

COMPLIANCE INSPECTION REPORT

1. Name and address of licensee
Uranium Reduction Company
557 First Security Building
Salt Lake City, Utah
(Moab, Utah)

2. Date of inspection
February 24 and 25, 1959

3. Type of inspection Follow-up

4. 10 CFR Part(s) applicable
20 - 40

5. License number(s), issue and expiration dates, scope and conditions (including amendments)
R-161, Amendment No. 3 (renewed in its entirety) Issued: 10/10/58 Expires: 4/1/62

Scope:

"To receive possession of and title to raw source material, without limitation as to quantity, from producers and distributors thereof licensed by the Atomic Energy Commission to transfer and deliver possession and title to such material, for processing at your plant at Moab, Utah, in accordance with Contract Number AT(05-1)-266 between Uranium Reduction Company, First Security Bank of Utah as trustee and the Atomic Energy Commission.

"To receive, transfer, or deliver possession or title to refined source material, in the form of uranium concentrates, from or to persons appropriately licensed by the Commission for resale to the Atomic Energy Commission."

Conditions:

"you are required to maintain records of your inventories, receipts and transfers of refined source material.

"This license is subject to all the provisions of the Atomic Energy Act of 1954 now or hereafter in effect and to all valid rules and regulations of the U. S. Atomic Energy Commission, including 10 CFR 20, 'Standards for Protection Against Radiation', except

(Continued)

6. Inspection findings (and items of noncompliance)

Since the initial inspection was made, the licensee has formulated, and has begun to put into operation, a program for surveying the mill to determine their degree of compliance with the regulations and to assess hazards to which their employees may be subjected. Measurements to determine existing radiation levels in and around the mill and dosages to some of the employees from external radiation, by means of film badges, have been made (Par. 12 and 13). Measurements of concentrations of airborne uranium have been made in some areas (Par. 14 and 15). The problem of radioactive materials in liquid effluents released into unrestricted areas has been acknowledged and a program for achieving information on the concentrations is being formulated (Par. 16 and 17). Adequate signs have been placed at entrances to the mill to conform with those required by their license (Par. 19).

The following items of noncompliance were found or observed during the inspection:

10 CFR 20.201 Surveys

(b) The determination of dosages to personnel from external radiation has not been completed (Par. 13).
The determination of concentrations of airborne radioactive materials has not been completed (Par. 14).
The program for determining concentrations of radioactive materials in liquid wastes released into unrestricted areas has been formulated but not initiated (Par. 17).

7. Date of last previous inspection
December 10, 1957

8. Is "Company Confidential" information contained in this report? Yes ☐ No ☒
(Specify page(s) and paragraph(s))

DISTRIBUTION:

Insp. HQ (3)
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Donald I. Walker

(Inspector)

Approved by:

Donald I. Walker, Director

Division of Licensee Inspection
Idaho Operations Office

(Operations office)

9612200041 590330
PDR ADOCK 04003453
C PDR

March 30, 1959

(Date report prepared)

If additional space is required for any numbered item above, the continuation may be extended to the reverse of this form using foot to head format, leaving sufficient margin at top for binding, identifying each item by number and noting "Continued" on the face of form under appropriate item.

RECOMMENDATIONS SHOULD BE SET FORTH IN A SEPARATE COVERING MEMORANDUM

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9. The initial inspection of the Uranium Reduction Company's uranium mill at Moab, Utah, was conducted on December 10, 1957. The items of noncompliance which were reported for that inspection were:
- 10 CFR 20.201 Surveys
 - (b) The licensee had performed no surveys of the possible hazards existing in the mill.
 - 10 CFR 20.203 Caution signs, labels and signals
 - (e)(2) Areas within the mill having amounts of uranium in excess of specified limits have not been posted.
 - (f)(2) Containers within the mill having amounts of uranium in excess of specified limits have not been marked.
10. A follow-up inspection of the licensee was conducted on February 24 and 25, 1959. The writer was accompanied by D'Arcy George, Metallurgical Engineer, Technical Services Branch, Division of Source Material Procurement, Grand Junction Operations Office. Licensee personnel contacted were Roy F. Hollis, General Manager, Theodore Izzo, Chief Metallurgist, and B. B. Winn, Plant Metallurgist.
11. Since the initial inspection approximately 14 months ago, the licensee has initiated a series of surveys to determine the radiation levels in various areas of the mill and its environment under the direction of Mr. Winn. An initial sampling of the atmosphere in various areas of the mill to determine the concentrations of airborne radioactive material has also been made. Verbal reports on the concentrations of radium in liquid effluents released into unrestricted areas, performed by the Winchester Laboratory, have been received by the licensee. No written report of the results has yet been obtained.

EXTERNAL RADIATION

12. To determine the existence of, and evaluate, radiation levels within the mill, 124 areas were surveyed by the licensee using a Precision Instrument's scintillator, Model SBX-111B. The radiation survey was performed by Thomas Donnard of the analytical laboratory. Of the 124 areas in which the radiation levels were measured, all were below 1 mr/hr with the following exceptions. In the area of the ore pad where the ore is fed to the grizzly, radiation levels of 1.4, 2.0, and 2.5 mr/hr were measured. The highest level, 2.5 mr/hr, was measured on top of the ore piles. The radiation level of 2 mr/hr was found in the area in which the men who operate the grizzly are employed. In the crushing building, on the sides of the dust collector, which is located on the outside of the crushing building, radiation levels of 1.2 and 1.0 mr/hr were found at one foot and three feet, respectively, from the sides of the collector. The radiation levels on the stack scrubber, which concentrates the yellow cake dust emitted from the hearth dryer, were found to be 2.8, 1.4, and 1.0 mr/hr at distances of 1, 3, and 6 feet, respectively. At the platform located adjacent to the scrubber stack, the radiation level was found to be 1 mr/hr. In the filtering area, a cart of yellow cake was found to be 1.2 mr/hr; the areas around the filter presses and the drum filters were .5 mr/hr or less. Radiation levels of 1.5 and 1.8 mr/hr were found on the side and bottom, respectively, of the thickener tank. A level of 1.8 mr/hr was also found at the railing around the sump in the thickener area. The following radiation measurements made in the packaging area where the yellow cake is barreled were measured at 1 and 3 feet, respectively: the bottom of the dryer, 1.2 and .6; the open barrel while being loaded, 1.4 and 1.0; on the top of a group of loaded barrels, 3.2 and 1.8; and on the sides of a group of loaded barrels, 2.5 and 1.6 mr/hr. It was estimated that the operators' average exposure was in the neighborhood of 1.5 mr/hr. Average radiation levels of 1.0 mr/hr were found over the tailings pond area where a man is located 40 hours per week. Radiation levels over the crushed ore stockpiles were also measured and varied from 1.0 to 5.0 mr/hr. It should be noted that these stockpiles are around the ore pad where the employees are generally not located. The Michigan loader operator, who is located approximately 6 feet above or to the side of the ore stockpiles, is potentially exposed to these radiation levels.

13. To further evaluate the doses that the employees may receive from the external radiation, Mr. Winn requested film badge service from the Radiation Detection Company, Palo Alto, California, which started on November 2, 1958. The use of the one film badge had been sporadic, being given to one operator in the various areas of the mill for five consecutive days or a 40-hour workweek. The following film badge results were taken from Mr. Winn's records. A crusher operator in the crushing building received a dose of 10 mrem for one week; the grizzly operator received a dose of 40 mrem for one week; and the yellow cake packaging operator received a dose of 140 mrem consisting of 110 mrem beta and 30 mrem gamma. The operator in the tailings pond area, for a 40-hour week, received a dose of 160 mrem, all gamma. To eliminate the possibility that the film badge, when worn by the yellow cake packaging operator or the tailings pond operator, had been contaminated, Mr. Winn stated that they intended, in the near future, to supply these operators with film badges on a continuing basis for a period of several weeks to determine the average dose which they are receiving.

CONCENTRATIONS OF AIRBORNE URANIUM

14. To determine the existence of and evaluate the hazards from airborne radioactive materials, Mr. Winn initially collected, on February 17 and 19, 1959, 18 samples in the various areas of the mill using a Staplex, high-volume air sampler. Eleven of the samples were collected in the crushing area and five of the samples in the yellow cake area since the licensee anticipated the greatest concentrations of airborne uranium to occur in these two areas. In the packaging area, the samples were taken on the first level of the hearth dryer, where the concentration of uranium was found to be approximately 8 times over the maximum permissible concentration. The sample collected in the yellow cake precipitation area was approximately four times over the MPC. In the crushing area, three samples were found to be in excess of MPC, one in the area of the cone crusher where the limit was approximately 5 times MPC; and two in the sampling tower on the ground floor near the roll crushers where the levels were approximately 1.5 times MPC. A recheck on the hearth dryer, the No. 1 level of the hearth, taken on the following day, showed the concentrations to be 2 times the MPC. Mr. Winn stated that additional samples will be taken in these areas and throughout the remainder of the mill to evaluate the hazards in each area. As stated above, the samples were taken with a Staplex, high-volume air sampler, employing Whatman No. 41 filter paper. The sampler was operated at a flow rate of 12.5 cubic feet per minute for a period of four minutes to obtain a total volume of 50 cubic feet of air or a total of 1.4×10^3 liters. Mr. Winn stated that the samples from the Staplex are placed into beakers which are covered with aluminum foil, are then digested with perchloric and nitric acids and diluted to 25 milliliters. Of this 25 ml solution aliquot, 2 ml is extracted into 10 ml of ethyl acetate. An aliquot of .1 ml of this solution is fused with sodium fluoride to perform a fluorometric analysis. Calculations reveal that under this procedure their analyst can detect uranium to the extent of approximately 12% of the MPC. Mr. Winn stated that additional air samplers were on order with which to conduct a more complete survey of atmospheric conditions.
15. Mr. Winn's result of the above air sampling had been calculated in terms of micrograms of uranium per cubic meter. A copy of their results were furnished to the inspector for his retention. The results have been converted to microcuries per milliliter and to the relative MPC values in the above paragraph by the writer. Mr. Winn, informed that records should be maintained in those units specified in 10 CFR 20.401(c), stated that the correct units would be used in all future reports.

EFFLUENTS RELEASED INTO UNRESTRICTED AREAS

16. According to both Mr. Issa and Mr. Winn, the mill is currently releasing approximately 1500 gallons of waste liquids per minute into the Colorado River which is approximately 500 feet from the edge of the tailings pond.

The pH of this effluent varies from 1 to 3. Mr. Winn stated that samples of the effluent and of the river above and below the point where the effluent flows into the river have been taken by them, but, at the present time, they have been unsuccessful in finding an analytical laboratory that is capable of analyzing these solutions for radium. Mr. Winn stated that the Winchester Laboratory, operated by the National Lead Company, had requested and had been granted permission to sample both the effluent and the river waters for radium analyses. The results of the analyses have been given to him verbally but not in written form.

17. Mr. Winn stated that the U. S. Geological Survey reported that the river flow for a one-year period, 1951, varied from 1600 to 25,000 cubic feet per second and that this information would be used to make calculations of the increases in radium concentrations which the release of their effluents would cause, once the written report of the Winchester results had been received. He further stated that they had been contemplating the establishment of an analytical section to perform their own radium analyses, and, if warranted and requested, would perform similar services for other uranium mills which have radium-effluent problems.

GENERAL INFORMATION

18. At the conclusion of the discussion with Mr. Winn and Mr. Izzo, a tour of the Uranium Reduction mill was taken by Mr. George and the writer, guided by Mr. Winn. Housekeeping throughout the mill appeared to be exceptionally good. At the time of this tour, the ore being processed possessed a fairly high moisture content, resulting in very little dust throughout the crushing area. Several points were observed in the process where extreme dust conditions could arise when drier ores were being processed. These were pointed out to Mr. Winn and were also mentioned to Mr. Hollis, with whom the results of the tour and of their survey were discussed at the completion of the tour. Considerable amounts of yellow cake dusts were observed on the floor in the general area of the hearth furnace and the packaging area. The hood, over the drums being filled as the yellow cake emerges from the hearth furnace, is equipped with a dust collection duct which goes to a bag-filtering system, located on the outside of the building. The yellow cake hearth furnace doors, and the areas underneath each, were observed to be covered with fine, yellow cake dust, in spite of the negative pressure maintained within the furnace. This condition was pointed out to Mr. Winn who stated that plans had been made to enclose the yellow cake area, separating the furnace and barreling area from the remainder of the mill, if necessary, and to possibly equip the furnace with a more efficient dust collection system, if warranted. It was pointed out to Mr. Winn that enclosing the furnace and barreling area would undoubtedly reduce the concentrations of airborne uranium throughout the remaining sections of the mill building, but would also increase the concentrations within the enclosed area.
19. During the tour, it was observed that each entrance to the mill area had been supplied with a sign bearing the radiation caution symbol and the words, "CAUTION - RADIOACTIVE MATERIALS", to comply with the provision of the exemption from posting of areas and marking of containers, which is incorporated into their new license. The sign at each entrance was found to be conspicuously located, at eye-level, immediately adjacent to the entrance. It was suggested to Mr. Winn that one additional sign might be located at the truck entrance to provide adequate warning to riders in the ore trucks entering the mill area. Identical signs were also observed around the tailings area which is not fenced.