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Atlas Minerals
Division of Atlas Corporation
P. O. Box 488
Moab, Utah

R. F. HOLDS
Vice President - Milling

January 28, 1964

Mr. Donald A. Nussbaumer, Chief
Source and Special Nuclear Materials Branch
Division of Licensing and Regulation
United States Atomic Energy Commission
Washington 25, D. C.

Reference: DLR:DFH 40-3453

Dear Mr. Nussbaumer:

This report is submitted in accordance with conditions of the November 23, 1963, amendment to Source Material License No. R-161.

The results of the surveys required by the amendment are contained in the following enclosed tables:

Table I	-	Tailings Pond Effluent Survey
Table II	-	Colorado River Survey (Radionuclides)
Table III	-	Colorado River Survey (Flowrates)

The sampling criteria outlined in Condition 2 were satisfied by installing an automatic sampling device on the effluent discharge canal at the point of release from the tailings retention system. This sampler is designed to cut the entire cross-section of the stream regardless of the volume. The cutting frequency is controlled electrically at 20 minutes. Approximately 10 milliliters of sample are taken per cut for each 100 gallons per minute being discharged. The sample is allowed to collect for 24 hours in a 20 liter plastic bottle. At the end of each 24 hour period the sample is picked up, the flowrate determined from a Parshall Weir through which the effluent flows, and an aliquot proportional to the flowrate is added to the monthly composite sample.

As shown in Figure 1, the discharge of suspended solids in the main tailings pond overflow is controlled by utilizing a dike and canal arrangement which allows the selection for decantation of an overflow substantially free of suspended solids. This clarified discharge then flows to two settling basins in series where approximately 48 hours of additional retention time is available for final polishing prior to release to the Colorado River. With this type of system it is possible, if there is no clear solution available in the main tailings pond, to stop the flow completely for several days and allow the solution to clarify.

Condition 5 requires a progress report on efforts to reduce the levels of radioactivity released to unrestricted areas. Initial work in this direction consisted of treating the discharge stream with increasing concentrations of barium sulfate. It soon became apparent that this method would never result in an effluent which met 10 CFR 20 specifications. Laboratory test work conducted during the past summer indicated that in excess of 90% of the soluble radium could be removed from the effluent using barium chloride as the decontaminant. In August, 1963, the installation of equipment necessary for full-scale barium chloride treatment was initiated. This included a storage shed for the dry reagent, a mixing tank, and a large effluent settling basin (approximately 2 million gallon capacity), plus the necessary wiring and piping. On September 20, 1963, we began adding barium chloride to the effluent stream as it entered the final settling basin. The results of the treatment program to date are quite encouraging. However, the system has not operated long enough to evaluate accurately the

long-term efficiency of this program. Some factors which may determine the efficiency of the system are the possible redissolving of precipitated radium from the bottom of the settling basin, the wide fluctuations in the concentration of radium in the main pond overflow (feed to the decontamination system), higher temperatures of the water during the summer months, and variations in the concentrations and kinds of ions in the feed to the decontamination system that result from changes in the character of ore treated and of the river water used for processing of the ore.

On the basis of the data presented in this report, we hereby request that the amendment to Source Material License No. R-161 concerning the discharge of liquid effluents to an unrestricted area be extended to January 31, 1965. In order to make possible the accumulation of analytical and flow information, we also request that the reporting period for the new amendment be calendar 1964.

Very truly yours,

Kerr-McGee Nuclear Corp.

for R. F. Hollis
Vice President - Milling

RFH/bj

Enclosures

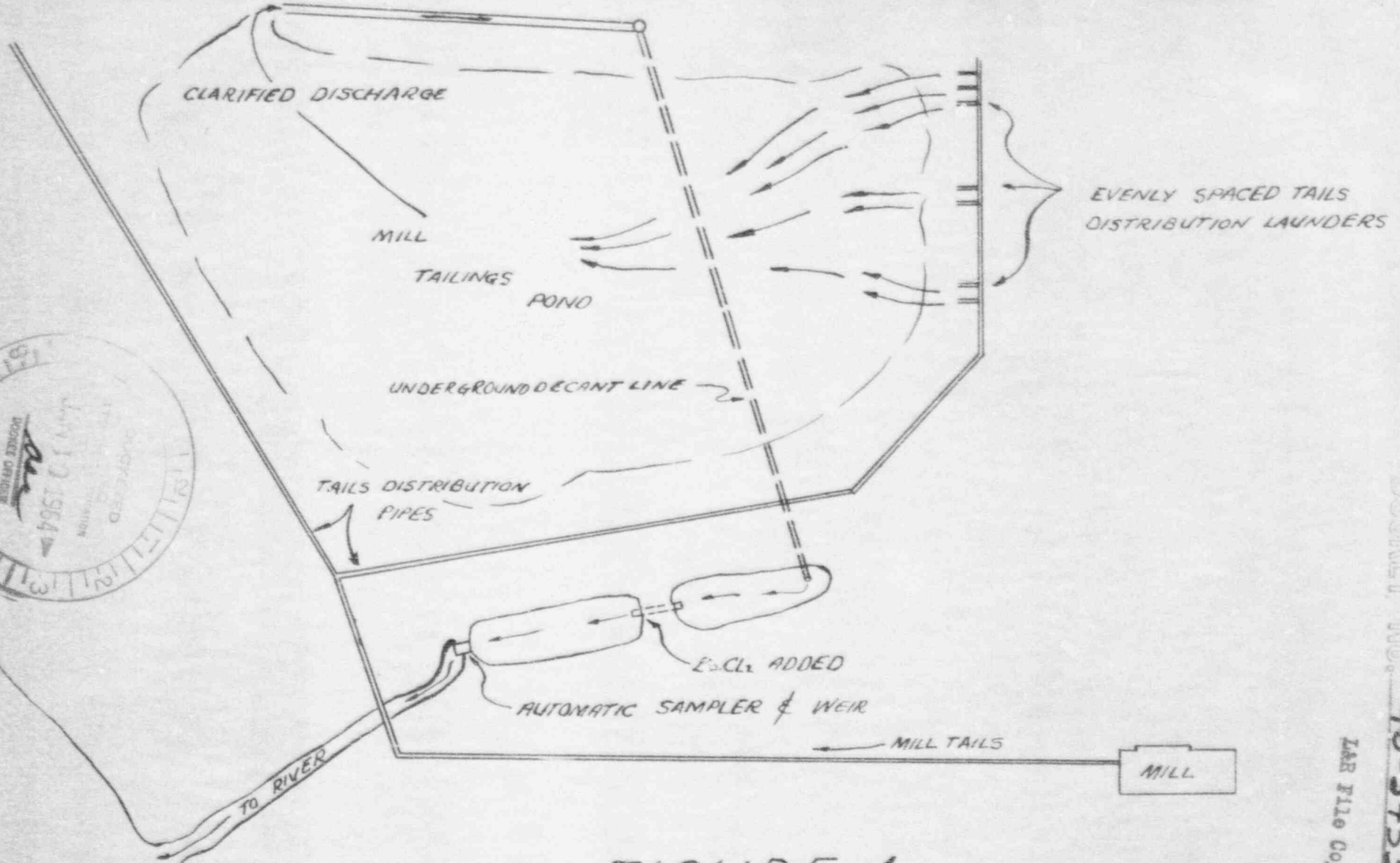

FIGURE 1

ATLAS MINERALS MILL MOAB, UTAH

TAILINGS RETENTION & RADIUM TREATMENT SYSTEM

NOT TO SCALE

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TABLE I

Tailings Pond Effluent Survey for 1963 - Moab Mill

1963 Month	Effluent Flowrate (GPM)		Ra 226 (N x 10^{-8}uc/ml)	Th 230 (N x 10^{-6}uc/ml)	U-Natural (N x 10^{-5}uc/ml)
January	1497	$BaSO_4$ Treatment to September 20th.	2.66	0.009	0.10
February	1477		2.96	0.027	0.12
March	1309		8.53	0.039	0.14
April	1603		9.75	0.043	0.20
May	1256		16.00	0.017	0.16
June	951 1/		3.56	0.006	0.09
July	None		-	-	-
August	547		2.16	0.013	0.11
September	1063		1.62	0.008	0.09
October	1322	$BaCl_2$ Treatment	2.44	0.012	0.09
November	1184		0.21	0.031	0.11
December	1192		0.03	0.028	0.11
Average Flowrate	1217				
Weighted Average Concentrations			4.85	0.023	0.12

1/ Low flowrates in June and August and no flow in July resulted from the annual shutdown of the Moab Mill starting the last week in June.

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TABLE II

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Colorado River Radionuclide Survey for 1963 - Moab Mill

January

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.04	0.029	0.008
1/4 mile below mill	0.04	0.025	0.011
1/2 mile below mill	0.05	0.009	0.011
1 mile below mill	0.07	0.007	0.008
5 miles below mill	0.07	0.004	0.011
10 miles below mill	0.07	0.003	0.008

February

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.08	0.006	0.0004
1/4 mile below mill	0.29	0.004	0.004
1/2 mile below mill	0.15	0.003	0.003
1 mile below mill	0.03	0.004	0.0005
5 miles below mill	0.03	0.004	0.0007
10 miles below mill	0.05	0.003	0.001

March

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.06	0.005	0.0009
1/4 mile below mill	0.28	0.009	0.009
1/2 mile below mill	0.14	0.005	0.003
1 mile below mill	0.04	0.007	0.0006
5 miles below mill	0.02	0.009	0.0006
10 miles below mill	0.03	0.005	0.0006

April

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.09	0.005	0.002
1/4 mile below mill	0.37	0.005	0.019
1/2 mile below mill	0.23	0.004	0.006
1 mile below mill	0.08	0.007	0.001
5 miles below mill	0.08	0.004	0.002
10 miles below mill	0.07	0.007	0.001

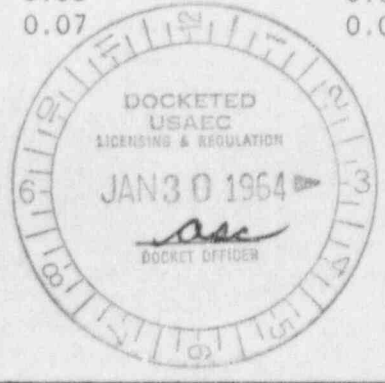

TABLE II

Colorado River Radionuclide Survey for 1963 - Moab Mill

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May

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.08	0.005	0.001
1/4 mile below mill	0.31	0.009	0.001
1/2 mile below mill	0.16	0.008	0.001
1 mile below mill	0.05	0.006	0.001
5 miles below mill	0.06	0.005	0.001
10 miles below mill	0.08	0.005	0.001

June

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.05	0.006	0.0002
1/4 mile below mill	0.06	0.005	0.0002
1/2 mile below mill	0.07	0.004	0.0004
1 mile below mill	0.10	0.004	0.0002
5 miles below mill	0.04	0.005	0.0003
10 miles below mill	0.10	0.005	0.0004

July

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.08	0.007	0.005
1/4 mile below mill	0.01	0.004	0.005
1/2 mile below mill	0.01	0.005	0.004
1 mile below mill	0.02	0.005	0.004
5 miles below mill	0.05	0.005	0.005
10 miles below mill	0.05	0.006	0.005

August

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.27	0.010	0.0006
1/4 mile below mill	0.23	0.006	0.0006
1/2 mile below mill	0.18	0.008	0.0004
1 mile below mill	0.27	0.005	0.0004
5 miles below mill	0.29	0.006	0.0006
10 miles below mill	0.26	0.005	0.0006

TABLE II

Colorado River Radionuclide Survey for 1963 - Moab Mill

Page 3

September

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.09	0.009	0.0005
1/4 mile below mill	0.08	0.007	0.0011
1/2 mile below mill	0.02	0.009	0.0008
1 mile below mill	0.03	0.008	0.0005
5 miles below mill	0.05	0.006	0.0005
10 miles below mill	0.02	0.011	0.0005

October

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile ~~below~~ above mill	0.05	0.008	0.001
1/4 mile below mill	0.05	0.007	0.001
1/2 mile below mill	0.04	0.006	0.002
1 mile below mill	0.04	0.008	0.002
5 miles below mill	0.03	0.009	0.001
10 miles below mill	0.06	0.006	0.002

November

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile ~~below~~ above mill	0.04	0.011	0.001
1/4 mile below mill	0.07	0.013	0.001
1/2 mile below mill	0.01	0.018	0.001
1 mile below mill	0.02	0.014	0.001
5 miles below mill	0.04	0.007	0.001
10 miles below mill	0.02	0.008	0.001

December

Sampling Station	Radium 226 N x 10^{-8} uc/ml	Thorium 230 N x 10^{-6} uc/ml	Natural Uranium N x 10^{-5} uc/ml
1 mile above mill	0.01	0.009	0.0008
1/4 mile below mill	Nil	0.011	0.0007
1/2 mile below mill	Nil	0.010	0.0015
1 mile below mill	0.02	0.013	0.0008
5 miles below mill	Nil	0.005	0.0009
10 miles below mill	Nil	0.005	0.0013

TABLE III

Colorado River Flowrate Survey for 1963

Month	Flowrate (GPM)
January	1,102,778
February	1,336,170
March	1,601,429
April	1,852,326
May	3,771,078
June	2,510,312
July	836,621
August	1,189,851
September	1,377,911
October	975,759
November	1,347,839
December	1,004,484

Flowrates obtained from United States Department of the Interior, Geological Survey, Water Resources Division, as determined at the Cisco, Utah, measuring station.

FROM: Atlas Corporation
Moab, Utah

DATE OF DOCUMENT: 1-26-64
DATE RECEIVED: 1-30-64
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LTR. MEMO: REPORT: OTHER: x & encls.

TO: D. Nussbaumer
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NO ACTION NECESSARY ☐ COMMENT ☐ BY:

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DESCRIPTION: (Must be Unclassified)
Ltr. submitting results of surveys conducted as a condition of lic. amendment dtd. 11-23-62 to R-161...Included:

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Nussbaumer	1-30		
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ENCLOSURES: (2 cys. ea)

Fig. 1 - Tailings Retention & Radium Treatment System dtd. 1-27-64

Tables II; X; & III

REMARKS: Mail Room Distribution:
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ACKNOWLEDGED

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U. S. ATOMIC ENERGY COMMISSION MAIL CONTROL FORM FORM AEC-326S (8-60)

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