

UNITED STATES GOVERNMENT

Memorandum

TO : J. C. Delaney, Chief,
Nuclear Materials Branch
Division of Licensing and Regulation
FROM : R. Rogers, Asst. Dir. for Nuclear Materials Safety
Division of Licensing and Regulation

DATE:

FEB 8 1961

SUBJECT: URANIUM REDUCTION COMPANY, MOAB, UTAH
LICENSE NO. R-161
AUTHORIZATION TO DISCHARGE RADIOACTIVITY IN LIQUID
EFFLUENTS TO UNRESTRICTED AREAS IN EXCESS OF MPC

DLR:CGW

As the result of an inspection of subject licensee's mill on February 24 and 25, 1959, Uranium Reduction was ordered on July 13, 1959, to describe in detail their survey programs which included determining concentrations of Radium 226 discharged to unrestricted areas in liquid effluents. By letter dated August 10, 1959, Uranium Reduction described their liquid effluent survey program which started February 27, 1959. They expressed their intentions of applying for an exemption to Section 20.103(b) for liquid effluents after gathering data for a period of one year.

In a letter dated February 25, 1960, the licensee requested a year extension of their liquid effluent sampling program which was proposed in their August 10, 1959, letter. Their reasons for desiring the extension were to determine the effect on concentrations of radioactivity in liquid effluents of the following: (1) conversion of the plant to a combined acid leach - alkaline leach process and (2) analytical procedures were giving erroneous results for thorium.

During the follow-up inspection of the mill on May 12, 1960, it was observed that the licensee was discharging Radium 226 in liquid effluents to unrestricted areas in excess of the MPC.

On August 9, 1960 representatives of the Division of Licensing and Regulation, IIO Inspection Division, U. S. Public Health Service and Utah State Health Department visited the mill to review waste treatment procedures. DLR representatives made specific recommendations as a result of their findings.

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By letter dated November 29, 1960, Uranium Reduction made formal application to DLR for authorization to discharge Radium 226 in liquid effluents to unrestricted areas in excess of Commission limits. The following information has been extracted from the letter of application:

1. Average concentrations of nuclides in tailing pond effluents over a ten-month period were:

<u>Nuclide</u>	<u>Average Concentration</u>
Radium 226	32.1×10^{-9} microcurie/milliliter
Thorium 230	1.0×10^{-8} microcurie/milliliter
Uranium-Natural	2.6×10^{-6} microcurie/milliliter

Note: Both Thorium and Uranium are below MPC.

2. Average volume of pond effluent discharged to the Colorado River over a ten-month period was 1219 gallons per minute.
3. Colorado River flow for nine-year period was:
 - a. 6,143,599 GPM for mean average, and
 - b. 1,343,800 GPM for mean of 8-month lows
4. Assuming Radium 226 concentration in effluent as 40.0×10^{-9} and using an effluent flow rate of 1219 GPM, the increase in Radium 226 concentrations in the river following complete mixing would be:
 - a. For 9-year mean average river flow - 0.008×10^{-9} microcurie/milliliter or $0.0005 \times$ MPC
 - b. For 9-year mean of average 8-month lows - 0.036×10^{-9} microcurie/milliliter or $0.009 \times$ MPC

Note: The licensee states that the average yearly concentration of Radium 226 in the tailings pond effluent is not expected to exceed 40.0×10^{-9} μ c/ml.

5. Average concentrations of Radium 226 in river water over a ten-month period were:

5. - Continued:

<u>Location</u>	<u>Concentrations in microcuries/milliliter X 10⁹</u>
Colorado above Dolores	0.8
Dolores above Colorado	2.8
Colorado below Dolores	0.9
Colorado at Moab Bridge	0.9
Colorado 1/4 mile below mill	1.1
Colorado 1/2 mile below mill	1.5
Colorado 1 mile below mill	0.9
Colorado 5 miles below mill	1.3
Colorado 10 miles below mill	1.8
Colorado 20 miles below mill	2.0
Colorado 30 miles below mill	0.9
Colorado 20 miles above confluence	3.0
Colorado 1 mile above confluence	2.9
Green River above confluence	0.5
Colorado below confluence	1.5

The above data indicate that over the ten-month sampling period waters in the Dolores, Green and Colorado Rivers at points sampled were below MPC for Radium 226 in unrestricted areas. Further, the increase in river radium concentrations produced by effluent discharge appears to have been insignificant over the ten-month period.

Based on these findings, it is concluded that an authorization to continue discharging liquid effluents to unrestricted areas should be granted with the following conditions:

1. The effluent stream at the point of release to unrestricted areas shall be substantially free from radioactive materials contained in suspended solids and shall not contain (a) concentrations of Radium 226 in excess of 4×10^{-8} microcuries/milliliter, averaged over one-year, and 8×10^{-8} microcuries/milliliter averaged over any thirty-day period; and (b) concentrations of radioactive materials, other than Radium 226, in excess of the values listed in Appendix B, Table II, 10 CFR 20.

- * 2. The effluent stream shall be sampled continuously, or semi-continuously at no greater than hourly intervals. Effluent samples shall not be composited, for purposes of analysis, over periods of greater than one month.
3. Records of surveys of pond effluents and waters from the Colorado River ~~must~~ provide data sufficient for estimating the effect of the effluent discharge on concentrations of radionuclides in unrestricted areas.
4. The volume of effluent discharged to unrestricted areas shall not exceed a flow of 1300 GPM averaged over a period of one year.
- * 5. The blue-green algae which has formed over the surface of the tailings ponds shall be analyzed for Radium 226 concentrations. If the algae is found to be concentrating radium, appropriate steps shall be taken to prevent its release to unrestricted areas.
- * 6. The authorization shall be for a period of one year.
7. At the end of the authorization period, a report shall be made to the Commission on the Uranium Reduction Company's evaluation of means of reducing the concentrations and quantities of Radium 226 being discharged to unrestricted areas.
8. Authorization to continue similar disposal practices after the one year period ~~should~~ be reevaluated in light of new data gathered during this period and any new developments in milling or disposal technology.

* These items are modifications of the recommendations made by DLR representatives following their August 9, 1960 visit to the mill.

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