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Reviewed by: EJS
Date: 9/22/66

BACK-UP FOR ARG-592

DEPARTMENT OF THE ARMY
USA Edgewood Arsenal
Edgewood Arsenal, Maryland

Inspector: Charles E. Coner

License No.: 19-1826-6

Docket No.: 27-23

Dates of Inspection: September 1 and 2, 1966 (Announced Reinspection)

Persons Accompanying Inspector:

None

Persons Contacted:

Allen H. Hilsmeier, ESO, Edgewood Arsenal
Robert Dean, Supervisor, Depot Operations Division, and ESO
James P. Mitchell, Chairman, Radioisotope Committee

Previous Inspection: April 28 - May 1, 1964 by W. R. Lorenz

Items of Noncompliance

The only items of noncompliance observed or noted during the course of the inspection are set out below:

License Amendment No. 5, paragraph 3; material will be transported in specified containers.

On 6/20/66 material was shipped in unauthorized containers. See paragraph 11 a and b of report details.

10 CFR 20.201(b), "Surveys"

Surveys conducted in the Repackaging Shed, a restricted area, were not adequate to determine compliance with 10 CFR 20.103, "Exposure of individuals to concentrations of radioactive material in restricted areas". See paragraph 15 of report details.

Source of Information

This report presents information in substance unless quotation marks indicate otherwise. All information in this report was obtained from Robert Dean, unless otherwise specifically stated.

DETAILS

Organization and Administration

1. Mr. Dean is operationally in charge of the waste disposal facility and the thirteen men who operate it. He reports to Stanley Laye, Chief, Chemical and Radiological Branch, Central Property Division, Directorate of Installation Services. With regard to matters relating to operations of interest to the Commission, he reports to Mr. A. F. Becher, Chief, Safety Officer, Edgewood Arsenal and to Mr. J. P. Mitchell, Chairman, USA Edgewood Arsenal, Radioisotope Committee. The following persons comprise the Committee:

Mitchell, James R., Chairman

Dean, Robert L., Alt. Chairman, RSO Lic. -6

Hagen, Samuel J., Ph.D.

Hassett, Charles C., Ph.D.

Papirmeister, Bruno, Ph.D.

Miller, William M.

Hilsmeier, Allen E., RSO Lic. 19-10306-1

Edmiston, Paul

Wright, Earl, RSO Lic. -7

Becher, Albert F., Chief, Safety Officer

Johnston, Gerald S., Major M1

The committee meets quarterly and records of the minutes of the meetings are maintained. I examined these records and noted that matters relating to the program concerned with this license were frequently discussed.

Facilities and Uses of Material

2. Amex III B to Form AEC-313 dated April 10, 1964 shows a map and aerial photograph of the Radiological Waste Disposal Facility (RWDF). The material is received, packaged, stored, and shipped from an area of

approximately 2 acres that is enclosed by a 6 foot chain-link fence topped with 3- strand barbed wire and an electrical trip wire. The fence is posted at approximately 50 foot intervals with signs showing the radiation caution symbol and the words "Caution - High Radiation Area". Ten yards beyond the gate to the yard, outside, there is a three room cinder-block building used by the yard workers as a personnel decontamination station, change room and lunch room. I inspected this building and found that it was posted with signs directing the workers to enter the building through the decontamination station, monitor themselves, decontaminate themselves, and remove contaminated clothing before entering the change room. I noted that there were two meters available for personnel monitoring; a Labitron Monitor, Nuclear-Chicago Model 1619A and a GM survey meter, Nuclear-Chicago Model 2612. I also noted that a Form AEC-3 was posted in the worker's lunch room.

3. At approximately 200 yards from the yard entrance there is secondary gate across the only access road to the yard. I noted that this gate was posted with a sign prohibiting entrance without authorization. Outside the secondary gate there is a building (#2372) which is occupied by the yard supervisor (Mr. Dean) and his administrative staff. The counting laboratory also is in this building. I noted the following radiation measuring devices in the laboratory:

Nuclear-Chicago Gas Flow Detector with D-47 alpha-beta probe and DS-5-G alpha probe.

RIDL 400-channel analyser, Model 34-12 with 2" sodium iodide crystal.

Nuclear-Chicago -gas flow counter- automatic sample changer.

Tracerlab Anti-coincidence Sealer and low background beta counter.

Packard Tri-Carb Model 527 Liquid Scintillation Spectrometer.

Victoreen Condenser R meter set Model 570 complete with set of hard and soft chambers.

Nuclear-Chicago Model 2670 Alpha Scintillation Detector.

Nuclear-Chicago Model 2612 Beta-Gamma Detector.

Eberline Model FNC-1 neutron detector.

Picker Model 6B Beta and Gamma GM Meter.

Thyas-II Model 489 Beta and Gamma GM meter.

Staplex Hi Volume Air Sampler.

4. Bask in the yard, in which the material is handled, I noted that the buildings and operations were laid out as shown in the previously referenced aerial photograph. I noted that the packaging shed was conspicuously posted with signs instructing the workers to wear protective footwear before entering the shed and to remove the footwear prior to leaving the shed. In the shed I noted that there was an Eberline particulate air monitor, Model AIM-3 that was in operation and was reported to be constantly in operation while the shed was being used. I noted that the monitor draws 3 c/m through a 10' x 1/2" plastic hose. I noted that the inlet of the hose was located at the center of the shed at approximately 7' above the floor. I also noted that protective footwear and disposable gloves were available for use. I noted that the workers in the yard were wearing coveralls that were supplied by the management. I noted an ample supply of remote handling tongs and cargo handling devices (e.g. fork lift trucks, cranes, barrel lifters). I noted that the equipment and facilities were maintained in an orderly manner.
5. During FY 1966 I noted that the Hensee's records showed that 211.4 tons of material including 3600 gallons of liquid waste was received and 565.07 tons of waste material was shipped. Dean stated that his present inventory shows 263 curies of byproduct material, 38,000 lbs of source material and .006 grams of special nuclear material.
6. I noted that the shipping documents showed that the licensed material was received from Federal Government facilities and it was shipped to Nuclear

Fuel Services, West Valley, New York; Nuclear Engineering Corporation, Moorehead, Kentucky; and to Nuclear Engineering Corporation, Beatty, Nevada.

- 6a. Mr. Dean stated that there had been no accidents or incidents associated with his shipments of material since the last inspection.

Restricted Area

7. The entire peninsula in which the RWDF is located is fenced off to the water line and is considered to be a restricted area. Within this area the yard, covering two acres of ground, is completely enclosed.

Handling Procedures and Operations

8. All material is shipped into the RWDF in accordance with the licensee's specific shipping instructions. Shipments may arrive by commercial carrier or by Army trucks. When the shipment arrives at the gate of the outer fence (beside Building No. 2342, Administration Building) the shipping documents are collected and the shipment containers and truck bed are swiped to detect removable contamination. A gamma rate measurement is made of the surface of each container in the shipment. I noted that this data is recorded. The findings of the survey are reported to Mr. Dean who, on the basis of the findings, instructs the yard workers on the necessary precautions.
9. When a shipment has been cleared by Mr. Dean or his assistant, the truck driver is issued a pocket dosimeter and instructed to proceed to the yard. At the yard the shipment is unloaded in the open yard if no contamination was found and into the packaging shed if contamination was found. The truck is again checked for contamination, decontaminated if required, and dispatched.
10. High curriage and high density shipments are not repackaged unless by some mistake they were received in inadequate shipping containers.* Low curriage and low density shipments are repackaged. Mr. Dean stated that this was a

*not with regard to ICC regulations, but relative to capacity of the container to withstand transshipment under the handling conditions to which it will be subjected.

general rule, but it had to be applied with judgement. Repackaging takes place in the Repackaging Shed. Waste is separated as burnable and non-burnable material. Glassware is collected separately and crushed before repackaging. Liquid wastes of low specific activity are delivered to the Low-Level Radioactive Liquid Concentrator, which is described in Annex M to Form AEC-313 dated April 10, 1964.

11. I noted that material was repackaged in containers not authorized by paragraph 3 of the license. Specifically, I noted that 55-gallon drums numbered 118 to 125 were ICC specification 17E containers. I noted that these drums were labeled indicating that they contained mixed fission products in quantities from 10 mc to 50 mc. Mr. Dean stated that these drums were packed and labeled for shipment.

(See page 6a for paragraphs 11 a and b.)

Instrumentation and Calibration Procedures

12. The instruments noted to be on hand were previously listed (see paragraph 3). The beta-gamma survey meters are calibrated monthly using a 124 mc Co-60 sealed source. The neutron survey meter is calibrated monthly by personnel of the Health Physics Office of USA Nuclear Defense Laboratory using a 5 curie Plutonium-Beryllium source. The alpha survey meters are checked immediately prior to use with a U-238 source. The air monitors (Tritium monitor Model TSM-91B, Victoreen air particulate monitor, Model 900-56, and Berlin air particulate monitor Model AIM-3) are given a quarterly check using an electronic pulse generator and a check source. The latter is used to check the function of the alarm settings on the monitors. I questioned Mr. Dean about the advisability of doing a meaningful calibration of the air monitors. He stated that this had not been done because the monitors were not used for quantitative determination, but simply as warning devices; when they indicate the presence of airborne contaminants the operation is controlled or modified to eliminate the exposure. To date they have not detected a

Shipping Documents

11a. Having noted that unauthorized drums were being used to contain the material for shipment I examined Mr. Dean's records of shipments to ascertain if they gave evidence that material had been shipped in unauthorized containers. I noted that the shipping documents bore a statement to the effect that all material was packaged in accordance with ICC regulations. The documents did not specify what type of drum was used. Mr. Dean, however, freely admitted that he had frequently shipped material in drums having specifications other than those listed on his license.

11b. I noted that a shipping document (DA Form 2502-R) dated 6/20/66 showed that the following packages were shipped:

Package No.	195	196	197	198
Volume (ft ³)	150	125	125	125
Weight (lbs)	2200	1700	1925	1450
Type Pkg.	Wd. Box	1700 ditto	1925 ditto	1450 ditto
Contents	Combustible Waste	1700 ditto	1925 ditto	1450 ditto
Principal isotope	Fission Products	1700 ditto	1925 ditto	1450 ditto
Est. Activity (mc)	20	10	10	10

I also note that no wooden box authorized by the license has a capacity in excess of 500 lbs.

a concentration of airborne material of sufficient magnitude to cause the monitor alarms to sound.*

Radiation Safety Precautions and Procedures

13. All employees of the RWDF who handle radioactive material are required to read "Standing Operating Procedure for Edgewood Arsenal Radioactive Material Disposal Facility". A copy of this paper is included with Form AEC-313 dated April 10, 1964. I noted that a copy was also posted on the bulletin boards in the Administration Building and in the yard workers lunch room. I also noted that Forms AEC-3 were posted on these bulletin boards. During my inspection I questioned several of the workers concerning the procedures that are detailed in the SOP and found that they were familiar with the procedures.** I noted that Mr. Dean had copies of his license, 10 CFR 20 and 10 CFR 30 available in his office. He stated that these papers were available for the information of any employee who expressed an interest in seeing them.

Surveys

14. Mr. Dean stated, and I noted that his records confirmed his statements, that direct reading, smear and air sampling surveys are conducted every two weeks, ^{within the restricted area} Special smear surveys are also made following packaging operations when Mr. Dean or any of the workers believe that there is a potential contamination hazard.** All incoming and outgoing shipments are surveyed to determine the extent of removable contamination on each container. The exposure rate at the surface and at one meter is measured for all outgoing containers.
15. I noted that although the licensee repackages several hundred tons of radioactive material in a year and had an inventory of several hundred curies of byproduct material on hand, his only means of evaluating the internal hazard to the workers was through smear tests of the area and the operation of two

*I noted that the alarm was set at approximately twice the background count rate. I also noted that the detector was surrounded with a wall of 2" x 4" x 8" lead bricks.

**Mr. Dean stated that sheets of sturdy brown manila wrapping paper are used to cover the concrete flooring when operations having a potential for spreading contamination are conducted. I noted that the smear and air sampling surveys showed little evidence of removable or airborne contamination.

***In the course of my inspection I did not note any significant divergence between the operating procedures and the statements, representations and procedures appended to Form AEC-313 dated April 10, 1964.

constant particulate air samplers. One sampler, a Victoreen Model 900-56, is located in the Low-Level Liquid Concentrator Building (#2364). Another sampler, an Eberline, Model AIM-3, is located in the Repackaging Shed (Building #2362). This sampler collects a 3 cfm sample from a fixed point at a height of 7' above the floor. I noted that the size of the shed (Approximately 40' x 20') and the location of the equipment in the shed was such that repackaging could be done within a radius of 10' from the sampling point. I also noted that the shed was open on three sides.

Storage and Security of Material

16. All material is stored within a 2-acre yard that is completely enclosed by a chain-link fence that is topped with 3 strands of barbed wire. The gate to the yard is locked when the workers are not on duty. A security patrol checks the fence line every four hours during nonduty hours.

Waste Disposal

17. No material was disposed of by means other than transfer. Material was transferred to the companies listed in paragraph 6 of this report.

Posting and Labeling

18. The fence surrounding the yard is posted "Caution - Radioactive Material" and "Caution - High Radiation Area" every 50'. The containers holding radioactive material are labeled to show the following information:
 - a. Total activity in millicuries, or in the case of source and special nuclear material, the total weight.
 - b. Principal radioisotope.
 - c. Radiation level at the surface of the container and at one meter from the source.

d. The name and address of the licensee.

e. Container serial number.

I noted that the containers were not labeled with the radiation caution symbol or the words "Caution - Radioactive Material".

19. All outgoing vehicles in which radioactive material are transported are placarded on each side and the rear with lettering that is at least three inches high stating "DANGEROUS - RADIOACTIVE MATERIAL". All incoming Department of Defense vehicles are also similarly marked.

Personnel Monitoring Program

20. All personnel who occupy the restricted area (the area enclosed by the outer fence line) for more than 8 hours per week wear film badges. Personnel who visit the area are provided with two pocket chambers. Records of exposure to the film badges are maintained on DD Forms 1141 at the Edgewood Arsenal Dispensary. Records of exposure to the pocket chambers are maintained by Mr. Dean on a form that shows the name, date and exposure. I examined the records and found that no person had been exposed to more than 50 mrem in any week since May 1964.
- 20a. Until March 1966 weekly film badge service was used. Mr. Dean stated that he changed at that time to monthly service because he believed that a more reliable measurement could be obtained on a monthly basis for low exposures. The average exposure was 20 mrem per week for the twelve persons at RWDF during 1965. In the past four months (using monthly badges) he noted that the average reported dose has been approximately 10 mrem/week although his workload has been relatively unchanged. The film badge supplier is Lexington-Blue Grass Army Depot.
21. No bioassays, for radioactive material other than radium, have been performed since May 1964 on the personnel who handle radioactive material.
22. Wrist or ring badges are not worn. Wrist badges were worn from 1960 to 1962 and Mr. Dean noted that the body and wrist badge readings were essentially the same so he terminated the wrist badge service.

License Conditions

23. I checked each of the six paragraphs of the license and found no items of noncompliance except those noted previously in this report.

Discussion with Management

24. On September 2, 1966 I discussed the findings of my inspection with Mr. Mitchell, Chairman, Radioisotope Committee. With regard to the two items of noncompliance,

I stated that the item relating to the use of unauthorized shipping containers seemed to be incontrovertible, but I invited him to discuss the matter relating to Mr. Dean's failure to evaluate the internal hazard to the workers in the Repackaging Shed. Mr. Mitchell agreed that the Committee had been remiss in both instances. He stated that he would see that a system is instituted that will collect breathing zone samples while repackaging is being done. With regard to the use of unauthorized shipping containers, Mr. Mitchell stated that he will request an amendment to his license to authorize the use of the shipping containers that are available. He estimated that compliance with ICC regulations would cost Edgewood Arsenal \$30,000 per year.

25. With regard to their failure to evaluate the internal hazard in the Repackaging Shed, Mr. Mitchell stated that he had considered that the Eberline constant air monitor was providing an adequate evaluation. However, he stated that he now realized that one could hardly contend that a fixed sampler at a height of 7' in a large open area could collect a sample that would be representative of the air breathed by the workers particularly during such operations as fishing the contents out of a 55-gallon drum for repackaging or compacting glassware during such operations as repackaging.
26. During the conference I informed Mr. Mitchell that I had noted that the packaged waste containers in the yard were not labeled as required by 10 CFR 20.203(f)(4). However, on my return to Region I, I noted that Supplement No. 18 to Title 10 revised 10 CFR 20.203(f) (effective 11/3/66) to delete the labeling requirement under specified circumstances which obtained at RWDF (see 10 CFR 20.203(f)(3)(vi)). I notified Mr. Mitchell by telephone on September 8, 1966 that this citation would not be made.