



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W.
ATLANTA, GEORGIA 30323

AUG 13 1985

Report No.: 70-1113/85-04

Licensee: General Electric Company
Wilmington, NC 28401

Docket No.: 70-1113

License No.: SNM-1097

Facility Name: General Electric Company

Inspection Conducted: April 8-12, 1985

Inspector: C. M. Hohey
C. M. Hohey

8/6/85
Date Signed

Accompanying Personnel: D. Collins, Chief, EPRP Branch

Approved by: D. M. Collins
D. M. Collins, Branch Chief
Division of Radiation Safety and Safeguards

8/12/85
Date Signed

SUMMARY

Scope: This special, unannounced inspection entailed 40 inspector-hours onsite in the areas of followup on allegations, transportation of radioactive material, condition of UF₆ container shipped offsite for refurbishment, followup on previous enforcement matters and followup on previous inspector identified items.

Results: Three violations - Failure to include all bioassay data in the data base used to prepare a radiation exposure report provided a worker as required by 10 CFR 19.13c and sent to the NRC, transfer of special nuclear material to an unauthorized recipient, and failure to perform surveys as required by 10 CFR 20.201(b) and 20.103(a)(3).

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *W. C. Peters, Manager, Nuclear Safety Engineering
- *T. P. Winslow, Manager, CHEMET Lab
- *R. L. Torres, Manager, Radiation Protection
- S. P. Murray, Nuclear Safety Engineer
- P. S. Stansberry, Nuclear Safety Engineer
- F. S. Eschenlauer, Supervisor, Metallurgical Lab
- P. F. Hand, CHEMET Lab Shift Supervisor
- W. Lacewell, CHEMET Lab Shift Supervisor
- R. G. Lewis, Radiation Protection Shift Supervisor
- H. W. Ganius, CHEMET Lab Technician
- B. J. Beane, Senior Engineer
- R. Keenan, Nuclear Safety Engineer
- H. Fordham, CHEMET Lab Technician
- W. Bullard, CHEMET Lab Technician
- J. C. Lewis, CHEMET Lab Technician
- A. Neil, CHEMET Lab Technician
- C. G. McLamb, CHEMET Lab Shift Supervisor
- M. Thompson, CHEMET Lab Technician
- R. Hudson, Uranium Recovery-Test Operator
- M. Savage, CHEMET Lab Technician
- R. L. Brown, CHEMET Lab Test Operator-A
- J. R. Sutton, CHEMET Lab Test Operator-A
- B. F. Bentley, Manager, Fuel Chemical Operation
- J. R. Watkins, Acting Manager, Powder Production Unit
- E. Rouse, Radiation Protection Technician
- P. Flood, Heating, Ventilating and Air Conditioning Specialist
- G. M. Coronado, CHEMET Lab Technician
- *B. S. Dunn, Licensing Administration

*Attended exit interview

2. Exit Interview

The inspection scope and findings were summarized on April 12, 1985, with those persons indicated in paragraph 1 above. The violations involving failure to include all bioassay data in the data base used to generate a radiation exposure report provided a worker as required by 10 CFR 19.13c and sent to the NRC as required by 10 CFR 20.408(b) (Paragraph 8), failure to perform appropriate surveys as required by 10 CFR 20.201(b) and 20.103(a)(3) (Paragraph 4) and transfer of special nuclear material to an unauthorized recipient (Paragraph 5) were discussed in detail. Licensee management acknowledged the findings. However, they indicated that they intended to

deny the violation concerning incomplete exposure data on termination reports, because they believed NRC regulations did not require the licensee to provide a detailed report but rather a summary. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspector during this inspection.

3. Licensee Action on Previous Enforcement Matters

(Closed) Unresolved (84-17-01) This item was determined to be a violation of NRC requirements and is discussed in Paragraph 8.

4. Allegations, Discussions and Findings

NOTE: The pronoun "he" is used throughout this report without regard to the sex of the individual to protect the identity of confidential sources of information to the maximum extent possible.

a. Allegation

Licensee supervision covered up an incident involving spread of contamination that resulted from the cutting, grinding and polishing of uranium pellets in the Metallurgical Lab. They called it an "unusual incident" and documented it on microfiche.

Discussion

Based on discussions with licensee representatives and interviews with the individuals who were still employed at the plant and had any involvement with the incident, it was determined that the incident took place in May 1975. The incident involved the cutting and polishing of uranium fuel pellets in preparation for analysis in the Metallurgical Lab, an uncontrolled area. As a result of the cutting and polishing operation, the cutoff wheel and polishing wheel were contaminated.

Discussions with licensee representatives disclosed the following: Radiation Protection was not notified prior to this operation and consequently, appropriate airborne radioactivity and contamination control measures to minimize the spread of contamination were not in place prior to the work. Following the cutting and polishing of uranium pellets, the equipment was used to cut non-radioactive metal by lab personnel who had no knowledge of the contaminated condition of the equipment. One of the individual's interviewed stated that he overheard the lab supervisor tell a lab technician to cut and polish the pellets on the Metallurgical Lab equipment. The lab supervisor did not recall telling a lab technician to perform the cutting and polishing on equipment in the uncontrolled area. The lab supervisor questioned the logic of such a directive, since equipment for such work was available in the controlled area. Thus, the lab supervisor stated although he could not recall such an incident, he could not understand

why he would have given instructions to use the equipment in the uncontrolled area. It could not be determined why this equipment was used rather than the equipment located in the Wet Lab, a controlled area, which is normally used to prepare this type of sample for analysis. A lab worker, who had personal knowledge of the incident, sampled the cooling solution for the equipment and, when it was determined that the cooling solution contained uranium, notified Radiation Protection. Another worker who used the cutter for nonradioactive work became concerned because, during the cutting process, the cooling solution forms a mist which comes out when the door is opened to remove the sample. From a review of records, it was determined that Radiation Protection surveyed the equipment and found 1500 dpm/100 cm² and 300 dpm/100 cm² on the cutoff wheel and the polishing wheel, respectively. Direct contamination readings (fixed and removable) were 25,000 dpm/probe area and 3000 dpm/probe area on the cutoff wheel and the polishing wheel, respectively. The cooling system was sampled and found to have a radioactivity concentration of 1.11×10^{-4} μ Ci/ml. The cooling liquid was disposed of as radioactive waste. The equipment was decontaminated and released the same day.

The licensee investigated the incident in accordance with Nuclear Safety Instruction 0.22, Incident Investigation, and completed a form entitled "Investigation for Exceeding NSE Action Guides." The investigation determined that the surface contamination action guides had been exceeded and a procedure violation occurred. Actions taken to prevent a recurrence included requiring prior approval from Nuclear Safety Engineering and issuance of a radiation work permit to handle radioactive material in the Metallurgical Lab. The report indicated that a copy was sent to the CHEMET Lab Manager, Manager, Nuclear Safety Engineering and the Supervisor, Radiation Protection.

The licensee routinely microfiches records that are to be retained in order to minimize the storage space required. Most "out-of-the-ordinary" radiation protection events are called "unusual incidents" and historically, have been usually investigated by the licensee. The classification of this event as an unusual incident and the microficheing of the records were not unusual and did not appear to represent an attempt on the part of licensee management to coverup the incident. Neither NRC regulations nor license conditions required the licensee to report violation of plant procedures or spreads of radioactive contamination in the facility, unless such violations fall under the reporting requirements of 10 CFR 20 or 10 CFR 70. This incident was not reportable under the requirements stated above.

10 CFR 20.201(b) requires that each licensee make such surveys as may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and are reasonable under the circumstances to evaluate the extent of radiation hazards that may be present. As stated in 10 CFR 20.201(a), a "survey" is an evaluation of the radiation hazards incident to the production, use, release, disposal, or presence of radioactive materials or other sources of radiation under a specific

set of conditions. 10 CFR 20.103(a)(1) requires that no licensee shall possess, use, or transfer licensed material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive materials in air as specified in Appendix B, Table 1, Column 1. 10 CFR 20.103(a)(3) requires for purposes of determining compliance with the requirements of this section, the licensee use suitable measurements of concentrations of radioactive materials in air for detecting and evaluating airborne radioactivity in restricted areas.

A review of the whole body counts for the two individuals directly involved in the use of the cutoff wheel and the polishing wheel, which have been performed since the event, indicated that the deposition of radioactivity in the workers have been less than the minimum detectable level of the whole body counter at the time the counts were performed. (approximately 75 micrograms of uranium 235.) One of the individuals received a whole body count on 9/16/75. The other individual received a whole body count on 9/19/75. Whole body counting is the appropriate bioassay method since the airborne material potentially generated by the cutting and polishing would have been insoluble. The licensee's bioassay program was conducted in accordance with the guidelines contained in Regulatory Guide 8.11, June 1974.

Finding

The allegation was substantiated as far as the occurrence of the incident. However, the inspector found no evidence which would indicate that licensee management attempted to cover up the incident. The incident was investigated in accordance with licensee procedures and appropriately documented. Microfiching the records of the incident was a normal evolution for the licensee and a standard industry practice to reduce the storage space required for archived records.

Failure to perform airborne radioactivity surveys as may be necessary to demonstrate compliance with 10 CFR 20.103 was identified as an apparent violation of 10 CFR 20.201(b) (70-1113/85-04-03).

A whole body count result of 75 micrograms uranium 235 (the minimum detectable level of the counter at the time of incident) represents less than 35 percent of a maximum permissible lung burden (MPLB). A maximum permissible lung burden is that quantity of uranium deposited in the lungs which, if continuously present, would result in the maximum permissible annual dose to the lungs of 15 Rems after long term exposure. A whole body count result of 75 micrograms uranium 235 would represent an intake of approximately 50 percent of the NRC limit.

No violations or deviations were identified.

b. Allegation

The criticality alarm frequently sounded during a midnight shift and may not have been properly repaired.

Discussion

Through discussion with licensee representatives and reviews of licensee records, it was determined that the event referenced in the allegation occurred on February 4, 1985. A DC power supply failed causing batteries in the system to lose their charge. As the battery voltage decreased to the point where it could no longer supply the power required to operate the system if AC power was lost, the system automatically sounded the criticality warning alarms. After the power supply was replaced, the licensee had trouble resetting the system to normal AC operation. However, this was corrected on February 4, 1985.

Nuclear Safety Instruction 0.4 required that the system be tested every Friday. Two detectors common to a particular area were simultaneously exposed to radiation sources and the entire system tested, including sounding the alarm. The two detectors chosen each week are different so all data acquisition modules are periodically checked.

The inspector reviewed the results of the test performed in the month of February 1985. The test results indicated that the criticality warning systems were functioning properly after the repairs to the DC power supply.

Finding

The allegation was not substantiated. Discussions with Radiation Protection personnel indicate that multiple alarms were not experienced on February 4, 1985, but, rather a single alarm was sounded. Also, discussions with licensee representatives and review of records indicate that Radiation Protection personnel provided continuous radiation monitoring in the plant while the criticality warning system was inoperable. The system was repaired and subsequent test indicated it was functioning properly.

No violations or deviations were identified.

c. Allegation

An individual's work area in the CHEMET Lab was repeatedly contaminated when he came to work.

Discussion

The individual who alleged that his work station was contaminated frequently when he came to work was interviewed by the inspector to determine the extent of the contamination, the probable cause, and licensee action, if reported. The individual indicated that he had a concern in the latter part of 1984 and early 1985 with contamination being left by a previous shift. However, when he reported the concern to his supervisor, it was corrected. He also stated that in recent months the work area had been left clean by the previous shift. The inspector also questioned the individual who worked at the same work station on the previous shift, concerning cleanliness in the lab and supervision's attention to lab cleanliness. The individual indicated that he had always stopped work periodically and cleaned his work station. He also stated that each supervisor frequently emphasized that lab workers should clean up spills of material and that cleanliness in the lab had improved significantly in the last three or four months.

Finding

The allegation was substantiated. However, when the individual brought the concern to the attention of the CHEMET Lab Supervisor, the supervisor took appropriate actions and he had no further problem with finding contamination at his work station.

No violations or deviations were identified.

5. Transfer of Radioactive Material

The inspector reviewed the events surrounding the transfer of six UO_2 powder samples to an unauthorized recipient.

In discussions with licensee representatives and reviews of licensee records, the inspector determined that on February 22, 1985, the licensee prepared six UO_2 powder samples containing a total of 6.09 grams of Uranium 235 for shipment to a testing laboratory. The six vials were packaged in a one-gallon pail, with a fiber carton overpack. At the same time, another package containing no special nuclear material was also prepared for shipment to a different addressee. Both packages were properly addressed. However, the package which contained no special nuclear material was to be shipped by the same carrier by "next day air." The carrier representative signed the "next day air" label and by, affixing the label to the wrong package, covered the correct address label. Both packages were delivered to the same consignee. The receiver discovered the mixup when the package containing special nuclear material was opened, and it was observed that the inner pail was labeled "Radioactive Material." The receiver notified the licensee and was directed to ship the packages to the correct address. The licensee verified it arrived at the correct destination.

A review of licensee records indicated that the package containing special nuclear material was identified as limited quantity and was properly packaged, labelled and met the requirements of 49 CFR 173.421 for shipment to the intended recipient. The packing list in the package identified the material as radioactive material, limited quantity. The NRC was notified by the licensee of the incorrect shipment on February 25, 1985.

10 CFR 70.42 requires that no licensee transfer special nuclear material except as authorized pursuant to this section. The transfer of the six UO_2 samples to a company not licensed to receive the material was identified as an apparent violation of 10 CFR 70.42 (85-04-01). The transfer was not authorized pursuant to 10 CFR 70.42.

6. UF_6 Cylinder Shipment

In discussions with licensee representatives and reviews of licensee records, the inspector reviewed the emptying procedure for UF_6 cylinders and the preparation of the empty cylinder for shipment for refilling or refurbishment.

On February 26, 1985, an NRC licensee, which refurbishes cylinders, was preparing to clean a cylinder from General Electric. Refurbishment company personnel determined that the cylinder valve was plugged when they attempted to add water to the cylinder. When the plug was removed, the cylinder depressurized causing a small release of UF_6 gas from the cylinder.

The licensee records indicated that the cylinder was emptied at General Electric between October 15 and 18, 1984. A review of licensee logs by the inspector showed that nothing unusual occurred during the vaporization process and that the amount of material remaining in the cylinder was typical.

Licensee Procedure PROD 10.10, UF_6 Cold Trap, specified how the licensee reduced the UF_6 remaining in the cylinder to a minimum. Logs and records reviewed by the inspector indicated that nothing unusual occurred during the performance of this procedure. Licensee representatives stated that this operation would normally leave the cylinder with a slight negative pressure. However, on occasion a slight positive pressure had been experienced. The procedure called for the process to continue until the vacuum remained constant. A licensee representative indicated it was possible for the vacuum to remain constant with the valve plugged. The operator would have no way of knowing this condition existed. A review of licensee records indicated that the net weight of the cylinder, prior to shipment was typical.

NRC Certificate of Compliance 4309 specified special provisions for use of this cylinder for shipping UF_6 . It contained no special shipping instructions for empty cylinders. The review of the licensee records indicated that the licensee followed the provision of the certificate of compliance.

No violations or deviations were identified.

7. Followup on Previous Inspector Identified Item (IFI)

(Closed) IFI (84-17-04) Contamination Surveys in the CHEMET Lab and cleanup of spills. This item pertains to the frequency and quality of radioactive contamination surveys performed in the CHEMET Lab by Radiation Protection personnel and the notification and cleanup of spills. In discussions with licensee representatives and reviews of survey records, the inspector determined that since the inspection of November 27-30, 1984 (70-1113/84-17), the licensee has been performing routine contamination surveys in the CHEMET Lab two or three times per week. During each survey the Radiation Protection technician would survey, in detail, a particular part of the lab, in addition to performing random loose and fixed contamination surveys. The area selected for a detailed survey was changed each time the lab is surveyed. Therefore, the entire lab received a detailed survey every two or three weeks. In addition, in a letter dated May 9, 1985, and telephone call on July 10, 1985, the licensee notified the NRC that the CHEMET Lab was now classified as a controlled area with special contamination limits (lower than controlled area limits). Previously, the licensee had classified the area as semi-controlled with contamination control action points very much lower than controlled area action points. As a controlled area, the licensee's procedures for controlled areas, General Controlled Area Rules, would be applicable to the CHEMET Lab. These procedures require cleanup of spills as soon as possible and notification of Radiation Protection of large spills.

The inspector reviewed the results of contamination surveys performed in the lab in 1985 and noted that the number of contaminated areas found on each survey was declining. The inspector also noted that surveys were being performed in areas with the highest potential for contamination spills.

The licensee has provided the CHEMET Lab with a survey instrument which was used to monitor work area contamination levels, particularly after a spill. If contamination was identified, lab personnel were to clean up the spill and notify Radiation Protection for a final survey.

The frequency and scope of contamination surveys in the CHEMET Lab appears to be adequate. The inspector had no further questions.

8. Radiation Exposure Records

Followup on an allegation that an alleged had been furnished incomplete radiation exposure results, in that the record had incomplete film badge/thermoluminescent dosimeter (TLD), urinalysis and whole body count data, resulted in the identification of an unresolved item in Inspection Report No. 70-1113/84-17. The completeness of the termination exposure record was identified as unresolved pending establishment, by the licensee, of the dates when whole body counts, external monitoring, urinalysis and assigned airborne programs began and a review of licensee records by the inspector to

determine if pertinent information had been omitted from the termination radiation exposure record provided to the alleged.

10 CFR 20.202(a) requires that each licensee supply appropriate personnel monitoring equipment to, and require the use of such equipment by each individual who enters a restricted area under such circumstances that he receives, or is likely to receive, a dose in a calendar quarter in excess of 25 percent of the applicable value specified in paragraph (a) of 10 CFR 20.101. The inspector reviewed the external radiation monitoring device (film badge/thermoluminescent dosimeter) issue records for the period of 1968 (plant startup) to 1985 and discussed the records with licensee representatives. The records indicated that individuals assigned to the CHEMET lab were issued monitoring devices between 1968 and the first quarter 1971. No monitoring devices were issued between the 2nd quarter 1971 and the 2nd quarter 1976. In reviewing the exposure data for CHEMET Lab personnel for the period of 1968-1971, it appeared that personnel monitoring specified by 10 CFR 20.202 would not have been required for CHEMET Lab personnel. The alleged was issued a monitoring device beginning with the third quarter 1976 until he was transferred out of the Lab in 1984.

Through reviews of records and discussions with license representatives, it was determined that the licensee used several methods for evaluating an individual's radiation dose resulting from the internal deposition of radioactivity. These included an assigned airborne exposure value derived from the time spent in the work area and the air concentration measured in the work area, whole body counts for evaluating the uptake of insoluble material and urinalysis results for evaluating the uptake of soluble materials. A licensee representative stated that normally dose calculated from assigned airborne radioactivity data is included on the termination report provided to the worker unless, an unusual whole body count or urinalysis indicated that one of these methods should be used to calculate the highest dose resulting from internally deposited radioactivity. During the review of the exposure records for CHEMET Lab personnel, the inspector noted that data for the period of February 1979 through May 1982 was omitted from the assigned airborne exposure data available for the internal dose assessment of some individuals. The licensee determined that the omission of the data was the result of a change over in computer programs, and that the data for the period was available. The inspector reviewed the data omitted from the termination report.

A review of licensee records indicated that the routine calculation of assigned airborne exposure began for the CHEMET Lab in November 1973. the highest exposure for a calendar quarter was 17 MPC-hrs. 10 CFR 20.103(a)(1) states that no licensee shall possess, use or transfer licensed material in such a manner as to permit any individual in a restricted area to inhale a quantity of radioactive material in any period of one calendar quarter greater than the quantity which would result from inhalation for 40 hours per week for 13 weeks at uniform concentrations of radioactive material in air specified in Appendix B, Table I, Column 1 (520 MPC-hrs).

In addition to using suitable measurements of concentration of radioactive material in air for detecting and evaluating airborne radioactivity in restricted areas, 10 CFR 20.103(a)(3) requires the licensee to use measurements of radioactivity in the body, measurements of radioactivity excreted from the body, or any combination of such measurements as may be necessary for timely detection and assessment of individual intakes of radioactivity by exposed individuals.

The inspector reviewed the bioassay data for the alleged. During this review, the inspector noted that whole body counts received by the alleged prior to 1977 were omitted from the radiation exposure record provided to the alleged. The alleged received whole body counts prior to 1977 on May 6, 1974; August 31, 1974; December 10, 1975; March 17, 1976; and November 29, 1976. All of the results were less than the minimum detectable level of the whole body counter which ranged between 75 and 55 micrograms of uranium 235. A whole body count result of 75 micrograms uranium 235 (the highest minimum detectable level of the counter) represents less than 35 percent of a maximum permissible lung burden (MPLB). A MPLB is that quantity of uranium deposited in the lungs which, if continuously present, would result in the maximum permissible annual dose to the lungs of 15 rems after long term exposure. A whole body count result of 75 micrograms uranium 235 would also represent an intake of approximately 50 percent of the NRC limit.

A licensee representative stated that whole body counts performed prior to 1977 had not been included in the data base used to generate the termination report. The specific reason for this omission could not be determined.

The inspector also reviewed the urinalysis data for the alleged. Although the termination report received by the alleged did not contain a listing of urinalysis data prior to January 1983, the licensee has the individual reports for weekly urinalysis performed prior to January 1983. However, this information was not added to the data base used to generate the termination report. In reviewing the data, the inspector noted that all the results were less than the licensee's action level of 15 micrograms per liter ($\mu\text{g/l}$). An elimination rate of 15 $\mu\text{g/l}$ measured on the last day of the work week from an intake of uranium received on the first day of the work week represents approximately 25 percent of the NRC intake limit specified in 10 CFR 20.103(a)(2).

A licensee representative stated that due to the low levels measured that the inclusion of the missing data in the termination report probably would not alter the final internal dose reported for the alleged. In addition, the licensee representative stated that the report given to the alleged was not typical, in that a detailed report of all bioassays are not normally provided, instead a total dose to the critical organs is calculated using the assigned airborne data in the data base and these values reported.

10 CFR 19.13(c) requires at the request of a worker formerly engaged in licensed activities controlled by the licensee, that each licensee furnish to the worker a report of the worker's exposure to radiation or radioactive material. Such reports shall be furnished within 30 days from the time the request is made, or within 30 days after the exposure of the individual has been determined by the licensee, whichever is later. The report shall cover, within the period of time specified in the request, each calendar quarter in which the worker's activities involved exposure to radiation from radioactive material licensed by the Commission. 10 CFR 20.408(b) requires that when an individual terminates employment with a licensee, the licensee shall furnish the NRC a report of the individual's exposure to radiation and radioactive material, incurred during the period of employment or work assignment in the licensee's facility, containing information recorded by the licensee pursuant to 10 CFR 20.401(a) and 20.108.

Through reviews of licensee records and discussions with licensee representatives, it was determined that the licensee failed to review all of the individual's bioassay data (assigned airborne, whole body counts and urinalyses) available to the licensee prior to reaching the conclusion that whole body count and urinalysis data would not have significantly altered the dose due to internally deposited radioactivity reported to the individual and the NRC. Subsequent reviews of the data by the licensee indicated that inclusion of this data would not have altered the results. Reviews of records and discussions with licensee representatives, indicated that the dose due to internally deposited radioactivity was based on incomplete assigned airborne data.

Failure of the licensee to include all of available assigned airborne information in the data base used to generate the termination report given to the allegor on July 17, 1984, and sent to the NRC on October 19, 1984, was identified as an apparent violation of 10 CFR 19.13(c) and 10 CFR 20.408(b) (85-04-02).