	3623
Sulfate (mg/l)	123.0	165.0	1148	1304	2353	3566	2425
Total Dissolved Solids (mg/l)	442.6	441.0	1743.8	2014.2	3601.6	4015.0	3709.2
Nickel (mg/l)	<0.01	0.08	<0.04	<0.04	0.15	0.10	0.03
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	0.6	20.7	<0.6	<0.6	<0.6
Gross Alpha (pCi/l)	300	365	25	16	10	5	12
Hardness (mg/l)	70.7	85.0	472.7	553.3	1109.8	1210.4	395.1

TAILINGS DRY 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 of El Paso Refinery	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Welch Station E. of Arizona Border
PARAMETERS	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Aluminum (mg/l)	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Arsenic (mg/l)	0.0220	0.0239	0.0125	0.0178	<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	40.91
Chloride (mg/l)	36.2	30.1	18.1	35.2	48.2	48.2	132.6
Copper (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 (microhm/cm) 25°C	550.	670.	1130.	1200.	2600.	2690.	3000.
Copper (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfide (mg/l)							
Fluoride (mg/l)	0.296	0.319	0.520	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
Molybdenum (mg/l)	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Mercury, Total (mg/l)							
Nitrogen (nitrate) (mg/l)							
Potassium (mg/l)	1.47	1.57	3.21	2.75	6.89	5.17	13.76
pH	8.73	8.78	7.49	7.43	6.83	5.54	7.81
Selenium (mg/l)	0.1252	0.1219	0.1254	0.1232	0.1055	0.0502	0.1123
Silver (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Sulfur (mg/l)							
Sulfate (mg/l)	134.3	141.2	465.0	513.6	1938.2	2024.6	1917.6
Total Dissolved Solid (mg/l)	406.0	426.0	902.0	976.0	3274.0	3350.0	1358.0
Nickel (mg/l)	<0.01	<0.01	<0.01	<0.01	0.13	0.08	<0.01
Zinc (mg/l)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Mercury (mg/l)	<0.01	<0.01	0.01	0.03	0.04	0.04	0.03
Total Uranium (mg/l)	0.90	0.86	0.58	0.56	<0.01	<0.01	0.19
Barium-226 (pCi/l)	2.5	3.0	2.8	3.0	2.6	2.6	6.6
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	175.5
Hardness (mg/l)							

TAILINGS DPM BREACH

Sampling Date: 8-04-79

Parameter	1.5 mi. upstream at Ford in Road	1.5 mi. upstream at Waterfall	4.5 mi. downstream at Pinedale Road Crossing	5 mi. downstream at State Road 506 Bridge	13 mi. downstream North East of El Paso Refinery	16 mi. downstream at Hogback East of Gallup	36 mi. downstream at Velje Station E. of Arizona Border
Aluminum (mg/l)	0.737	0.583	0.379	0.140	0.273	0.223	0.723
Arsenic (mg/l)	0.003	<0.001	0.004	0.003	0.003	0.004	0.003
Boron (mg/l)	0.759	0.866	0.464	1.212	1.212	0.463	0.121
Cadmium (mg/l)	0.0007	0.0007	0.0010	0.0012	0.0019	0.0021	0.0021
Calcium (mg/l)	3.24	2.32	14.11	17.41	43.53	41.12	31.78
Chloride (mg/l)	25.0	30.0	20.0	20.0	25.0	30.0	45.0
Copper (mg/l)	0.016	0.011	0.018	0.024	0.034	0.086	0.091
Cobalt (mg/l)	0.041	0.003	0.076	0.002	0.092	0.045	0.022
Conductivity (microhm/cm) 25°C	580	550	940	1010	1830	2000	2420
Copper (mg/l)	0.0073	0.0002	0.0290	0.0083	0.0006	0.0021	0.0138
Cyanide (mg/l)	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride (mg/l)	0.39	0.35	0.80	0.55	0.43	0.57	0.19
Iron (mg/l)	0.152	0.121	0.353	0.209	0.507	0.037	0.135
Lead (mg/l)	0.0231	0.0258	0.0284	0.0400	0.0635	0.0368	0.0228
Magnesium (mg/l)	3.12	3.04	2.45	6.41	26.78	29.11	20.40
Phosphorus (mg/l)	0.0014	0.0012	0.0021	0.0035	0.5812	0.1122	0.7610
Potassium (mg/l)	0.363	0.357	0.417	0.418	0.374	0.397	0.077
Selenium (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Mercury Total (mg/l)							
Nitrogen (Nitrate) (mg/l)							
Nitrate (mg/l)	3.52	2.31	3.44	4.13	7.86	10.31	9.78
pH	8.89	8.87	7.65	7.71	7.43	7.52	7.73
Selenium (mg/l)	0.041	0.012	0.012	0.010	0.007	0.008	0.016
Silver (mg/l)	0.0010	0.0051	0.0032	0.0023	0.0041	0.0076	0.0065
Sodium (mg/l)	3698.0	4043.0	2742.0	2436.0	2572.0	1318.0	3373.0
Sulfate (mg/l)	134.8	140.4	403.4	471.7	1176.9	1374.4	1566.0
Total Dissolved Solids (mg/l)	1294	1320	1698	1792	2750	3122	3560
Nickel (mg/l)	0.007	0.012	0.014	0.008	0.007	0.006	0.008
Vanadium (mg/l)	0.004	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	0.47	0.16	0.08	0.16
Radium-226 (pCi/l)	2.1	2.4	1.0	2.5	3.7	3.0	4.7
Thorium-230 (pCi/l)	34.6	35.5	30.3	8.4	<0.6	<0.6	14.8
Gross Alpha (pCi/l)	210	206	103	89	12	10	7
Barium (mg/l)	18.63	18.31	45.32	66.77	212.24	175.61	89.76

TAILINGS DAM BREACH

Sampling Date: Aug. 2, 1972

PARAMETERS

	1.5 ml. upstream at Ford In Road	.5 ml. upstream at Waterfall	4.5 ml. downstream at Pinedale Road Crossing	5 ml. downstream at State Road 566 Bridge	13 ml. downstream North East of El Paso Refinery	16 ml. downstream at Mogback East of Gallup	36 ml. downstream at Veach Station E. of Arizona Border
Aluminum (mg/l)	0.330	0.076	0.189	0.223	0.160	1.091	0.843
Arsenic (mg/l)	0.005	0.007	0.033	0.023	0.024	0.030	0.016
Boron (mg/l)	0.0372	0.668	0.231	1.011	1.003	0.312	0.079
Calcium (mg/l)	0.6007	0.0004	0.0005	0.0007	0.0006	0.0007	0.0005
Calcium (mg/l)	7.8	6.7	71.4	44.9	267.2	193.3	97.4
Chloride (mg/l)	11.5	13.7	17.0	18.7	30.9	28.6	35.2
Chromium (mg/l)	0.007	0.669	0.003	0.007	0.005	0.009	0.010
Cobalt (mg/l)	0.013	0.015	0.019	0.023	0.021	0.026	0.032
Conductivity (microhm/cm) 25°C	650	580	1110	1190	2130	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	0.31	0.44	0.39
Iron (mg/l)	0.114	0.011	0.004	0.024	0.018	0.074	0.011
Lead (mg/l)	0.024	0.025	0.037	0.042	0.005	0.058	0.055
Magnesium (mg/l)	6.1	5.3	15.1	15.3	36.9	41.6	31.1
Manganese (mg/l)	0.0015	0.0010	0.0095	0.0021	0.0210	0.0131	0.7010
Nickel (mg/l)	6.267	0.254	0.283	0.763	0.226	0.212	0.161
Mercury, Total (mg/l)	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Microselenium (mg/l)							
Potassium (mg/l)	0.6	1.1	8.3	1.7	9.1	3.6	3.8
Sulfate (mg/l)	8.83	8.87	5.03	7.94	7.69	7.57	7.84
Selenium (mg/l)	0.005	0.007	0.035	0.030	0.034	0.041	0.023
Silver (mg/l)	0.0065	0.0055	0.0015	0.0038	0.0026	0.0046	0.0022
Sodium (mg/l)	2999.4	3171.0	2524.7	2136.5	2102.5	1595.0	1789.1
Sulfate (mg/l)	132.0	152.0	457.0	522.8	1204.6	1818.6	1178.8
Total Dissolved Solids (mg/l)	530	604	1010	1083	2112	3608	2624
Uchiel (mg/l)	0.006	0.009	0.004	0.003	0.005	0.006	0.007
Vanadium (mg/l)	0.072	0.064	0.059	0.045	0.048	0.054	0.061
Zinc (mg/l)	0.0041	0.0032	0.0084	0.0071	0.0035	0.0021	0.0031
Total Uranium (mg/l)							
Uranium-236 (mg/l)	0.85	6.89	0.65	0.34	0.23	0.17	0.12
Uranium-238 (mg/l)	2.6	4.1	<0.6	0.9	0.8	2.7	1.3
Uranium-239 (mg/l)	20.6	25.4	11.8	14.7	9.8	<0.6	11.8
Gross Alpha (mg/l)	293	364	167	73	34	12	7
Barium (mg/l)	41.8	38.5	240.4	173.5	806.6	653.9	371.2



BRUCE KING
GOVERNOR

STATE OF NEW MEXICO

OFFICE OF THE GOVERNOR

SANTA FE

87503

August 21, 1979

Mr. John Duboise, President
Manuelito Charter
The Navajo Nation
P. O. Box 1254
Window Rock, Arizona 86515

Dear Mr. Duboise:

The State of New Mexico has been actively following up the spill of radioactive material with several courses of action. Copies of the state orders and news releases are attached for your information.

Direct action by State of New Mexico included the following:

1. Issued order on July 16, 1979 prohibiting use of tailings dam.
2. Issued advisory against use of Rio Puerco water for domestic, livestock and irrigation.
3. Issued order on July 18, 1979 directing clean-up.
4. Issued order on July 18, 1979 prohibiting use of dam until State Engineer's office had reviewed the cause of dam failure and plans for rebuilding.
5. Issued order on August 8, 1979 stopping additional construction raising the existing dam structure.
6. Issued order on August 13, 1979 covering clean-up criteria and sampling procedures.
7. Provided state laboratory support for sample analyses and funds for commercial laboratory analyses.

Other action requested by State of New Mexico:

1. Nuclear Regulatory Commission was advised of the failure on July 16, 1979 and provided the following support:
 - a. Geo-Technic Engineer for on-site visit for consultation and advice July 18-20, 1979.
 - b. Offered assistance of the federal laboratory in Idaho for sample analyses which was accepted by the state.

- c. Provided two additional consultants for review and advice on August 6, 1979.
 - d. Provided consultative advice and assistance of clean-up criteria.
 - e. Provided a member of the IIRC Regional office to assist in sampling on July 18-20, 1979.
2. Environmental Protection Agency was advised of the dam breach on July 16, 1979 and provided the state the following assistance:
 - a. Provided an aircraft mission on July 16, 1979 for aerial photos of the dam breach and Rio Puerco.
 - b. Provided assistance with sampling in Gallup area.
 - c. Provided assistance with developing clean-up criteria through coordination with headquarters IIRC.
3. U. S. Army Corps of Engineers, Albuquerque District was requested to provide assistance on evaluation of the dam breach. The Corps had members of its organization visit the site on July 19, 1979 and provided technical advice on investigative areas concerning the dam stability and safety. They will provide assistance for the stability evaluation of the dam and also investigate the stability and safety of the existing tailings dam.
4. The state has also asked the Center for Disease Control to review the potential health effects to determine if any additional action of follow-up programs are warranted.

Additional cooperative assistance involving the State of New Mexico:

1. Supported UHC offer of drinking water and stock water in the local potentially affected area of the Rio Puerco.
2. Advised the State Veterinarian that testing animals by the Indian Health Service was a prudent course of action.
3. Advised the Indian Health Service that doing tests on people concerned about potential health effects was certainly within their prerogative.

The actual loss of tailing solution was approximately 95 million gallons and 1100 tons of solid material. Sampling results to date has not indicated that

August 21, 1979

any acute health problems exist. The Health and Environment Department has asked the Center for Disease Control to review the potential for very long term health effects.

Sincerely,

BRUCE KING
Governor

BK/gsg

Attachments



BRUCE KING
Governor

STATE OF NEW MEXICO
NATURAL RESOURCES DEPARTMENT
WATER RESOURCES DIVISION

S. E. Reynolds, State Engineer
Paton Memorial Building
Santa Fe, New Mexico 87503
(505) 827-2526

September 13, 1979

SEP 14 1979

TO THE DIRECTOR

Mr. D. D. Turberville
Vice President
Mining and Milling Division
United Nuclear Corporation
Post Office Box 3951
Albuquerque, New Mexico 87110

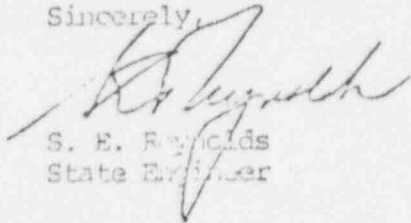
Certified-Return
Receipt Requested

RE: File No. 3346

Dear Mr. Turberville:

Upon review of several reports on recent inspections of tailings dams I have concluded that henceforth all dams being constructed by the use of tailings or otherwise to impound mill discharges must be considered dams under construction which must be under the supervision of a registered professional engineer as provided by Section 72-5-9, NMSA 1978 (copy attached). It is hereby ordered that by October 31, 1979 the qualifications of a professional engineer registered in New Mexico who will supervise the continuing construction of United Nuclear Corporation's tailings dam be submitted to the State Engineer for approval.

Sincerely,


S. E. Reynolds
State Engineer

SER*hl
Attachment

cc: William S. Huey
Col. Bernard J. Roth
Tom Baca



STATE OF NEW MEXICO
NATURAL RESOURCES DEPARTMENT
WATER RESOURCES DIVISION

S. E. Reynolds, State Engineer
Oroon Memorial Building
Santa Fe, New Mexico 87503
(505) 827-2526

September 13, 1979

Mr. Billy Stevens, Manager
Ambrosia Lake Facility
Kerr-McGee Nuclear Corporation
Post Office Box 218
Grants, New Mexico 87020

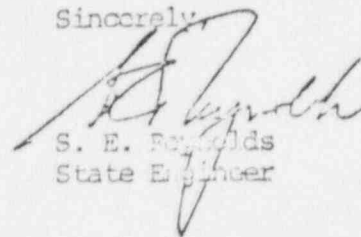
Certified-Return
Receipt Requested

Re: File 2950

Dear Mr. Stevens:

Upon review of several reports on recent inspections of tailings dams I have concluded that henceforth all dams being constructed by the use of tailings or otherwise to impound mill discharges must be considered dams under construction which must be under the supervision of a registered professional engineer as provided by Section 72-5-9, NMSA 1978 (copy attached). It is hereby ordered that by October 31, 1979 the qualifications of a professional engineer registered in New Mexico who will supervise the continuing construction of Kerr-McGee Nuclear Corporation's tailings dam be submitted to the State Engineer for approval.

Sincerely,



S. E. Reynolds
State Engineer

SER*pat
Attachment

cc: Mr. William S. Huey
Colonel Bernard J. Roth
Mr. Tom Baca



STATE OF NEW MEXICO
NATURAL RESOURCES DEPARTMENT
WATER RESOURCES DIVISION

S. E. Reynolds, State Engineer
Dorson Memorial Building
Santa Fe, New Mexico 87503
(505) 827-2526

September 13, 1979

Mr. William P. Biava
Manager of Milling
Bokum Resources Corporation
Post Office Box 1833
Santa Fe, New Mexico 87501

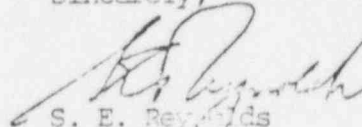
Certified-Return
Receipt Requested

Re: File 3398

Dear Mr. Biava:

Upon review of several reports on recent inspections of tailings dams I have concluded that henceforth all dams being constructed by the use of tailings or otherwise to impound mill discharges must be considered dams under construction which must be under the supervision of a registered professional engineer as provided by Section 72-5-9, NMSA 1978 (copy attached). It is hereby ordered that by October 31, 1979 the qualifications of a professional engineer registered in New Mexico who will supervise the continuing construction of Bokum Resources Corporation's tailings dam be submitted to the State Engineer for approval.

Sincerely,


S. E. Reynolds
State Engineer

SER:pat
Attachment

cc: Mr. William S. Huey
Colonel Bernard J. Roth
Mr. Tom Baca ✓



STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 968, Santa Fe, New Mexico 87503
(505) 827-5271

Thomas E. Baca, M.P.H., Director

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

September 17, 1979

The Honorable Stephen W. Kennedy
State Representative
1703 Gallup Road
Gallup, NM 87301

Dear Representative Kennedy:

Responses to your questions are as follows:

1. The first paragraph of our September 4, 1979, letter explains the EID effort during the first few weeks after the UNC dam breach. Specific individuals directly affected by this spill were contacted. I will see to it that you are informed promptly of EID's activities in the future.
2. Answered by State Engineer's Office.
3. Attached is the first data on clean-up effectiveness by UNC.
4. The following potential health problems exist as a result of the spill:
 - a. Radiologic and chemical contaminants in standing pools can be part of the food chain through animals to man;
 - b. Contaminants can be resuspended after drying and become an inhalation exposure pathway to both man and animals;
 - c. Contaminants can be deposited on soil and translocate (move through) the ground to ground water resources and, if reflooded, be moved to another surface location.

The potential health effects may be estimated by the exposure pathways for alpha emitting particles - potential affected areas are those of the lung and bone. Our potential exposures were estimated to be less than 10 mrem/year to the lung and 25 mrem/year to the bone.

5. and 6. No drinking water supplies are known to be contaminated from the breach solution at this time. Sampling is continuing since there may be long term impacts.

7. The caution signs are considered a prudent precautionary measure and we expect those that can read will accept the responsibility to warn their fellow citizens, particularly those that own livestock.

8. Yes, the upstream data as used for background against which downstream data is compared recognized that water is discharged from both UNC and Kerr-McGee mines.

9. "Mrem", millirem or a thousandth of a rem, is a measure of the amount of radiation to which an individual is exposed. Mrem/year is the dose rate, i.e., amount of radiation received in a year's time.

Radiation, such as an alpha particle radiation, causes damage to man by transferring energy from the particle to living tissue. A rem is a measure of the amount of energy per unit mass that the tissue receives.

The type of radiation is also taken into account. It has been found that some forms of radiation, such as alpha, are much more destructive than other forms, such as beta or gamma, in causing damage. Energy from alpha radiation is usually weighted by a factor of 10 with respect to beta and gamma energies to adjust for this.

The unit rem combines energy absorbed by the tissue per unit mass with type of radiation to arrive at a measure of radiation dose.

10. It is unknown how soon the radium-226 and thorium-230 will "stabilize" and it is not known what is meant by this term. Radium-226 in the soil appears to follow a more consistent pattern but thorium-230 appears to be more erratic. Additional soil sampling is the only method usable to monitor and ascertain the locations and amount of radioactivity. (See UNC clean-up effectiveness data.) The half-lives for Ra-226 and Th-230 are 1600 and 80,000 years respectively and therefore will not decay away in any short period of time.

11. EID letter dated August 13, 1979, paragraph (7) establishes interim clean-up criteria. This letter is attached for your information.

12. Restoration of the stream bed is proceeding but progress is slow.

13. Clean-up criteria was concurred with by the Nuclear Regulatory Commission by letter dated August 23, 1979.

14. The Indian Health Service has sacrificed a few animals for tissue analysis by two laboratories. The results should be available by the end of September.

15. Available sample results indicate that there will be little or no effects on humans from radiation exposures suffered to date. The major concern is for long term exposure of humans. According to our present understanding, radiation exposures are accumulative. A small radiation exposure acquired over several weeks or months will have little health impact. However, if that same exposure were allowed to persist for twenty or thirty years the impact may be significant. The exposures,

small if suffered only for weeks or months, would build to larger exposures over a long period of years. The clean-up requirements have been based on this long-term consideration.

The principal radioactive contaminant identified to date has been a form of the radioactive element, thorium-230. Thorium can enter the body in various ways, but principally through inhalation or ingestion. Once it enters, a great part of this thorium will be quickly cleared from the body. However, some fraction will remain and enter the blood stream. Thorium will preferentially deposit itself in bone tissue. Therefore, bone is the principal organ at risk from long-term exposure to thorium.

16. Clean-up efforts may be affected by the "lower than upstream" readings for selenium, uranium, and radium, but it cannot be determined at this time what that effect will be.

The "lower than upstream" readings refer principally to water samples. (Soil samples downstream have given mixed results, but they are almost invariably much higher than the upstream samples in at least one radionuclide, thorium-230.) It is not completely clear why some downstream samples are lower than the upstream samples. At this time we can only speculate in the following: The Rio Puerco normally is slightly alkaline. Since the spill it has been acidic. This may lower the solubilities of the radioactive and toxic material in the river water, causing them to drop out of solution. The EID is concerned that, when the river eventually returns to its normal alkaline condition, the radioactive materials will again be soluble and dissolve in the river, increasing the radioactive and chemical content of the stream. The only way to understand what processes are at work is to observe the river through sampling for a period of time sufficient to determine what trends in contaminant concentrations are taking place.

17. EID is not exercising licensing or regulatory authority over uranium mines, only the uranium mills and their associated activities.

17a. EID proposed revisions to the 1973 New Mexico Radiation Regulations governing health and safety at a public hearing May 16-20, 1979. There are no statutory changes desired or considered necessary at this time. However, when a review of the spill is accomplished there may be issues uncovered that will need statutory support.

18. and 19. Answered by State Engineer's Office.

20. There were no EID personnel with recording equipment at the August meeting of the Interim Committee on Energy and Environment.

21. The EID is a regulatory body. The liability for operating in a responsible manner is the responsibility of the company.

22. Effective control of Polycorp necessitated much involvement and an eventual law suit. It was not handled quickly. There is no confusion over

clean-up criteria. Assessments of the radioactivity released during the UNC spill was needed to establish the clean-up criteria.

23a. The EID Order #3 was typed on Friday, August 10, 1979, and signed on August 13, 1979. The date on page 2 was overlooked when the other pages had the date changed to conform with the signature date.

23b. The intent was to give UNC seven days, although four days would have been adequate for a response.

23c. The order was received by UNC on August 13, 1979.

24. EID Order #2 was defined by paragraph 7 of EID letter dated August 13, 1979.

25. See attached UNC weekly reports. Total volume is reported as 15,162 cubic feet as of September 7, 1979.

26. The present clean-up work force is reported by UNC as nominally two 20-man shifts each working day.

27. To my knowledge the Kerr-McGee mine discharge water had no effect on the spill, per se, but keeps the arroyo stream flowing during clean-up the same as UNC mine dewatering operations do.

28. Subparagraph (3) of EID letter dated August 13, 1979, requests chemical analyses of the crystallized salts along the channel bed and is not related to UNC data on spill water. We were aware of UNC data of August 9, 1979.

28a. Water data by UNC was not applicable. Data on salts and soil were required to determine the potential for contamination.

29. Diversion of the stream may be required in order to clean-up the contamination caused by the UNC spill. The licensee, UNC, is responsible for those analyses required in attempting to meet the clean-up criteria as it is responsible for the contamination resulting from the release.

30. Paragraph (7) of EID letter dated August 13, 1979, concerning rainstorms is in force until clean-up is completed. Snow, when melted, results in surface water runoff and will be considered if clean-up extends into the winter season. Snow will not affect the contaminants except when melted.

31. There is no implication from the sentences in the July 27, 1979, EID press release that UNC would be unable to pursue total clean-up efforts until twelve weeks after the spill due to studies. UNC knew the spill solution contained radioactivity and was advised by order on July 18, 1979, that clean-up was to be initiated immediately to prevent further disposal of the contaminants.



STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
P.O. Box 198, Santa Fe, New Mexico 87503
(505) 827-5271

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.
DEPUTY SECRETARY

Thomas E. Baca, M.P.H., Director

September 4, 1979

The Honorable Stephen W. Kennedy
State Representative
1703 Boulder Road
Gallup, NM 87301

Dear Representative Kennedy:

The attached letter from Governor Bruce King to Mr. John DuBoise outlines the action taken by the State of New Mexico on the tailings spill of United Nuclear Churchrock on July 16, 1979. The maximum effort during the first few weeks after the spill by the limited Environmental Improvement Division's staff was directed to evaluating the consequences of the spill, determining the health and safety impacts, assessing radioactivity source problems, evaluating potential exposure pathway analyses and determining cleanup criteria.

The confusion as to the response given by myself to the Legislative Agency Review Committee and that given by Gerald Stuart to the Interim Energy and Environment Committee stems from the fact that the questions were different and didn't relate to the same specific issue. The Interim Energy and Environment Committee asked Mr. Stuart, "Was UNC responsive to the cleanup order issued by the Division?" to which he responded, "I would not characterize UNC as responsive but as somewhat less than desired."

I wholeheartedly agree with Mr. Stuart's statement in that the Division was not happy with the slow response on the part of the Company in formulating and undertaking cleanup activity.

The question asked of me before the Interim Legislative Agency Review Committee related to the Company's overall responsiveness to which I answered that I felt they were generally responsive. The Company promptly shut down the mill and has complied with Environmental Improvement Division's orders to remain closed until the breach in the dam is determined. They have also been responsive in notifying the people most directly affected by the spill and are hiring consultants to determine the cause of the breach.

In summary the Company has cooperated but has been somewhat less than responsive initially in undertaking cleanup measures.

Representative Stephen W. Kennedy
Page -2-
September 4, 1979

Mr. Stuart was addressing a specific issue while I was addressing a more general concern regarding UNC's cooperation.

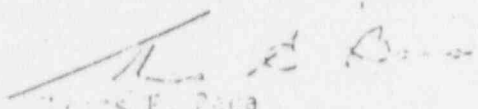
The licensee, UNC Mining and Milling, is responsible for cleanup of their spills of radioactive material. The spill on July 16, 1979 was the largest single release of radioactive material to a water course in history. As such, this release has required very serious and extensive monitoring, sampling and evaluation effort to make certain that health and safety are insured. There is no confusion as to what has to be done concerning the spill or who is responsible for the necessary cleanup action.

The EID has specific responsibilities imposed by the Radiation Protection Act of the State of New Mexico (Sections 74-3-1 through 74-3-16 NMSA 1978) for licensing of radioactive material. "Regulations for Covering the Health and Environmental Aspects of Radiation" were approved by the New Mexico Environmental Improvement Board on June 16, 1973. The EID's action for protection of the health and safety of the people and property of New Mexico is being taken pursuant to the provisions of these statutes and regulations.

We are certainly aware of the economic impacts of the breached dam on your District. When UNC advises the Division of the cause(s) of the dam failure and what they propose to do about the future operation, the EID can then give prompt attention to their proposal. UNC has scheduled several meetings to present the results of their engineering analyses. The first meeting was scheduled on August 17, postponed at UNC's request to August 24, then to August 31, and this date may be delayed until the first week of September. The Division understands that UNC will not discuss proposals for resumption of operation at this time.

If we can be of any additional assistance on this matter, please let me know. I will be in Gallup on September 6, 1979 and will stop by to visit with you.

Sincerely,


Thomas E. Baca
Director

Enclosures



State of New Mexico
House of Representatives

THIRTY-FOURTH LEGISLATURE

Santa Fe

STEPHEN W. KEENEY
BURNLEY COUNTY
District 5

1703 BOWLER ROAD

Home Telephone 722-3543

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GALLUP, NEW MEXICO 87301

August 22, 1979

COMMITTEES:
Vice-Chairman:
VOTERS & ELECTION
Member:
TAXATION & REVENUE
PLANNING & BUDGET

Mr. Tom Baca, Director
Environmental Improvement Division
Health & Environment Department
P. O. Box 958
Santa Fe, New Mexico 87503

Dear Tom:

During the five weeks since the tailings spill at the United Nuclear uranium mill near Churchrock, I have heard only two reports from EID representatives on the consequences and nature of the spill. I was present at a meeting of Churchrock chapter of the Navajo Tribe during the week following the spill. Mr. Trivino of the Gallup office of EID presented information to the chapter at that meeting. On 8-16-79, Gerald Stewart of the Radiation Protection Section of the EID discussed the spill during a meeting of the Interior Energy and Environment Committee, of which I am a member.

My legislative district includes the UNM Churchrock mining and milling operations, the Churchrock chapter, and much of Gallup. For this reason alone, I should have been briefed on the ramifications of the spill. You and your staff have visited with me on several occasions about extraneous EID matters. On the major matter of concern to my legislative district, the EID staffers have not contacted me.

I am also upset by the apparent lack of consistency in the reports given by EID representatives before the Interior Energy and Environment Committee and the Interior Administrative Agency Review Committee. Both legislative committees met in Santa Fe and heard reports from the EID on 8-16-79. In discussing the reports with members of the other committee, I was surprised to learn that the reports did not correspond. UNM was thoroughly criticized before the energy committee while being praised before the review committee for its cleanup efforts. Paradoxical reports from the same agency on the same subject are unacceptable.

Residents and members of the Churchrock chapter are justifiably concerned about the quality of the air and water in the proximity of the Rio Puerco of the West along the path of the spill. They need and deserve a factual explanation of the situation. They also are in need of adequate water for themselves and their livestock. An explanation, factual in nature, is needed regarding the effects of the spill during the past five weeks on their livestock.

Mr. Tom Baca
page 2

United Nuclear also deserves to be treated fairly in this matter. The EID has had a role in the licensure and operation of the UNC Churchrock mine and mill. For that reason, the EID must share in the responsibility for the tailings spill instead of charging United Nuclear with full responsibility for the spill.

Frequently, I hear and read reports of tailings spills from the Holycorp mine near Questa into the Red River. The EID has apparently been able to deal with such spills on short notice. These spills have apparently been cleaned up within a matter of hours, if not a few days.

To this date, the EID appears to be dragging its feet around the circumference of dead center without resolving the problems created by the Churchrock tailings spill. I believe that I am witnessing confused bureaucracy. Should this confusion not cease in the very immediate future, the economy of Churchrock, Gallup and McKinley County will very likely suffer due to a reduction in the UNC workforce at Churchrock. Surely the EID and State Engineer do not believe that UNC can maintain its mining operations indefinitely without its milling operations! Is there any reason why operation of the mill can not be resumed with the utilization of other containment areas for the tailings? If not, then I request that such operations be permitted in the interest of the employment and economy of McKinley County.

If operations can not be resumed prior to the second week of September, then I would like to receive an explanation from the EID on the matter. In any event, I would appreciate receiving an immediate written report on the tailings spill. During the first week of September, I would appreciate receiving an oral briefing on the spill from an EID representative.

I am hopeful that the EID will be more responsive to the various factors which I have outlined in this letter.

Sincerely,

Stephen W. Kennedy
State Representative

cc: John Ables, UNC VP for Environment and Safety Standards
Harvest Bennett, President of Churchrock Chapter
George Goldstein, EID, Secretary for Health and Environment

P. S.: Following completion of this letter, two more questions came to mind:

- 1) Has anyone at the EID or State Engineer's office considered that the Rio Puerco also carries treated water which originates from the Horn-Moore mining facilities adjacent to the UNC operations? Neither the runoff from mine nor the discharge from Horn-Moore can be diverted without other changes!
- 2) Why are people to be placed at 1/2 mile intervals along the banks of the Rio Puerco. Who is going to teach the livestock to swim?



DRUCE KING
Governor

STATE OF NEW MEXICO
NATURAL RESOURCES DEPARTMENT
WATER RESOURCES DIVISION

S.E. Reynolds, State Engineer
Baird Memorial Building
Santa Fe, New Mexico 87503
(505) 827-2526

September 10, 1979

The Honorable Stephen W. Kennedy
State Representative
House of Representatives
McKinley County, District 5
1703 Boulder Road
Gallup, New Mexico 87301

SEP 11 1979
F.A. DODGE

Dear Steve:

Your September 5, 1979 letter to Mr. Thomas E. Baca poses a number of questions about the tailings spill at the United Nuclear Corporation's Church Rock mill and suggests that I might respond to some of the questions. Those questions related to the State Engineer Office are quoted below and followed by my response.

2. What kind of monitors were in existence at the mill site which could have forewarned UNC personnel of the dam breach? If none, are any contemplated for future use?

I am not aware of any installed instrumentation which could have forewarned personnel of the potential breach. A survey which permitted a determination of differential settlement of the dam was made in January 1979. The consulting engineering firms for UNC have recommended a program to monitor settlement, alignment, hydraulic gradient and other performance characteristics of the dam before resumption of operation.

17. What is the role of the EID in licensing and regulating a uranium mine and mill?
 - a. Are statutory changes necessary as a result of the spill?
18. What is the role of the state engineer, pursuant to question 17?

The State Engineer's role is the protection of existing water rights and construction and maintenance of works so that menace to life and property is avoided. I believe the statutory authorities with respect to the State Engineer's role are adequate.

19. What is the reputation of bentonite as a sealing agent for cracks in earthen dams?

Bentonite is the most commonly used sealing agent because of its non-shrinking characteristics and its low permeability.

32. What was the role of the EID and the state engineer in allowing United Nuclear Corporation to not maintain a sand beach in front of the tailings pond dam prior to the breach of 7-16-79?

Maintenance of the sand beach was a recommendation of UNC's consulting engineer in November 1977 after cracking was observed. The State Engineer had no knowledge of that recommendation until after the breach.

35. How does the proposed Bokum tailings pond and dam compare to the breached UNC dam?

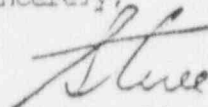
They are similar in design; however, the UNC dam was not constructed with a full sandy shell as designed to provide adequate drainage. Furthermore, foundation at the UNC dam is a compressive alluvial material whereas the foundation at the Bokum dam is a non-compressive Mancos shale.

36. When will the UNC Churchrock mill be allowed to resume operations?

The existing dam must be modified; upon receipt of formal plans and specifications for repair and modification we will give them prompt attention.

Please let me know if further discussion would be helpful.

Sincerely,



S. E. Reynolds
State Engineer

SER:pat

cc: Mr. Thomas E. Baca, Director, EID ✓
Mr. Charles N. Ofelt, UNC
Mr. Earnest Becenti, Churchrock Chapter President
Mr. Paul McCollum, Gallup City Manager



STATE OF NEW MEXICO
ENVIRONMENTAL IMPROVEMENT DIVISION
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Thomas E. Baca, M.P.H., Director

Radiation Protection Section

Bruce King
GOVERNOR

George S. Goldstein, Ph.D.
SECRETARY

Larry J. Gordon, M.S., M.P.H.
DEPUTY SECRETARY

September 21, 1979

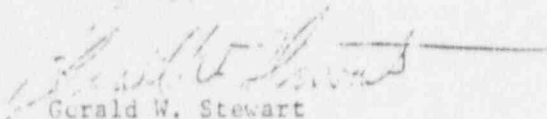
H. J. Abbiss, Vice-President
Environmental and Safety Services
UNC Mining and Milling
P.O. Box 3951
Albuquerque, NM 87190

Dear Mr. Abbiss:

Volume 1, SHH Job. No. E79-1096 contains a section on "Resumption of Operations" and Volume 4, SHJ Job. No. E79-1096, Existing Dam Stability, contains a Section 5.2 "Suggested Concept for the Resumption of Operations".

These sections are considered inadequate for any engineering and technical evaluation. There are significant differences between the two proposed concepts. Therefore, it is requested that a comprehensive technical proposal, including engineering plans and analyses, with operational procedures be prepared and submitted to the Environmental Improvement Division on any proposed interim operation of the tailings impoundment facility.

Sincerely,


Gerald W. Stewart
Program Manager

CWS:ns

2 copies to Head of...
21 Sept 79



State of New Mexico
House of Representatives
THIRTY-FOURTH LEGISLATURE
Santa Fe

STEPHEN W. KENNEDY
McKINLEY COUNTY
District 5
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GALLUP, NEW MEXICO 87301

September 5, 1979

COMMITTEES:
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PRINTING & SUPPLIES

Mr. Thomas E. Baca, M.P.H., Director
Environmental Improvement Division
Health and Environment Department
P. O. Box 968
Santa Fe, New Mexico 87503

Dear Tom:

Following receipt of several letters from United Nuclear Corporation and your letter of 9-4-79, I have a number of questions about the tailings spill at the UNC Churchrock mill.

1. Why have McKinley County legislators not been kept abreast of the developments in this matter by the EID?
- 2. What kind of monitors were in existence at the millsite which could have forewarned UNC personnel of the dam breach? If none, are any contemplated for future use?
3. How thorough is the UNC clean-up effort?
4. What health and safety problems exist with standing pools of water and contaminants from the spill?
5. What effects have been noticed in area drinking water to date?
6. What effect has the spill had on tribal water wells to date?
7. What good are the EID-mandated signs when livestock can not read and some area residents in the vicinity of the spill can not read?
8. In utilizing upstream data as the background against which downstream data is compared, is the discharged water from the Kerr-McGee mines taken into consideration?
9. Define please mrem/yr.
10. How soon will the radium 226 and thorium 230 stabilize?
11. How extensive must the UNC clean-up be?
12. What is the current state of restoration to background radiation levels along the course of the spill?
13. How do the clean-up parameters utilized by UNC compare to generally accepted standards from knowledgeable sources within the nuclear industry, including scientific labs?
14. What is the apparent effect of the spill on livestock?
15. What is the apparent effect of the spill on humans, especially bone tissue?
16. What effect on clean-up efforts does the "lower than upstream" readings for selenium, uranium, and radium 226 have?
(readings of 7-16-79, 7-19-79, etc.)
- 17. What is the role of the EID in licensing and regulating a uranium mine and mill?
 - a. Are statutory changes necessary as a result of the spill?

Mr. Tom Baca
page 2, 9-5-79

- 18. What is the role of the state engineer, pursuant to question 17?
- 19. What is the reputation of bentonite as a sealing agent for cracks in earthen dams?
- 20. Did the EID have a representative present with a tape recorder at the August meeting of the interim committee on Energy & Environment?
- 21. Why is the EID not also responsible for the clean-up operation in terms of manpower?
- 22. Why has confusion occurred over clean-up procedures mandated by the EID when the Molycorp spills near Questa are handled as a matter of course in a quick and effective manner?
- 23. re EID order # 3
 - a. Why is page 1 of your letter dated 8-13-79 (a Monday), page 2 dated 8-10-79 (a Friday) and the last two pages dated 8-13-79?
 - b. Was the intent to give UNC four days or seven days to implement this order?
 - c. When was this order received by UNC?
- 24. re EID order # 2, please define "recover to the extent practicable".
- 25. What volume of contaminants have been cleaned up to date?
- 26. What is the magnitude of the UNC work force assigned to clean up the spill?
- 27. What effect does Kerr-McGee water have on the spill and clean-up?
- 28. Was your office aware of the UNC data dated 8-9-79 regarding the chemical content of spill water samples in light of subparagraph 3 (3) in your letter of 8-13-79?
 - a. Why was there an extension to 8-27-79 for radium 226, lead 210, and thorium 230 when the accumulation of these elements was reported in a UNC spill water sample survey dated 8-9-79?
- 29. re subparagraph five (5) of your letter of 8/10-13/79, why is UNC required to bear the burden for an analysis of future water discharge northward into the San Juan Basin when Kerr McGee water is also a factor?
- 30. re subparagraph six (6) of the same letter, what is the duration of the sampling order for rainstorms of 0.1 inch or more? Are snowstorms considered as rainstorms for this purpose? What effect will snow have on the contaminants along the path of the spill?
- 31. re the EID news release of 7-27-79, is the EID suggesting in the final paragraph of the release that UNC will be unable to pursue total clean-up efforts until nearly twelve weeks after the spill due to necessary studies?
- 32. What was the role of the EID and the state engineer in allowing United Nuclear Corporation to not maintain a sand beach in front of the tailings pond dam prior to the breach of 7-16-79?
- 33. What role is Mother Nature taking in the clean-up campaign?
- 34. Who supplied Jack Anderson, syndicated columnist, with the material which he quoted in his nationwide radio broadcast? What role has the EID had in supplying current facts and information about the spill to the public, both directly and through the news media?
- 35. How does the proposed Behm tailings pond and dam compare to the breached UNC dam?
- 36. When will the UNC Churchrock mill be allowed to resume operations?

Mr. Tom Baca
page 3, 9-5-79

It has been extremely difficult for me to answer questions posed of me by constituents when I have not been fully informed of the magnitude of the tailings spill. During the past two weeks, I have been receiving significant information from UNC, and most recently from you.

As I suggested in my previous letter to you, the economies of Churchrock, Gallup, and McKinley County are significantly effected by the UNC operations at Churchrock. The Gallup-McKinley County school district and the State of New Mexico also realize considerable tax revenue from this operation. The full valuation of the facility, according to McKinley County tax records, is \$61.5 million. The assessed valuation is \$21.5 million. This generates a minimum of \$1.29 million in ad valorem taxes under the twenty mill levy.

Consideration must be given immediately to the employment future of UNC personnel. Surely the state does not expect UNC to continue operations without the milling capacity at Churchrock! The EID and state engineer should give immediate consideration of the economic impact of the UNC Churchrock operations upon the McKinley County payroll, income taxes, property taxes, severance taxes, and other revenue generated by the facility. A closed facility will be of very little benefit to the various parties concerned.

Perhaps the bottom line in this matter is the current and future impact of the spill upon the public health, welfare, and safety of the people of the State of New Mexico. I appreciate the time which you, Bill, and Russell took to meet with me in Gallup. I look forward to your written reply to my questions. Perhaps the State Engineer could assist in answering questions not in your jurisdiction.

Should any other individuals wish a copy of your written responses to my questions, please feel free to provide them.

Sincerely,

Steve (9-6-79)
Stephen W. Kennedy
State Representative

cc: Charles N. Ofelt, UNC
Steve Reynolds, State Engineer
Earnest Becenti, Churchrock Chapter President
Paul McCollum, Gallup City Manager

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Fe
J Kam
Rosa
8/2

Status Report on Sampling Program To
Determine the Environmental Impact of the United
Nuclear Corporation Mill Tailings Spill

Environmental Improvement Division
New Mexico Health and Environment Department

August 20, 1979

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DUPLICATE