



UNITED STATES
ATOMIC ENERGY COMMISSION

DIVISION OF COMPLIANCE
REGION I

970 BROAD STREET
NEWARK, NEW JERSEY 07102

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January 6, 1970

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

WHITTAKER CORPORATION
NUCLEAR METALS DIVISION
WEST CONCORD, MASSACHUSETTS
LICENSE NOS. SNM-65 (DOCKET NO. 70-82) AND
SMB-179 (DOCKET NO. 40-672)

No items of noncompliance were observed during the inspection and an AEC-591 form for licenses SNM-65 and SMB-179 was issued in the field.

Corrective measures had been implemented regarding the item of noncompliance, for the lack of evaluations, that was observed during the previous inspection of September 3 and 4, 1969 of licenses SNM-65 and SMB-179. The corrective measures were satisfactory for the seven items involving health physics procedures.

Mr. Saul Isserow has assumed the responsibilities of the Criticality Officer replacing Mr. D. S. Kneppel, who has left the company.

The fabrication of CP-5 fuel elements was in progress during the inspection. This work is expected to be completed in the early part of 1970 and at the present time there is no other planned or scheduled work using enriched uranium.

In the Health and Safety Section of the present license application there are a number of references to studies performed back to 1958 which are used as a basis for health physics procedures. Since these procedures are applicable to both licenses SNM-65 and SMB-179 the licensee was encouraged to update the studies and document the information. Although the types of work performed with both depleted uranium and enriched uranium are still very similar to the work performed in 1958, the inspector feels that the studies for the basis of the procedures should be periodically reviewed. The review of these studies was discussed with Management and they appeared cooperative.

R. H. Smith
Radiation Specialist

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U. S. ATOMIC ENERGY COMMISSION
DIVISION OF COMPLIANCE
Region I

Title: WHITTAKER CORPORATION
Nuclear Metals Division
West Concord, Massachusetts
License Nos. SNM-65 and SMB-179
Docket Nos. 70-82 and 40-672

Period of Inspection: December 2 and 3, 1969

This report does not contain any classified information.

Inspector: R. H. Smith
R. H. Smith, Radiation Specialist

Jan. 6, 1970
Date

Reviewed by: H. W. Crocker
H. W. Crocker, Senior Fuel
Facilities Inspector

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BACK-UP NOTES TO FORM AEC-591

By : R. H. Smith, Radiation Specialist, CO:I

Date: January 6, 1970

Title: WHITTAKER CORPORATION
Nuclear Metals Division
West Concord, Massachusetts
License Nos. SNM-65 (Docket No. 70-82) and
SMB-179 (Docket No. 40-672)

INTRODUCTION AND SUMMARY

1. On December 2 and 3, 1969 an announced inspection was made of the Whittaker Corporation facilities at West Concord, Massachusetts, by R. H. Smith, CO:I. The primary purpose of the inspection was to review the corrective actions for the previous item of noncompliance and the current safety and health physics practices at the facilities. The last inspection of licenses SNM-65 and SMB-179 was made on September 3 and 4, 1969. The inspector was accompanied by H. W. Crocker, Senior Fuel Facilities Inspector, CO:I.
2. No items of noncompliance were found, so an AEC 591 form was issued in the field for licenses SNM-65 and SMB-179.
3. Mr. Saul Isserow has assumed the responsibilities of the Criticality Officer as a replacement for Mr. D. S. Kneppel, who is no longer with the company.
4. The CP-5 fuel element fabrication job was in progress and a secondary extrusion was observed during the inspection.
5. Work is continuing routinely on the casting of shielding devices for radio-graphy sources using depleted uranium.
6. There are no present plans for contract work using enriched uranium other than the current CP-5 fuel fabrication work.

DETAILS

Scope

7. The scope of this inspection included a review of the health physics records and practices, observations of air sampling methods, the criticality detector system and SNM storage.

Persons Contacted

8. Saul Isserow, Criticality Officer
M. A. Perella, Safety Director
P. J. Zagarella, Nuclear Control Monitor
J. C. Santangelo, Health Physics Consultant

Previous Item of Noncompliance

9. During the September 3 and 4, 1969, inspection of License Nos. SNM-65 and SMB-179 one item of noncompliance was noted which concerned improper evaluations of seven items. During the inspection it was verified that all items had been corrected. A summary of the items (all Condition 8 for License Nos. SNM-65 and SMB-179) and status of corrective action taken follows:
- a. The environmental samples of soil and water were not obtained in the spring of calendar year 1969 as stated in Section II.b.5(e). These samples were obtained in the month of October 1969.
 - b. In-plant air samples were not collected and analyzed on a monthly basis as stated in Section II.b.5(b). These samples were exchanged on a monthly frequency beginning with October, 1969.
 - c. The contamination smears of designated floor areas were not obtained on the frequency stated in Section II.b.5(c). Smear surveys were performed in October and November, 1969.
 - d. Exhaust stack air samples were not collected and analyzed each month as stated in Section II.b.5(d). All samples were collected during the months of October and November, 1969.
 - e. The exposure records did not include a proper evaluation of contaminated film badge dosimeters. An evaluation of the contaminated film badges was made by the licensee during the December 2 and 3, 1969, inspection.
 - f. An analysis of liquid waste was not performed quarterly as stated in Section II. b.6. All waste samples were collected and analyzed in October, 1969.
 - g. Air samples and contamination surveys had not been obtained during work as stated in Section II.b.5. These surveys were performed during portions of the CP-5 fuel fabrication work.

Plant Inspection

10. The inspector observed a secondary extrusion of a CP-5 fuel element that was extruded by the 1000 ton extrusion press. Other fuel elements were being machined to final dimensions in the machine shop. These two jobs were the only fabrication work being performed during the inspection. All work observed was being performed in accordance with license conditions.
11. The Butler building was inspected and it was observed that all SNM was properly stored and controlled.
12. A chain link security fence surrounds the Butler building and depleted uranium is stored within the boundary of the fence. The depleted uranium was properly stored. A radiation survey at the boundary of the fence showed all dose rates to be less than 0.5 mR/hr.
13. The criticality monitoring system was inspected and all five monitors were observed to be functioning. All were set to alarm at 10 mR/hr.
14. All fuel element tubes are radiographed on the second floor in the Mechanical Metallurgy section. Mr. Perella stated that surveys had been performed during radiographs and that since the elements were inside a shielded area the radiography did not contribute any exposure to personnel. He also stated that film dosimeters had been placed at this location and the film badge results for X-rays were negative.
15. The Arnold Greene Testing Laboratories, Inc., that is an authorized place of use for License SNM-65 has not been used since February 1968. Mr. Perella stated that some fuel elements were transported to this location for radiographing during February of 1968 and that this use is a planned one day job. The material is accompanied by a representative of the Nuclear Metals Division continuously until it is returned to the facility at West Concord, Mass. Presently there are no scheduled plans for using the facilities of the Arnold Green Testing Laboratories.

Environmental Water and Soil Samples

16. Soil and water samples were collected during the month of October. Seven samples each of soil and water were collected at seven well sites located on company property and seven samples each of soil and water were obtained off-site at distances up to three and one-half miles from the plant. The selected sample locations were based on prevailing wind directions and directional flow of the water table. All samples were analyzed for uranium alpha.
17. The maximum activity of soil samples obtained on company property was

8.7 microgram/gm and the maximum activity of off-site samples was 6.3 microgram/gm.

18. The maximum activity of water samples obtained on company property was 6 microgram/l and the maximum activity of water samples obtained off-site was less than 5 microgram/l.

In-Plant Air Samples

19. There are eleven locations in the plant where air samples are collected continuously, i.e., 24 hours each day for seven days/week. The flow rate varies from 0.5 to 0.9 l/min. All samples were exchanged on October 3, 1969 and the analysis for uranium alpha showed a maximum activity of $2.1 \pm 0.3 \times 10^{-12}$ uCi/ml and an average of all samples was 1.0×10^{-12} uCi/ml. All samples were exchanged on November 3, 1969 and had not been analyzed at the time of the inspection. Mr. Perella stated the samples would continue to be collected and analyzed on a monthly frequency.
20. The location of each of the in-plant samples was observed by the inspector and the selected locations appear to provide a satisfactory general air sample of the work locations.

Exhaust Stack Air Samples

21. There are 27 exhaust stacks that are sampled 18 hours each day for 5 days/week. Also there is one sampler on the roof to sample the general roof air and it is located on the roof edge in the area of prevailing winds from the stacks toward the sampler.
22. All exhaust air samplers have the filter paper (one inch glass fibre) located in the exhaust air stream at the top of the stack. The flow rates vary from 0.4 to 5.0 l/min., over the sampling period of one month. A pump located on the roof provides the air flow for all stack samplers. The method used for obtaining samples provides a representative sample of the exhaust stack effluents.
23. The sample records of the exhaust stacks were reviewed for samples that were collected from July 7, 1969 to September 29, 1969. The maximum concentration for a stack was $44.4 \pm 2.8 \times 10^{-14}$ uCi/ml with all other samples being $1 - 9 \times 10^{-14}$ uCi/ml. The roof sampler for this period was $1.2 \pm 0.3 \times 10^{-14}$ uCi/ml. Samples were collected from September 29, 1969 to November 3, 1969 and the maximum stack concentration was $29.4 \pm 3.6 \times 10^{-14}$ uCi/ml. The roof sample for this period was $0.6 \pm 0.3 \times 10^{-14}$ uCi/ml. All sample analysis were for uranium alpha.
24. The absolute filters for the exhaust stacks are routinely changed on a six month frequency or more often depending on pressure differential measurements.

Contamination Smear Surveys

25. During the month of October, 1969, smear surveys were performed at selected locations in the plant to determine contamination levels. There were a total of 20 floor surveys and the maximum activity detected was 8 dpm/100 cm² with an average of 2 dpm/100 cm². The survey results for smears in the cafeteria were all negative. An analysis had not been received from the consultant for smears obtained in November, 1969.
26. Mr. Perella stated that beginning with the month of December contamination smear surveys would also be obtained at selected plant locations and the contamination levels would be determined by surveying the smears with a portable instrument. Selected locations will also be surveyed with an instrument to determine levels of fixed contamination.

Film Badge Results

27. There are approximately 70 personnel wearing film dosimeters routinely and these are exchanged on a monthly frequency. The film badge service is provided by Landauer.
28. The records of film badge results were reviewed for calendar year 1969 through September 30, 1969. The inspector noted discrepancies in the reports supplied by the Landauer Company in that the calendar year exposure totals did not agree with the totals of individual badge periods. The following discrepancies are for two individuals:

	(units in mrem)			
	<u>Beta</u>	<u>Gamma</u>	<u>Beta</u>	<u>Gamma</u>
Total of monthly badges	0	*1610	630	390
Calendar year total reported	3070	1490	1240	390

- *Total contains results of contaminated badges that Landauer has not received corrected evaluations for.
29. Mr. Santangelo contacted the Landauer company by telephone regarding the discrepancies and was informed that they had experienced some difficulties with their computer programming. The Landauer company informed Mr. Santangelo that they would review the records and forward a corrected report for the film badge dosimeters.
30. During the inspection Mr. Perella evaluated the contaminated badge results and assigned exposures that were lower, based on surveys and film dosimeters of other employees doing the work. The evaluation of the contaminated film badges was performed by using a satisfactory method.

31. After the evaluations of the contaminated badges were completed there were no cases of exposure totals exceeding the limits of 10 CFR 20.
32. Mr. Perella was informed that when the exposure of personnel was reported to the Atomic Energy Commission on an individual basis the social security number and birth date should be listed for each. The necessity of auditing the exposure reports supplied by the Landauer Company was emphasized to Mr. Perella and Mr. Santangelo. They both stated that these reports would be audited in addition to reviewing and upgrading their system of exposure records.

Liquid Waste

33. The two 5,000 gallon liquid waste tanks have not been used since June, 1969. The combined aliquots from tank discharges during the period from March through June, 1969 were analyzed in October, 1969. The results of the analysis for U-235 content was 4×10^{-11} uCi/ml.
34. Mr. Perella stated that the tanks would probably be used again during the month of December and that samples of the aliquots would be analyzed.

Surveys During Work

35. Mr. Perella performed surveys during various phases of the CP-5 fuel element fabrication to determine contamination levels of equipment and airborne concentrations. The maximum contamination was on the lathe where elements are machined and was up to 2000 dpm/100 cm². The floor area around the lathe and other equipment used revealed no contamination had been spread to the floor.
36. An air sample was obtained to evaluate the fumes released by the 1000 ton press during the extrusion of a bare CP-5 fuel element. The analysis of the sample revealed a concentration of 0.07×10^{-12} uCi/ml. The fumes released by the press are exhausted to a filtered stack and is the primary potential for airborne contamination resulting from the work performed on the CP-5 fuel elements.

Bioassay Program

37. All workers in direct contact with radioactive materials are routinely sampled on an annual basis or at the completion of a contract involving SNM. Sample results were reviewed for calendar year 1969 through October.

38. The routine samples which are analyzed by the fluorometric method were all less than 5 microgram/l. The individuals performing the CP-5 fuel element fabrication work were also sampled and the samples were analyzed by the radiometric method for U-235. The maximum sample result was 14.4 ± 4.4 dpm/l.

Medical Program

39. A first aid medical facility is located in the plant and a nurse is available one-half day for 5 days/week. Dr. Seeler, MIT Medical Director comes to the plant twice each month and is also on call for the Nuclear Metals Division.
40. Medical examinations are provided for pre-employment and also on an annual basis. The examinations include complete chest X-ray, blood tests, urine tests etc. A program has also been started to obtain an electrocardiogram of each employee as a part of the medical record.

Materials Inventory

41. The following quantities of licensed material was possessed by the licensee:

Uranium greater than 75% enrichment	19.1 Kgs
Depleted uranium	21,263 pounds
Natural uranium	0 pounds
Thorium	0 pounds

All of the above quantities are within the possession limits of the licenses.

Management Discussion

42. Those present at the management discussion meeting on December 3, 1969 were; P. Ulf Gummeson, Manager, Nuclear Metals Division, M. A. Abreu, M. A. Perella and J. C. Santangelo (a consultant) of the Nuclear Metals Division and R. H. Smith and H. W. Crocker, CO:I.
43. No items of noncompliance were observed and an AEC 591 form was issued in the field for licenses SNM-65 and SMB-179.

44. Mr. Gummeson was told that the corrective actions taken for the item of noncompliance regarding the lack of evaluations for seven health physics practices observed during the inspection of September 3 and 4, 1969, were satisfactory.
45. Two of the items were further discussed where additional improvement would be desirable. These items were:
- a. Contamination smear surveys and surveys for fixed contamination with results determined by using portable instrumentation would determine problem areas before smear sample results could be obtained from an off site consultant. Mr. Perella stated that these types of surveys would be implemented during the month of December, 1969.
 - b. The deficiencies in the exposure reports supplied by Landauer were reviewed and the inspectors emphasized that it was the responsibility of the licensee to audit and evaluate these exposure reports. Mr. Perella stated that the exposure reports would be audited and evaluated.
46. Mr. Gummeson was informed that some of the procedures for health and safety contained in the present license application are based on studies that were conducted in 1958. These studies were performed to establish a basis for procedures such as air sampling methods, contamination control environmental monitoring, personnel exposure and waste disposal. A discussion followed regarding the need to perform updated checks of these studies for documented evaluations of the present conditions. Mr. Gummeson and his staff indicated a favorable attitude toward documenting updated studies to substantiate the basis for the procedures.