



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30303

OCT 18 1984

Report No. 70-1113/84-11

Licensee: General Electric Company
P. O. Box 780
Wilmington, NC 28402

Docket No. 70-1113

License No. SNM-1097

Safeguards Group No. III

Date of Inspection: July 30 - August 2, 1984

Inspector: B. L. Richards
B. L. Richards, Statistician

8/24/84
Date Signed

Approved by: J. E. J. McAlpine
J. E. J. McAlpine, Chief, Material Control and
Accountability Section, Nuclear Materials
Safety and Safeguards Branch, Division of
Radiation Safety and Safeguards

10/15/84
Date Signed

SUMMARY

Scope: This routine, unannounced inspection entailed 32 inspector hours on site in the areas of Measurements and Statistical Controls, Shipping and Receiving, Followup on Items of Noncompliance, and Followup on Unresolved Items and Inspector Identified Problems.

Results: Two violations were identified - failure to correctly calculate limits of error associated with uranium dioxide pellet shipments; and failure to organize a record system which allows for efficient retrieval of program information.

[REDACTED]

REPORT DETAILS

Report No. 70-1113/84-11

1. Key Persons Contacted

W. B. Haverty, Analyst, Licensing and Nuclear Materials Management
*W. J. Hendry, Manager, Regulatory Compliance
P. R. Jasinski, Process Control Specialist, Chemet Laboratory
*G. R. Mallett, Senior Engineer, Measurements and Statistics
*C. M. Vaughan, Manager, Licensing and Nuclear Materials Management
J. R. Watkins, Acting Manager, Powder Production

The inspector also interviewed several other licensee employees.

*Denotes those present at the exit interview

2. Exit Interview

The inspection scope and findings were summarized on August 2, 1984, with those persons indicated in Paragraph 1 above. The following issue was discussed in detail: failure to correctly calculate limits of error associated with uranium dioxide pellet shipments (violation - paragraph 4b). The licensee acknowledged this inspection finding and took no exceptions. The licensee did, however, question labeling the violation a repeat. Also discussed was the licensee's failure to retrieve measurement data associated with the random analytical (uranium) error calculation for uranium dioxide pellet shipments. During the week following the inspection, this concern was discussed internally with Region II management and also with the licensee in telephone conversations between C. Vaughan and B. Richards on August 6, 7, 8, and 10, 1984, and between C. Vaughan and E. McAlpine on August 7, 1984. After reviewing the situation, and finding that the request for information was made at a particularly bad time for the licensee as he was preparing to perform a physical inventory, the licensee was given additional time to find the information. When the licensee failed to find the information even with additional time, Region II considered the concern to be a violation (paragraph 4c). The licensee was advised of this decision via telephone conversation between C. Vaughan and B. Richards on August 10, 1984.

3. Measurements and Statistical Controls (85206B)

The licensee's methods for calculating control chart limits used in the Chemet Laboratory and for establishing control chart limits associated with uranium hexafluoride bulk measurements were examined. These areas were examined in conjunction with the inspection of the open items discussed in paragraphs 5d and 6a. The findings and conclusions are discussed in paragraphs 5d and 6a.

[REDACTED]

4. Shipping and Receiving (85208B)

- a. Various aspects of the licensee's program of accounting for SNM shipped and received were examined in conjunction with the open items discussed in paragraphs 5a, 5c, 5f, and 6b. Areas examined included the licensee's program for evaluating shipper-receiver differences (SRDs) (on a batch, total shipment, and cumulative basis), and the licensee's program for completing laboratory request forms associated with uranyl nitrate receipts. The findings and conclusions are discussed in paragraphs 5a, 5c, 5f, and 6b.
- b. During inspections conducted July 25-29, 1983, (reference Inspection Report 70-1113/83-21) and April 2-5, 1984 (reference Inspection Report 70-1113/84-06), it was determined that the licensee had incorrectly calculated limits of error associated with uranyl nitrate receipts. The reasons for the erroneous calculations (which led to violations 83-21-01 and 84-06-02) were incorrect factors being input into the limit of error (LE) calculation matrix, and deviations from routine sampling and analytical practices which caused inappropriate factors to be used in the LE calculation. The licensee has not received uranyl nitrate solution since their most recent corrective actions were implemented, therefore their current techniques for calculating LEs associated with uranyl nitrate receipts could not be examined.

During this inspection, the licensee's methods for calculating LEs associated with uranium dioxide pellet shipments were examined. Beginning in October 1983, the licensee began shipping uranium dioxide pellets to the Babcock and Wilcox, Commercial Nuclear Fuel Plant in Lynchburg, Va. A review of the LE calculations associated with uranium dioxide pellet shipments disclosed that the licensee had used improper techniques in the calculations. The licensee used incorrect factors in the random sampling (uranium) and random analytical (uranium) error components of the LE calculations for most shipments. The incorrect factors caused the biggest impact in the reported LEs for six recent shipments (NRC-741 transactions YLJ- YNJ 89 through 94, shipped between June 6 and July 25, 1984). The uranium concentrations applied to each of the lots in the shipments had been determined from two samples per lot. Each sample was analyzed once. The uranium concentration for each lot was determined from a total of two samples and two analyses. Therefore, a factor of two should be used in calculating the random sampling (uranium) and random analytical (uranium) error components of the LE. The licensee, however, used a factor of one in each case for each of the six shipments noted above. The licensee's erroneous techniques caused LEs (element weight) to be overstated in each of the six shipments. The table below shows the results of the licensee's erroneous calculation for the June 6, 1984 shipment.

	<u>Reported LE</u> <u>(Element Wt.)</u>	<u>Actual LE</u> <u>(Element Wt.)</u>
YLJ - YNJ 89		
(shipped 6/6/84)		
line item (lot 137)	1836 grams	1791 grams
total shipment	3646 grams	3598 grams

The impact on the other five shipments caused by the erroneous calculations was similar to that of the June 6, 1984 shipment.

For uranium dioxide pellets shipped prior to June 6, 1984, the licensee used a factor of ten in his random sampling (uranium) and random analytical (uranium) error components in the LE calculations. Most of the lots involved in these shipments, however, were only sampled twice for uranium concentration (each sample then analyzed once). The licensee's use of incorrect factors in these cases caused reported LEs to be understated. From a regulatory standpoint, this type of error is of a lesser concern when compared to the overstated LEs detected in the June-July 1984 shipments. The use of an understated LE is conservative in nature. The licensee, for example, reported an LE (element weight) of 1457 grams for lot 127 (April 25, 1984 shipment - YLJ-YNJ 82). Use of the correct factors yields an LE (element weight) of 1488 grams.

Some of the lots ("Conn Yankee" contracts) shipped prior to June 6, 1984, however, were sampled ten times for uranium concentration. The licensee's use of a factor of ten associated with the random sampling (uranium) and random analytical (uranium) error components thus yielded correct LEs. However, on occasion, the licensee sampled some of the Conn Yankee lots 20 times. The licensee's erroneous use of 10 for the applicable factor, rather than 20, caused reported LEs (element weight) to be slightly overstated in these cases. The uranium concentration for lot 90 (February 7, 1984 shipment - YLJ-YNJ 76), for example, was determined from 20 samples. The reported LE (element weight) for this lot was 1362 grams. The use of the correct factors yields an LE of 1358 grams.

The licensee's use of incorrect factors associated with the random sampling (uranium) and random analytical (uranium) error components did not cause errors in the reported LEs for isotopic weight. This is because the random analytical (isotopic) error was so large, compared to the other error variances used in the LE calculation, that this component totally dominated the reported LE (isotopic weight).

The causes of the licensee's use of incorrect factors in the LE calculation are similar to the causes of the two previous violations in this area. The licensee failed to input correct factors (to be consistent with the routine sampling plan) into the LE calculation matrix. Also, there appears to be inadequate communications with other departments to provide necessary information when deviations from routine sampling practices occurred. When these deviations occur, the

factors used in the LE calculation matrix must be adjusted accordingly. The licensee's failure to correctly calculate limits of error associated with uranium dioxide pellet shipments is a violation - (84-11-01). This is a repeat of the violations issued during the July 25 - 29, 1983 and April 2-6, 1984 inspections.

- c. As discussed previously, the random analytical (isotopic) error dominated the LE (isotope weight) associated with uranium dioxide pellet shipments. The LEs for element weight reported by the licensee were similar in magnitude to the LEs for element weight reported by the receiver. The LEs for isotope weight reported by the licensee, however, were routinely about five times larger than the LEs for isotope weight reported by the receiver. It should be noted that the licensee and the receiver have each pellet lot analyzed for enrichment by the same off-site laboratory. During the inspection, the inspector requested the measurement data which was used to calculate the random analytical (isotopic) error associated with uranium dioxide pellet shipments. The request was made on the morning of Wednesday August 1, 1984. The licensee was unable to furnish the inspector with the requested information through the end of the inspection (approximately 5 p.m. Thursday August 2, 1984). As of Friday August 10, 1984, the licensee was still unable to retrieve the requested measurement data. It appears that the licensee does not have a records system which allows for efficient retrieval of program information. The Office of Nuclear Material Safety and Safeguards published a generic letter (dated May 14, 1984) clarifying the intent of 10 CFR 70.57(b)(12), which states "The records system shall be organized for efficient retrieval of program information". Efficient retrieval has been determined to mean that the licensee shall be able to retrieve and provide any and all measurement control data generated during the last 12 months within 24 hours (1 working day). The licensee's failure to organize a record system which allows for efficient retrieval of program information is a violation. (84-11-02)

5. Followup on Items of Noncompliance (92702B)

- a. (Open) 84-06-03 (Violation) Failure to complete sample request form in accordance with written procedure.

During an inspection conducted April 2-6, 1984 (reference Inspection Report 70-1113/84-06), it was determined that the licensee had failed to complete a sample request form in accordance with the written procedure which resulted in improper analysis of a receipt of uranyl nitrate solution. The licensee stated in his response to the violation that the operator has misinterpreted the procedure. Discussions with licensee staff members indicated that all appropriate personnel have been reinstructed as to the intent of the procedure. In addition, this sampling procedure was discussed in the licensee's sampling training program meetings. However, the licensee has not received any uranyl nitrate solution receipts since the date fuel compliance was reached.

This item remains open pending review of future uranyl nitrate solution receipts.

- b. (Open) 84-06-02 (Violation) Failure to correctly calculate limits of error associated with uranyl nitrate receipts.

Inspection activities in this areas are discussed in paragraph 4b.

- c. (Closed) 84-06-01 (Violation) Failure to notify appropriate licensee management when significant shipper - receiver differences occur.

During an inspection conducted April 2-6, 1984 (reference Inspection Report 70-1113/84-06), the licensee's program for evaluating SRDs was examined. It was disclosed that significant shipper-receiver differences on a shipment of uranium hexafluoride received December 6, 1983, were not reported to the Manager, Licensing and Nuclear Material Management (L&NMM) as required by section 8.2.3.1. of the Fundamental Nuclear Material Control (FNMC) plan. In his response to the violation, the licensee stated that responsible individuals have been instructed, in writing, to follow the procedures with particular emphasis on obtaining review and a signature from the Manager, L&NMM when required. A review of recent receipts of uranium hexafluoride showed that the Manager, L&NMM was being notified when significant SRDs occurred. This item is closed.

- d. (Open) 83-28-01 (Violation) Failure to establish written procedure and failure to retain all data generated by the measurement control program.

During an inspection conducted September 20-23, 1983, it was determined that the licensee had failed to establish a procedure which addresses the periodic evaluation of control chart limits. In addition, subsequent written correspondence and telephone conversations between the licensee and Region II disclosed that the licensee had failed to retain records of the statistical calculations used in the evaluation of the NBL97 standard (used to monitor uranium concentration measurements of uranium dioxide power) for the August 10, 1982, through August 8, 1983, material balance period. An existing procedure (COI 002) has been revised to require that all control limits be recalculated each material balance period. The licensee also stated (in their response to the violation) that records relative to these calculations will be retained in accordance with procedure P/P 140-13.

The licensee updated control chart limits in the laboratory in January 1984 using standards data generated between January 1, 1983, and October 31, 1983. Most of the data from this time period was generated from the prior material balance period (August 10, 1982, through August 8, 1983), rather than the current material balance period. The licensee's procedure did not contain a provision for comparing the variance of the measurement data from the current material balance period to the variance of the measurement data from the prior material

balance period to determine whether the variances were not significantly different before combining. The Office of Nuclear Material Safety and Safeguards is currently reviewing this practice to determine its acceptability. (84-11-03) Therefore, this item remains open.

- e. (Open) 83-21-01 (Violation) Failure to correctly calculate limits of error associated with uranyl nitrate receipts.

Inspection activities in this area are discussed in paragraph 4b.

- f. (Closed) 83-17-01 (Violation) Failure to investigate and reconcile significant shipper - receiver differences.

During an inspection conducted June 13-17, 1983 (reference Inspection Report 70-1113/83-17), it was determined that the licensee had failed to properly investigate and reconcile significant SRDs associated with uranium hexafluoride receipts. The licensee's corrective actions included writing an internal memorandum to staff members which addressed the deficiencies discussed in the violation and modifying the applicable procedure (LNMMP 109). A review of current uranium hexafluoride receipts disclosed that significant SRDs were being properly investigated and reconciled, where appropriate. This item is closed.

6. Followup on Unresolved Items and Inspector Identified Problems (92701B)

- a. (Closed) 83-28-03 (Unresolved Item) Control limits associated with uranium hexafluoride bulk measurements.

During an inspection conducted September 20-23, 1983, the licensee's methods for establishing control chart limits associated with uranium hexafluoride bulk measurements were examined. The licensee staff member who established the control chart limits was not available for discussion at the time of the inspection. Recently, the licensee modified his FNMC Plan (per 10 CFR 70.32(c)) to allow plus or minus five pounds for control limits. The licensee's justification for establishing the five pound limit was examined. The five pound limit is approximately equal to a 0.001 action limit. It should be noted that the NRC has already approved this FNMC Plan modification. This item is closed.

- b. (Closed) 83-21-02 (Inspector Follow-up Item) Evaluation of cumulative shipper-receiver differences.

During an inspection conducted July 25-29, 1983, the licensee's program for evaluating cumulative shipper-receiver differences was examined. A programming error in the licensee's computer system prevented the acquisition of printouts displaying the CUSUM charts used to evaluate cumulative SRDs. During this inspection, computer printouts displaying cumulative SRDs (and their associated limits) for recent receipts of uranium hexafluoride and uranyl nitrate solution were examined. No significant trends were detected. This item is closed.

7. Enforcement Conference

a. NRC Attendees

J. P. Stohr, Director, DRSS
K. P. Barr, Branch Chief, NMSS
E. J. McAlpine, Section Chief, MC&A
J. B. Kahle, Fuel Facilities Project Manager

b. Licensee Attendees

C. M. Vaughan, Acting Manager, Regulatory Compliance

- c. NRC expressed their concerns regarding the repeat violations pertaining to limits of error associated with shipments and receipts of special nuclear material. The licensee presented an explanation of the causes of the violations and their tentative plans for remedial actions and stated that final remedy to prevent recurrence would be contained in their response to the violation identified in this report. —

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SGF:RLJ
70-1113

SEP 28 1984

General Electric Company
ATTN: Mr. C. M. Vaughan, Manager
Licensing and Nuclear Materials
Management
Mail Stop: M/C J-26
P.O. Box 780
Wilmington, North Carolina 28402

Gentlemen:

By means of this letter, we are revising License Condition 2.1 of Amendment MPP-3 to your License No. SNM-1097, effective immediately, to incorporate those changes made under the provisions of 10 CFR 70.32(c). Revised License Condition 2.1 is as follows:

- 2.1 The licensee shall follow the Fundamental Nuclear Material Control Plan dated June 24, 1977; as amended according to the schedule of pages dated March 21, 1984, transmitted by his letter from Charles M. Vaughan to J. P. O'Reilly (Region II) dated March 21, 1984, with the exception of those items delineated by the letter from J. Phillip Stohr (Region II) to J. A. Long dated August 10, 1984; and as may be further revised in accordance with the provisions of 10 CFR 70.32(c).

Pages 3-16 through 3-22 and Pages 7-7 through 7-17 marked "demonstration" use typical values for plant inventory and upper action limits for process control. Actual values for inventory, action limits, and custodial assignments will be maintained separately by licensee management on a current basis. Appendix A site description and Appendix D descriptive data for annual inventory are included for clarification and are not part of the BMMC Plan.

Sincerely,

15/

Willard B. Brown, Chief
Fuel Facility Safeguards
Licensing Branch
Division of Safeguards, NMSS

*See Previous Concurrence

8410240489

DISTRIBUTION
SGFF r/f & s/f
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Docket file 70-1113
Case file
Jackson, Weiss, Page, Cobb, Suarez, Stohr, RII

SGFF	SGFF	SGFF				
Jackson	Smith	Brown				
9/28/84	9/28/84	9/28/84				