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TO (Name and unit)	INITIALS	REMARKS
H. D. Thornburg, Chief, FS&EB	DATE	RO INSPECTION REPORT NO. 70-82/73-02 NUCLEAR METALS, INC. CONCORD, MASSACHUSETTS
TO (Name and unit) cc: RO:HQ (4) L:D/D for Fuels & Materials DR Central Files Regional Directors,	INITIALS DATE	REMARKS The subject inspection report is forwarded for your information. Distribution will be made by this office to the PDR, NSIC
TO (Name and unit) RO:II, RO:III	INITIALS & RO:V DATE	REMARKS and State representatives after review by the licensee for proprietary information.
FROM (Name and unit) H. W. Crocker, RO:I		REMARKS
PHONE NO.	DATE 5/1/73	

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GPO : 1971 O - 445-469

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UNITED STATES
ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS
REGION 1
970 BROAD STREET
NEWARK, NEW JERSEY 07102

70-82 file

MAY 1 1973

H. W. Crocker, Senior Fuel Facilities Inspector HWC
Directorate of Regulatory Operations, Region I

INSPECTOR'S EVALUATION
NUCLEAR METALS, INC.
CONCORD, MASSACHUSETTS
SNM-65
INSPECTION REPORT NO. 70-82/73-02

The inspection was of the activities involved in the manufacture of CP-5 fuel tubes for Argonne National Laboratory which consists of concentrically nested, aluminum-clad, aluminum-uranium alloy fuel tubes. Nuclear Metals have made these coextruded fuel tubes since 1959.

The criticality control system for nuclear materials employed by Nuclear Metals appears to function satisfactorily. It does rely heavily on Mr. Zagarella, Nuclear Control Monitor, in that he is directly responsible for movement of materials between exclusion areas. A copy of the safe handling limits for each exclusion area as prepared by Lincoln Clark, Criticality Consultant, was supplied to each technician according to A. Gilman, Criticality Officer. The safe handling limits are not complicated and should be easy to learn and follow.

The opening and closing of shipping containers is performed by Mr. Zagarella. He appears to be conscientious in the performance of his duties as he understands them. The performance or obtaining of radiation surveys of packages as received and unpacked and as packaged and loaded didn't appear to be one of his duties as he understands them. Records of any of the smear surveys or other radiation survey readings required by 49 CFR 173 couldn't be produced.

The lack of trained health physics personnel and the lack of a routine program for surveys of personnel for radioactive contamination appear to be Nuclear Metals, Inc. major shortcomings. They do have a process that makes contamination control relatively easy; however, a personnel survey

program is still needed. These observations are consistent with the findings made by Mr. Jerman during his inspection on March 14-16, 1973.

W. W. Kinney
Fuel Facilities Inspector

U. S. ATOMIC ENERGY COMMISSION

DIRECTORATE OF REGULATORY OPERATIONS

REGION I

RO Inspection Report No.: 70-82/73-02

Docket No.: 70-82

Licensee: Nuclear Metals, Incorporated

License No.: SNM-65

2229 Main Street

Priority: 1

Concord, Massachusetts

Category: A(1)

Location:

Type of Licensee: Fuel Fabrication

Type of Inspection: Routine, Unannounced

Dates of Inspection: April 4-5, 1973

Dates of Previous Inspection: March 14-16 & 21, 1973

Reporting Inspector: W. W. Kinney
W. W. Kinney, Fuel Facilities Inspector — 4/30/73 Date

Accompanying Inspectors: None — Date

Date

Other Accompanying Personnel: None

Reviewed by: H. W. Crocker
H. W. Crocker, Senior Fuel Facilities Inspector — 5/1/73 Date

SUMMARY OF FINDINGS

Enforcement Action

A. Failure to establish and maintain written procedures for opening and closing shipping containers as required in 10 CFR 20.205 and 10 CFR 71.51(b). (Details, Paragraph 8.b)

B. Failure to have special nuclear material (SNM) stored greater than 3 feet from the perimeter of the exclusion area around the saw used to cut the CP-5 fuel tubes to length. (Details, Paragraph 7.g)

C. Failure to have two fire extinguishers inspected for mechanical defects on the required 6 month frequency. (Details, Paragraph 5.a)

D. Failure to have an armed guard assigned to the day shift and to have the radiation, fire and security alarm control panels at the central guard station under constant surveillance. (Details, Paragraph 10)

Licensee Action on Previously Identified Enforcement Items

The criticality officer of Nuclear Metals, Inc. is now maintaining a system of memoranda reporting the scope and findings of his criticality safety inspections as committed to Region I in a letter dated September 18, 1972, and in a telephone conversation of September 28, 1972. (Details, Paragraph 4)

Design Changes

Not inspected

Unusual Occurrences

None

Other Significant Findings

A. Current Findings

Nuclear Metals, Inc. acquired the operating assets of the Nuclear Metals Division of Whittaker Corporation located in Concord, Massachusetts in September, 1972.

B. Status of Perviously Reported Unresolved Items

None

Management Interview

At the conclusion of the inspection, a management discussion meeting was held at 11:15 a.m. on April 5, 1972. Those present were:

Nuclear Metals, Inc.

W. B. Tuffin, President
R. A. Robie, Director of Administration and Controller
A. R. Gilman, Manager of Engineering
R. C. Franks, Health and Safety Officer

AEC

W. W. Kinney, Fuel Facilities Inspector

The scope of the inspection was presented and the following violations and other item were discussed:

A. Violations

1. Failure to establish and maintain written procedures for opening and closing shipping containers as required in 10 CFR 20.205 and 10 CFR 71.51(b). (Details, Paragraph 8.b)

2. Failure to have special nuclear material (SNM) stored greater than 3 feet from the perimeter of the exclusion area around the saw used to cut the CP-5 fuel tubes to length. (Details, Paragraph 7.g)

3. Failure to have two fire extinguishers inspected for mechanical defects on the required 6 month frequency. (Details, Paragraph 5.a)

4. Failure to have an armed guard assigned to the day shift and to have the radiation, fire and security alarm control panels at the central guard station under constant surveillance. (Details, Paragraph 10)

B. Survey Program

The failure of Nuclear Metals, Inc. to provide a routine survey program to determine that employees leaving potentially contaminated areas are not contaminated with radioactive materials was also discussed even though it had been a subject of the inspection conducted in March, 1973. (Details, Paragraph 9)

DETAILS

1. Persons Contacted

A. R. Gilman, Manager of Engineering and Criticality Officer
R. C. Franks, Health and Safety Officer
L. Clark, Criticality Consultant and Safeguards Consultant
P. J. Zagarella, Nuclear Control Monitor
R. Kruszkowski, Fire Safety Consultant

2. Organization

Nuclear Metals, Inc. acquired the operating assets of the Nuclear Metals Division of Whittaker Corporation located in Concord, Massachusetts in September, 1972. Mr. W. B. Tuffin is the president of Nuclear Metals, Inc. Reporting to the president are Mr. R. A. Robie, Director of Administration and Controller; Mr. A. R. Gilman, Manager of Engineering; Mr. R. B. KacKay, Manager of Manufacturing; a manager of inside sales and a technical director. Mr. R. C. Franks, Health and Safety Officer, reports to the director of administration and controller. Mr. P. J. Zagarella, Nuclear Control Monitor, reports to the manager of manufacturing through shipping and stores. Mr. Gilman also functions as the criticality officer. Mr. Zagarella also functions as the accountability representative. The organization has no experienced health physics personnel at the plant.

3. Scope of Operations

The only operation authorized by AEC License No. SNM-65 currently being performed by Nuclear Metals, Inc. is the manufacture of CP-5 fuel tubes for Argonne National Laboratory. Their inventory is about 25 kilograms of U-235 which is well within the 200 kilogram licensed quantity. Nuclear Metals, Inc. have been making these concentrically nested, aluminum-clad, aluminum-uranium alloy fuel tubes for Argonne National Laboratory periodically since 1959.

4. Previously Identified Enforcement Item

The lack of written records of the criticality safety inspections by the criticality officer was documented in a letter to the Nuclear Metals Division of Whittaker Corporation from Region I on August 28, 1972. The ultimate result of this was the Nuclear Metals commitment to have the criticality officer maintain a system of memoranda reporting the scope and findings of the criticality safety inspections.

The memoranda issued on September 1, October 2, November 14, and December 11, 1972 and January 2, February 6, and March 5, 1973 were reviewed by the inspector. The memoranda issued since October 2, 1972 have included the scope and findings of the inspections.

5. Fire Protection System

a. Fire Extinguishers

The fire extinguishers located throughout the plant were examined by the inspector. The date of inspections of the extinguishers for mechanical defects were reviewed. The dates of inspections by the fire safety consultant were recorded on a tag on each extinguisher. The dates showed that inspections were being made on the license required 6 month frequency. Two extinguishers located in Building C had tags that showed no inspection being made during October 1972 when the other extinguishers were inspected.

b. Sprinkler System

According to the licensee, the weekly checks of the sprinkler system to ensure proper operation are performed. No record of this checking is made.

6. Training

a. Training Program

The training program for new hire personnel for criticality safety consists of briefing of the subject with the person by the criticality officer for about an hour and on-the-job training by the foremen and co-workers. The fact that such a briefing was held with a new employee during January 1973 was documented in the February 6, 1973 criticality safety inspection memorandum from the criticality officer to the president. The on-the-job training is not documented. Radiation and criticality safety meetings were scheduled to be held April 8, 9, and 10, 1973.

b. Evacuation Drills

A nuclear criticality drill was held on August 19, 1972, according to licensee records. The evacuation alarm gave two short bursts and the building was evacuated in one and one-half minutes. A fire drill evacuation was held in November 1972 and the evacuation was complete in one and one-half minutes.

7. Nuclear Criticality Safety

a. Criticality Consultant

The evaluation of operations for criticality safety control is performed primarily by the criticality consultant. This individual prepared a memorandum to the project leader and the nuclear control monitor dated May 22, 1972, which stated the "Safe Handling Limits in Fabrication of CP-5 Fuel Elements". This memorandum gave the safe handling limits for each exclusion area. The limits were examined and found to be in accord with those stated in the authorized license conditions given in the "Application for Renewal of License to Process Special Nuclear Material," dated January 1, 1969. The criticality consultant also audits the operations against these limits when he visits the facility. Such inspections made on October 5, and 26, 1972 were documented in a memorandum. However, most such inspections are not documented.

b. Criticality Officer

The criticality officer helps assure that the approved criticality safe handling limits are adhered to. Among his duties to this end is the performance of frequent inspections to determine that personnel are cognizant of allowable limits and that these limits are rigorously observed. According to the criticality officer, all personnel questioned on the safe handling limits for an exclusion area were knowledgeable of the limits. The criticality officer also tests the response of the criticality monitors using the built-in check sources on a weekly schedule, approximately.

c. Nuclear Control Monitor

This individual functions in a key role in the administrative criticality control system used by Nuclear Metals, Inc. The nuclear control monitor directly controls all movements of special nuclear materials (SNM) in the Butler Storage Facility and between exclusion areas. He maintains records and a visual chart of the physical location of each item containing SNM and uses these records and chart to help control the amount of material in the different exclusion areas. According to the nuclear control monitor, he quite often personally moves the material between exclusion areas. He also verifies the records and chart against the actual physical situation daily, when material is being moved.

d. Nuclear Emergency Committee

This committee has been reformed since the change in management in late 1972. They plan to hold their first meeting prior to April 23, 1973 according to the licensee. Members have reviewed the emergency procedures and plan on updating them.

e. Process Nuclear Criticality Safety Analysis

The criticality safety analysis for the operations involved in the manufacture of the CP-5 fuel tubes is given in the "Application for Renewal of License to Process Special Nuclear Material", which is included in Condition No. 8 to License No. SNM-65. The memorandum from the criticality consultant to the project leader and nuclear control monitor with the subject, "Safe Handling Limits in Fabrication of CP-5 Fuel Elements," was reviewed by the inspector and it provides SNM limits for exclusion areas which are in accord with the license conditions.

f. Criticality Safety Audits

As mentioned previously, the criticality safety officer conducts frequent criticality safety inspections of the operations and now documents the scope and findings of the inspection in memoranda. The monthly memoranda written from September 1, 1972 through March 5, 1973 were reviewed by the inspector. The only violation of limits documented was in the memorandum dated November 14, 1972 and concerned the violation of the limit that material in an exclusion area will not approach closer than 3 feet from the exclusion area perimeter. The criticality consultant also conducts audits when he walks through the facilities on his visits, as mentioned before. The written report of the audits made October 5, and October 26, 1972 also mentioned the violation of the limit that material in an exclusion area will not approach closer than 3 feet from the perimeter of the exclusion area.

g. Criticality Safety Limit Violation

During the physical inspection of the facility, it was noted by the inspector that a CP-5 fuel tube was stored closer than 3 feet from the perimeter of the exclusion area around the saw where the tubes are cut to length. The violation of this 3 feet spacing limit was also noted in the audits by the criticality officer and the criticality consultant.

h. Criticality Monitors

The locations of the probes for the criticality monitors were noted during the physical inspection of the facility and were located as indicated in the license conditions. The control system located in the guard center was inspected. The monitors were set to alarm at 10 mr/hr. The criticality officer demonstrated the system checks he performs, which consist primarily of testing the response of the five probes to their built-in check sources. All five probes responded to the source check. An alarm horn is being installed in the Butler Building to assure audible coverage of an alarm.

i. Nuclear Materials Accountability and Criticality Prevention

The accountability records for the U-235 involved in the total CP-5 fuel tube fabrication program were examined. No appreciable material unaccounted for (MUF) was present in any material balance area which could be of concern in criticality prevention.

8. Receiving and Shipping of Radioactive Materials

a. Quality Control for Shipping Containers

The licensee had a list of the approved shipping containers, model 2823, which they had inspected and deemed suitable for use in packaging SNM for delivery to a carrier for transport. The nuclear control monitor prepares a "Check List for Packaging of SNM for Shipment in Container Model 2823" for each package prepared for shipment. This check list provides information concerning the protection of the product; inner container conditions and means of packing material in the inner container; and outer container condition including specific mention of the gasket and lid.

b. Procedures for Opening and Closing Shipping Containers

Nuclear Metals, Inc. does not have written procedures for safely opening packages in which licensed material is received as required in 10 CFR 20.205. Also, the licensee has not established written procedures for opening and closing packages in which licensed material is transported to provide safety and to assure that, prior to delivery to a carrier for transport, each package is properly closed for transport as required in 10 CFR 71.51(b).

c. Shipping Records

The records for shipments made from June 29, 1972, through February 23, 1973, were reviewed. The records for shipments not exempt from requirements of 10 CFR 71 included a copy of the teletype message sent to the receiver prior to shipment, a record of the available model 2823 shipping containers; a copy of the Form AEC-741 for the shipment; a listing of the identification of items in each shipping container; a completed check list for each container model 2823 used in packaging the material; and a teletype message from the receiver of the material. The records appeared to satisfy the requirements of 10 CFR 71.54 and 10 CFR 71.62. However, the licensee could not produce records of radiation survey of packages for shipment as required in 49 CFR 173.

9. Evaluation and Control of Personnel Radioactive Contamination

The licensee states that they depend upon personnel washing to control skin contamination. The licensee has no routine survey program to determine that employees leaving potentially contaminated areas are not contaminated with radioactive materials. The need to have assurance that the skin of personnel and their clothing is not contaminated especially prior to eating or leaving the plant is not being satisfied by use of radiation survey instruments. The inspector did not note the use of step-off boundaries or step-off procedures anywhere in the plant as a means to confine radioactive contamination to specific areas such as the exclusion areas.

10. Guard Coverage

It was noted during the inspection that no armed guard was present at the facility during the day. According to the license conditions, guards are on duty 24 hours a day on a three shift basis with one guard per eight-hour shift. Also, the radiation, fire and security alarm control panels at the central guard station are supposed to be under the constant surveillance of a guard. Each guard is armed and all guards are special police officers of the Town of Concord, according to the license condition.