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| MEMO ROUTE SLIP<br>Form AEC-93 (Rev. May 14, 1947) AECM 0240          |                | See me about this.<br>Note and return.   | For concurrence.<br>For signature. | For action.<br>For information. |
|---|----------------|--|------------------------------------|---------------------------------|
| TO (Name and unit)<br>H. D. Thornburg,<br>Chief, FS&EB                | INITIALS       | REMARKS<br>RO INSPECTION REPORT NOS. 70-82/73-01 and<br>40-672/73-01<br>NUCLEAR METALS, INC., CONCORD, MASS.   |                                    |                                 |
|   | DATE           |  |                                    |                                 |
|   |                |  |                                    |                                 |
| cc: RO:HQ (4)<br>RO Files<br>DR Central Files<br>Central Mail & Files | INITIALS       | REMARKS<br>The subject inspection report is forwarded for your<br>information. Distribution will be made by this<br>office to the PDR, LPDR, NSIC, DTIE and State<br>representative after review by the licensee for<br>proprietary information. |                                    |                                 |
|   | DATE           |  |                                    |                                 |
|   |                |  |                                    |                                 |
| TO (Name and unit)<br>Directorate of<br>Licensing (4)                 | INITIALS       | REMARKS<br>representative after review by the licensee for<br>proprietary information.   |                                    |                                 |
|   | DATE           |  |                                    |                                 |
|   |                |  |                                    |                                 |
| FROM (Name and unit)<br>P. R. Nelson<br>RO:I                          | REMARKS        |  |                                    |                                 |
|   |                |  |                                    |                                 |
|   |                |  |                                    |                                 |
| PHONE NO.   | DATE<br>8/3/73 |  |                                    |                                 |

USE OTHER SIDE FOR ADDITIONAL REMARKS

GPO : 1971 O - 445-469

*AKS*

U.S. ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS  
REGION I

RO Inspection Report No.: 70-82/73-01 & 40-672/73-01 Docket Nos.: 70-82  
40-672  
Location: Nuclear Metals, Incorporated License Nos.: SNM-65  
2229 Main Street Priority: 1 & 3  
Concord, Massachusetts Category: A & E  
Location: Concord, Massachusetts  
Type of Licensee: Fuel Fabricator & Product Manufacturer  
Type of Inspection: Routine, Unannounced  
Dates of Inspection: March 14 thru 16, 1973  
Dates of Previous Inspection: None.  
Reporting Inspector: Fred W. Brandkamp for PCT April 18 1973  
Phillip C. Jerman, Radiation Specialist Date  
Accompanying Inspectors: None.  
Other Accompanying Personnel: None.  
Reviewed by: M. R. Nelson for 4/19/73  
Paul R. Nelson, Chief, Radiological & Environ- Date  
Protection Branch

## SUMMARY OF FINDINGS

### Enforcement Action

#### A. Violations

1. Failure to hold quarterly meetings and training sessions to acquaint fire brigade members with proper emergency procedures, techniques, and equipment. (Details, Paragraph 2)
2. Failure to hold periodic meetings for all employees to review the health and safety program and discuss special matters related to health and safety. (Details, Paragraph 3)
3. Failure to check hoods and sucker hoses for proper operation and air flow velocity. (Details, Paragraph 4)
4. Failure to make direct survey measurements of fixed and removable contamination in the restricted area. (Details, Paragraph 7)
5. Failure to collect the stack air samples monthly for analysis of uranium concentration. (Details, Paragraph 8)
6. Failure to take and analyze environmental water and soil samples annually. (Details, Paragraph 9)
7. Failure to determine that employees were free of contamination before eating, smoking or leaving the plant area. (Details, Paragraph 10)
8. Failure to evaluate exposures of personnel to airborne concentrations of uranium-238 in restricted areas. (Details, Paragraph 6)
9. Failure to survey liquid waste releases to the unrestricted area to assure that concentrations of uranium-238 were within the limits specified by 10 CFR 20. (Details, Paragraph 16)
10. Failure to evaluate the exposure incurred by an individual whose film badge was reported to have been contaminated for three months. (Details, Paragraph 15)
11. Failure to post a radiation area. (Details, Paragraph 13)
12. Failure to assure that customers, to whom depleted uranium was transferred, were licensed to possess the material. (Details, Paragraph 12)

13. Failure to maintain valid records of transfers and disposals of source material. (Details, Paragraph 12)

Licensee Action on Previously Identified Enforcement Items

None.

Design Changes

None.

Unusual Occurrences

None reported by the licensee.

Other Significant Findings

A. Current Findings

Nuclear Metals, Incorporated acquired the operating assets of the Nuclear Metals Division of Whittaker Corporation on September 18, 1972. The incumbent in the office of the President changed. The Safety Officer resigned in October 1972 and a new Safety Officer was appointed, effective January 1, 1973.

B. Status of Previously Reported Unresolved Items

Not applicable.

Management Interview

- A. On March 16, 1973 the inspector met with the following officials of Nuclear Metals, Incorporated to discuss his inspection findings:

- W. Tuffin, President
- A. Gilman, Engineering Manager
- R. Franks, Safety Officer and RSO
- R. Robie, Comptroller

- B. The inspector informed the licensee of the present AEC policy of placing inspection correspondence and reports in the Public Document Room.

- C. The inspector discussed each violation listed above in this report. He explained the relevant requirements of the licenses and the AEC regulations, and related those findings of his inspection indicating violations of the requirements and regulations.
- D. The inspector also informed the licensee that if the rate of release of airborne depleted uranium, shown in the November and December 1972 records from Stack E-30, were not decreased, the average concentration for the year would exceed the limits specified by the AEC. A licensee representative stated that appropriate action would be taken to prevent excessive releases.
- E. In view of the number of violations found during this inspection, Mr. Nelson and Mr. Raymond H. Smith, Acting Senior Radiation Specialist, Directorate of Regulatory Operations, Region I, met with Messrs. Tuffin, Robie, Gilman and Franks at the licensee's plant on March 21, 1973. Mr. Nelson reviewed the violations. He expressed his concern that these violations might indicate that the licensee's management control system was not sufficiently responsive to the requirements of AEC. He explained the current procedures used by the Directorate of Regulatory Operations to enforce the Federal Regulations.
- F. The licensee stated that corrective action had been taken to correct the violations found during the inspection. He described in general terms his plans to improve the management control systems to assure compliance with AEC requirements.

DETAILS

1. Individuals Contacted

W. Tuffin, President  
R. Franks, Safety Officer and R.S.O.  
R. Robie, Comptroller  
A. Gilman, Engineering Manager  
P. Zagavella, Nuclear Control Monitor and  
SS Accountability Representative

2. Fire Brigade Meetings

No records were available to show that fire brigade meetings were held during the third or fourth quarters of 1972. A licensee representative stated that these meetings had not been held. The licensee's recorded minutes of a fire brigade meeting, held on January 10, 1973, were reviewed by the inspector.

3. Health and Safety Meetings

No records were available to show that health and safety meetings had been held for attendance by all employees since August 1, 1972. The licensee representatives stated that each new employee had been given an indoctrination on health and safety, but stated that no health and safety meetings, attended by all employees, had been held since August 1, 1972.

4. Hood and Sucker Hose Checks

A licensee representative stated that the hoods and sucker hoses had not been checked for proper operation since December, 1971.

5. In-Plant Air Monitoring - Special Nuclear Material

The inspector reviewed the in-plant air sampling records for fuel element fabrication operations. The records showed that the samples were collected and analyzed monthly from December, 1971 to March 29, 1972. For the next six months, collections were made over the following periods:

March 29, 1972 to June 19, 1972  
June 19, 1972 to August 16, 1972  
August 16, 1972 to September 27, 1972

Thereafter, collections were made over a monthly period. At the time of the inspection, the results for the January and February, 1973 collective samples had not been reported by the vendor to whom they had been sent for analysis. The maximum concentration shown on the records examined by the inspector was noted to have been  $0.38 \times 10^{-14}$  uCi U-235/ml of air.

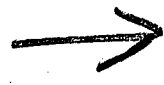
*Same  
only for  
alpha.*

6. In-Plant Air Monitoring - Source Material

*Same*

The inspector observed that there were two fixed air monitors in the foundry area where depleted uranium was processed. One was located above the cubicle (hood) on the furnace platform. The other was about 8' above the floor at a location that was remote from the area in which the source material was processed. A licensee representative stated that the filter papers from these samplers were assayed monthly to determine the concentration of airborne source material in the foundry area. He stated that no other evaluations of personnel exposure to airborne source material were made. The inspector made 8 swipes at random locations in the area where source material had been processed. He found that the beta-gamma exposure rates from these swipes showed 0.1 to 2.5 millirads per hour when measured with an end-window GM survey meter.

*Same only for 8*



*10 swipes raised from 150 to 2*

In the course of the inspection, the inspector observed a man cleaning the furnace crucible, an operation that gave rise to concentrations of visible dust in the breathing zone of the worker. A licensee representative stated that the furnace was used for melting depleted uranium. The inspector asked the representative if the worker's exposure to airborne uranium had been determined. The representative said that it had not been determined.

7. Direct Reading Surveys

*17,000 d/m Beta*

The inspector's examination of the licensee's records of survey showed that no direct measurement surveys of fixed and removable contamination in the restricted areas had been recorded since December 14, 1971. He noted that monthly swipe surveys were recorded. He asked a licensee representative if direct measurement surveys had been made. The representative stated that they had not been made since December 14, 1971.

*monthly swipes*

*contaminated spread outside foundry area*

8. Surveys of Airborne Effluents

The inspector's examination of the stack air sampling records showed that samples had been collected and assayed over the same periods as described for the in-plant air monitoring program in Paragraph 5 above: i.e., they had not been collected at monthly intervals as required by Section II of the License Manual.

*Same & only*

At the time of the inspection, the January and February 1973 stack samples had not been returned from the analysis service vendor. The records prior to January 1973 showed that the airborne concentrations

released to the unrestricted area had been below the limits specified by 10 CFR 20.106 when averaged over any 12 months. However, in November and December 1972, the 10 CFR 20, Appendix B, Table II, Colum 1, value of  $3 \times 10^{-12}$  uCi/ml for uranium-238, had been exceeded in the effluent from Stack No. E-30; a stack that vented the area in which depleted uranium was processed. The November concentration averaged  $3.1 \times 10^{-12}$  uCi/ml and the December concentration averaged  $1.9 \times 10^{-11}$  uCi/ml. At no time did the concentration exceed the limit specified for uranium-235,  $2 \times 10^{-11}$  uCi/ml.

9. Environmental Monitoring

*Annually  
& only.*

The inspector's examination of the environmental monitoring records showed no entry for water or soil analyses since November 10, 1970. A licensee representative stated that water and soil samples had been collected in 1971. He showed the inspector a collection of containers of water and soil that were labeled December 28, 1971. He stated that the samples had not been submitted for analyses.

10. Personnel Surveys

*St. 11  
two →*

In the course of the inspection, the inspector saw many employees going to and from the plant areas where special nuclear material and source material were handled. He observed that these employees did not monitor their hands or shoes before leaving the work areas. He asked a licensee representative what precautions were taken to prevent the spread of contamination through the plant and to prevent inadvertant ingestion of radioactive material during eating and smoking. The representative stated that there were no survey meters made available for personnel monitoring. However, he stated that all shop employees used plant issued outer clothing and safety shoes which did not leave the plant. The outer clothing was laundered by a nuclear laundry licensed by the AEC. All shop employees were encouraged to take showers at the end of the work day.

*Have  
a meter  
spot  
checked  
only.*

*15 mR/hr  
in heel*

ii. Bioassay Program

The inspector examined the records of bioassay. A licensee representative stated that all personnel working with uranium submitted urine samples annually for analysis. The latest entry in the records showed that urine samples submitted May 31, 1972, and analyzed radiochemically, showed the maximum concentration for any employee had been  $8.4 \pm 2.2$  d/m due to uranium.

*Could not  
guarantee  
not leaving  
plant.*

*same & only*



12. Use of Licensed Materials

The inspector examined the licensee's records of receipt inventory and transfer of licensed material and discussed the use of material with licensee representatives. He found that materials had been used only for the purposes authorized by the license and the quantities possessed had not exceeded the quantities authorized.

The inspector's examination of the records of transfers showed that those relating to the transfer of source material to customers and to the waste disposal service vendor did not always show the quantity of material that had been transferred. The inspector asked a licensee representative what procedure was followed to determine if a source material customer was licensed to possess the material shipped to him. The licensee representative stated that the company made no effort to assure that the customers were authorized to possess the depleted uranium products.

13. Posting and Labeling

All containers and areas observed by the inspector were noted to have been properly labeled or posted with one exception. In the foundry area, the inspector observed about 20 depleted uranium shields of various sizes stacked on pallets. At two feet from the assembly of shields, he measured a gamma exposure rate of 8 mR/hr. He noted that the area was not posted with a sign bearing the radiation caution symbol and the words "Caution Radiation Area".

14. Swipe Surveys

*Same as only*

The inspector examined the licensee's records of swipe surveys. He found that surveys had been accomplished at approximately monthly intervals at 12 specified locations in the plant. Eleven of these were located in the SNM area and one in the source material area. A licensee representative stated that the swipes taken in 1973 had not yet been returned from the assay service vendor. The inspector noted that the available swipe records showed that no removable contamination greater than 7.5 dpm/100 cm<sup>2</sup> had been found at these locations.

15. Personnel Monitoring

The inspector examined the licensee's records of whole body radiation exposure. He noted that the exposures had been measured by film badges issued monthly to 30 employees. He noted that the records were maintained on forms containing all the information required by Form AEC-5. He noted that the maximum annual whole body dose for 1971 had been

1070 mrem and for 1972 had been 1060 mrem. The maximum annual skin exposures were 6300 mrem in 1971 and 5420 mrem in 1972.

While examining the personnel dosimetry reports, the inspector noted that the film badge vendor's report showed several entries reading "Film shows too much evidence of contamination for a valid reading". Specifically, he noted that the film badge record of one employee showed this comment on the film record for January, February, March and December 1972 and January 1973.

A licensee representative stated that a survey showed that the probability of any employee receiving a hand exposure greater than 25% of the limit of 10 CFR 20.101(a), 18.75 rems per quarter, was negligible. The inspector's observations of the operations confirmed the licensee's findings.

16. Liquid Effluent Releases to Unrestricted Areas

*Have  
monitored  
or only.*

The inspector questioned a licensee representative about the procedure that was followed in disposing of the acid that was used to dissolve the copper sheath from the smeltered uranium. The representative stated that the acid, after neutralization, was poured into a bog on the plant property. The inspector asked if the neutralized acid was assayed to determine its concentration of uranium before release of the unrestricted area. The representative stated that the acid was not assayed.

17. Independent Measurements by the Inspector

The inspector took 8 swipes from the foundry floor, the furnace platform and the hoods. He measured beta-gamma exposure rates of 0.1 to 2.5 millirads per hour at the surface of the swipes with an end-window GM survey meter.

*Canvas glove used about only  
week for U-238 work.  
> 50 mR/hr at inside surface  
of glove.  
also leather glove used 1 or  
2 days 30 mR/hr at inside  
surface of glove.*