



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIVISION OF COMPLIANCE  
REGION I  
970 BROAD STREET  
NEWARK, NEW JERSEY 07102

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August 23, 1968

File

THRU: H. W. Crocker, Senior Fuel Facilities Inspector

WHITTAKER CORPORATION, NUCLEAR METALS DIVISION  
WEST CONCORD, MASSACHUSETTS  
LICENSE NO. SNM-65 (DOCKET NO. 70-82)

The last small contract for machining a Zirconium Uranium oxide material had been completed, so there was no SNM processing being performed at the time of the inspection. Nuclear Metals was doing some work with Natural Uranium and with depleted uranium, but Mr. Kneppel said this was a small contract. They do not anticipate any big SNM job for about a year when they may get some more CP5 work.

The only significant change in processing at Nuclear Metals would be the making of U-235 shot, since a geometrically unsafe vessel would be used. Mr. Kneppel recognized the potential criticality problem with finely divided metal and he said that a license amendment request would be submitted before they actually do any of this work. He said they would probably limit the total U-235 in the shot machine to 350 grams, which would be a reasonable control if their throughput is low.

Mr. Perella is new to his Health Physics responsibilities and with the low SNM processing schedule, he admitted that he was slowly getting control of all his predecessors programs. He seems to be relying heavily on Mr. Santangelo at present, but he appears to be capable. He did not feel sure of himself when he was asked about the action point for urine sample analytical data (the correct information was subsequently obtained from Santangelo). This point should be reviewed during the next inspection.

After the inspection, Mr. Harmon of DML was contacted by telephone and the information on licensing action was discussed with him. Mr. Harmon said that a letter will be sent to Nuclear Metals, requesting a re-submission of their license, due to inadequacies of the original renewal submission.

*W. G. Browne*  
W. G. Browne  
Fuel Facilities Inspector

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U. S. ATOMIC ENERGY COMMISSION

DIVISION OF COMPLIANCE

Region I

TITLE: WHITTAKER CORPORATION  
Nuclear Metals Division  
West Concord, Massachusetts  
License No. SNM-65  
Docket No. 70-82

Period of Inspection: July 30, 1968

This report does not contain any classified information.

Inspector: W. G. Browne 8/23/68  
W. G. Browne, Fuel Facilities Date  
Inspector

Reviewed by: H. W. Crocker 8/26/68  
H. W. Crocker, Senior Fuel Facilities Date  
Inspector, CO:I

BACK-UP NOTES TO FORM AEC-591

By: W. G. Browne, Fuel Facilities Inspector, CO:I

Date: August 23, 1968

Title: WHITTAKER CORPORATION  
Nuclear Metals Division  
West Concord, Massachusetts  
License No. SNM-65 (Docket No. 70-82)

Inspection Date: July 30, 1968

INTRODUCTION AND SUMMARY

1. An announced nuclear safety and health physics inspection was made of the Nuclear Metals Division facilities at West Concord, Mass., on July 30, 1968, by W. G. Browne, Fuel Facilities Inspector, CO:I. Mr. H. W. Crocker, Senior Fuel Facilities Inspector, CO:I, accompanied Mr. Browne on the inspection. The purpose of this inspection was to review operating procedures, the storage and control of special nuclear material and the Health Physics data. The last inspection of this facility was made on December 27 and 28, 1967.
2. No items of noncompliance were noted and a form AEC-591 was issued. At the time of the inspection, the Nuclear Metals Division had just completed a contract for machining some zirconium-uranium oxide material that involved less than 350 grams of U-235 total, so they were not processing Special Nuclear Material in the plant. Mr. Kneppel said that they do not anticipate any big contracts (more than 350 grams of U-235) for about a year.
3. Mr. Mario A. Perella is their new Health and Safety Director, replacing Mr. Raymond L. White, who left Nuclear Metals in June 1968. A review of the radiation and bioassay data showed that the essential program is continuing, although it was noted that Mr. Perella has not been following all of the programs as fully as his predecessor.
4. A criticality evacuation drill was held on July 10, 1968 and although there were no problems encountered, the time required for arrival at the assembly area was 45 seconds. A memorandum was circulated to all personnel admonishing them to improve on this evacuation time. Mr. Perella said he thought 15 seconds should be a reasonable time.
5. Nuclear Metals is changing their film badge system somewhat, since they are changing to "Gardray" film badges, supplied by Picker-Gardray, a division of Technical Operations. The new badges will all have colored identification pictures in the badge and a piece of indium foil on the badge. Film packs will be supplied for those people who work in areas that use radioactive materials. The badges will be left at the plant.

DETAILS

Scope

7. The storage of special nuclear material and the records on radiation and biological data were reviewed specifically and although no SNM processing was being performed at the time, the facilities were examined to determine what controls were in effect.

8. Persons Contacted:

Mr. M. A. Abreu, Representing the Plant Manager

Mr. David S. Kneppel, Criticality Officer

Mr. Mario A. Perella, Health and Safety Director

Mr. Peter J. Zagarella, Nuclear Control Monitor

Mr. John C. Santangelo, Consultant on Health Physics

License Application

9. Nuclear Metals submitted a license application dated January 1, 1968, but according to Mr. Kneppel it has not been approved yet. He said that he had taken their 1963 application and updated it by including the amendments that were made over the years. In his discussions with DML, he got the impression that the submission was satisfactory but that DML would like to have the license re-submitted, minus some of the details that were submitted in 1963. He does not plan to re-submit unless he gets a letter from DML requesting a new submission. Mr. Kneppel said that he is busy re-writing the safeguards manual now, so he will not do anything until DML contacts him.

Organization

10. Mr. Kneppel said that except for the new Health and Safety Director, there were no organization changes that affected nuclear or radiological safety, since the December 1967 inspection.
11. Mr. Mario A. Perella is the new director of Health and Safety at Nuclear Metals, and he replaces Mr. Raymond L. White, who left Nuclear Metals in June of 1968 to take a job with Harvard University. Mr. Perella does not have a Health Physics Technician in his organization, but he uses John C. Santangelo in a consultant capacity on health physics items. Mr. Santangelo has <sup>(b)(6)</sup> from his former work at Nuclear Metals so he is retired from regular work but he is spending a significant amount of time helping Mr. Perella. In addition, available on a consulting basis, are Sam Levin and Dr. A. O. Seeler at Massachusetts Institute of Technology, and Mr. Fred Viles of Harvard University.

12. Mr. Perello said that people who report to him at the plant are: Dr. John Japp, the medical doctor at the plant, Nina McLaren, a registered Nurse, and the 12 men in the Fire Brigade, who are Nuclear Metal's "first-line-of-defense" if radiological or criticality problems develop. These 12 men have had special training in both criticality and radioactive material hazards.

#### Production

13. Mr. Kneppel said that Nuclear Metals had just finished a contract, of less than 350 grams of Uranium-235, for Knolls Atomic Power Laboratory and that they were not currently processing any special nuclear material in the plant. A metal-like blank of Zirconium-Uranium oxide was supplied which they machined to some special design specifications. Mr. Kneppel thought that there was a possibility that there might be another order for this machined part sometime in the future, but that there was no contract that he knew about for as much as a year ahead, which would involve more than 350 grams of U-235. There is a possibility that they might do another big CP-5 contract in about a year, but SNM processing will probably be minimal until then, according to Mr. Kneppel.

#### SNM Storage and Inventory

14. It was noted that the storage of special nuclear material in the Bulter building was under good control and that the storage area housekeeping was very good. Mr. Zagarella said that most of their waste was either being buried or returned to the customer for recovery. The accountability records showed that there were about 9 Kgs of high enriched U-235 at the plant, after they made a 16 Kg., shipment of scrap on July 8, 1968. There were 2½ Kgs., of low enriched Uranium that was held under license SNM-65. (See Attachment A).

#### Evacuation Drill

15. A criticality evacuation drill was held on July 10, 1968 and no problems were encountered. The drill was unannounced to plant personnel and the Fire Chief for the town of Concord was an observer. The time required for evacuation and arrival at the assembly area north of the plant, was 45 seconds, compared to an expected time of about 15 or 20 seconds. A memorandum was prepared and circulated to all plant personnel encouraging them to do a minimum of talking on their way to the assembly area, so the evacuation time could be reduced.

#### Health Physics Records

16. Smear sample data for areas outside the production area were all below 4.0 dpm/100 square centimeters. Environmental air samples were less than  $1 \times 10^{-14}$  microcuries/milliliter.

17. Stack sampler data were generally less than  $10 \times 10^{-14}$  microcuries/milliliter of alpha, well below the  $3 \times 10^{-12}$  limit of 10CFR20, but four were significantly high:

| <u>Sample Description</u> | <u>Alpha - Microcuries/ml x 10<sup>-14</sup></u> |                          |
|---------------------------|--|--------------------------|
|                           | <u>10/16/67 to 2/28/68</u>                       | <u>2/28/68 to 4/8/67</u> |
| E-21                      | -  | 93.0                     |
| E-23                      | 33.2   | 95.0                     |
| Vacuum Exhaust - Right*   | 94.0   | 149.0                    |
| Vacuum Exhaust - Left     | 35.7   | 39.0                     |

\*Mr. Perella said that these data indicated a possible failure in the plant's vacuum exhausting system filters. Particle size is being checked to see if a few large particles, indicative of a torn bag filter, are causing the high sample readings.

18. Air samples taken in the production area were all below  $0.1 \times 10^{-12}$  microcuries/ml - alpha, for the period December 13, 1967 to April 5, 1968.
19. The film badge data did not show any significant radiation readings. Mr. Perella said that Nuclear Metals was changing to the Picker-Gardray film badges (Technical Operations) and that all badges would have a colored identification picture and a piece of Indium foil. The badges will be left at the plant. Film packs will be inserted for those employees who work in areas that contain radioactive material. The new system should be in effect by September 1968.
20. The bioassay data are derived from an annual urine sample (taken October 6, 1967) that is given a flurometric analysis. These data are recorded on the individuals' personnel cards. Of 97 samples taken, all but three were less than 5 dpm/per liter. The three persons above 5 dpm/liter were:

|        |   |   |           |
|--------|---|---|-----------|
| (b)(6) | - | 7 | dpm/liter |
|        | - | 7 | dpm/liter |
|        | - | 8 | dpm/liter |

21. Mr. Perella was asked at what point Nuclear Metals took additional action, such as re-sampling. He was not sure if a specific point has been established, but he said that results of 7 to 10 dpm/liter would be cause for further action, depending on whether the person worked in an area where some contamination could be expected. Mr. Santangelo informed the inspector that the action point for urine samples is 10 dpm/l.

Nuclear Safety Committee

22. Mr. Kneppel said that all items which could affect nuclear safety are

reviewed by a Nuclear Safety Committee, composed of Jack Yoblin, Plant Manager, Dave Kneppel, Mario Perella, Al Gilman, and consultants as appropriate. One item being considered as a process change is the fabrication of U-235 shot. This operation would be performed in a machine that is about 8 feet in diameter and about two feet thick. Mr. Kneppel said they would probably limit the total U-235 in the shot machine to 350 grams, to control criticality problems. No contract has been signed for making this U-235 shot as yet and Mr. Kneppel realizes that it would require a license amendments before the shot could be made.

#### Management Discussion

23. Those present were: Mr. M. A. Abreu, representing the Plant Manager, Mr. David S. Kneppel, Mr. Mario A. Perella, Mr. Crocker and Mr. Browne.
24. Mr. Abreu was informed that no items of noncompliance had been noted during the inspection and that a form AEC 591 was being issued.
25. It was noted that during the discussion of bioassay data, Mr. Perella had not been sure of what the action point was for requiring a second urine sample, based on the analysis data. Mr. Perella had agreed to establish an action point so this item will be discussed again during the next inspection. Mr. Abreu was told that the license action on Nuclear Metal's submission for SNM-65 has not been completed, but that DML expects to contact Nuclear Metals in the near future. Mr. Kneppel stated that he would not be taking any further action until he heard from DML.
26. The slow (45 second) criticality evacuation of July 10, 1968 was discussed briefly and it was noted that the memorandum encouraging people to refrain from talking until they reached the assembly area, seemed to be an appropriate action for improving the time required for complete evacuation of the building.

ATTACHMENT A

Inventory of Special Nuclear Material

June 30, 1968 Inventory of Uranium-235

Station Contract Material - U-235 75%

|                               | <u>Grams of U-235</u> |
|-------------------------------|-----------------------|
| Starting Inventory            | 25357                 |
| Receipts                      | 44                    |
| Shipments                     | 26                    |
| Process Loss                  | 3                     |
| Balance on Hand June 30, 1968 | 25,372*               |

\* A shipment of 16,472 grams of U-235 scrap was made on July 8, 1968. Of the remaining balance, 8,883 grams of U-235 was CP-5 scrap, which may be retained. The scrap could be reprocessed if they get a CP-5 contract next year.

SNM-65 Material - U-235 75%

|                               | <u>Grams of U-235</u> |
|-------------------------------|-----------------------|
| Starting Inventory            | 2974.90               |
| Receipts                      | 0                     |
| Shipments                     | 361.46                |
| Process Loss                  | 52.43                 |
| Balance on Hand June 30, 1968 | 2561.01               |