



Westinghouse Electric Company LLC
Nuclear Fuel
Columbia Fuel Site
P.O. Drawer R
Columbia, South Carolina 29250
USA

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk,
Washington, DC 20555-0001

Direct tel: 803-647-2045
Direct fax: 803-695-3964
e-mail: couturgf@westinghouse.com
Your ref:
Our ref: LTR-RAC-09-86
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December 21, 2009

Subject: Report of Concentrations of Radioactive Material Exceeding Limits Outside of a Restricted Area (Docket No. 70-1151, License No. SNM-1107)

Reference: 10 CFR 20.2203, "Reports of exposures, radiation levels, and concentrations of radioactive material exceeding the constraints or limits"

Dear Sir:

As required by 10 CFR 20.2203(a)(3)(ii), this letter submits the Westinghouse Electric Company LLC (Westinghouse) report of an occurrence identified at the Westinghouse Nuclear Fuel Site Columbia, SC involving levels of radioactive material on Westinghouse property outside of the restricted area that exceeded the applicable limits of 10 CFR 20, Appendix C. As detailed further in the attached report, this occurrence did not involve any significant occupational dose or exposure of an individual in excess of the limits in 10 CFR 20.1301.

Pursuant to 10 CFR 20.2203(b), the attached report describes the extent of exposure of individuals to radiation and radioactive material, including: (1) estimates of the individual's dose; (2) the levels of radiation and concentrations of radioactive material involved; (3) the cause of the elevated concentrations; and (4) corrective steps taken and planned to ensure against recurrence. The attached report is provided by the required December 23, 2009, report due date.

If you have any questions concerning this letter, please contact me at 803-647-2045.

Sincerely,


Gerard F. Couture
Manager, Licensing & Regulatory Programs
Columbia Fuel Fabrication Facility

Enclosure: Report of Concentrations of Radioactive Material Exceeding Limits on Westinghouse Property Outside of the Restricted Area

cc: U. S. Nuclear Regulatory Commission, Region II
Mr. Richard Gibson
Sam Nunn, Atlanta Federal Center
61 Forsyth Street, SW., Suite 23T85
Atlanta, GA 30303

U. S. Nuclear Regulatory Commission
Mr. Christopher Ryder, Project Manager
Fuel Manufacturing Branch
Division of Fuel Cycle Safety and Safeguards
11545 Rockville Pike
Mail Stop EBB2-40
Washington, DC 20852

REPORT OF CONCENTRATIONS OF RADIOACTIVE MATERIAL EXCEEDING LIMITS
ON WESTINGHOUSE PROPERTY OUTSIDE OF THE RESTRICTED AREA

This report addresses an occurrence involving storage of 30,017 lbs of internally radiologically contaminated tubes inside of a Sea Land Container on Westinghouse Columbia Fuel Fabrication Facility (CFFF) property outside of the restricted area, known as the CAA. The levels of radioactive material contained within these tubes exceeded the applicable limits of 10 CFR 20, Appendix C, requiring posting and labeling pursuant to 10 CFR 20.1902 and 10 CFR 20.1904.

In an effort to alleviate crowding in the shipment preparation areas within the CAA, empty containers are periodically moved outside the CAA fence. Sea Land Container WEC700, which contained 30,017 pounds of contaminated Zirc tubing, had not been posted and was thought to be empty. This container was already on a trailer and was moved outside the CAA on Monday 11-23-09. On Wednesday 11-25-09 it was discovered that this container had not been correctly posted and tamper-sealed and it was moved back inside the CAA. Therefore a potential dose was estimated for an individual who might have been exposed to the container over this 48 hour period.

The Fundamental Nuclear Material Control (FNMC) Plan for CFFF, Rev 38, on page 6.21 provides: "Items expected to have only surface contamination are screened by use of this method, surface area estimated, and the standard survey is performed. Items thus shown to be contaminated with less than 0.5 grams U-235 may be placed directly into a low-level radioactive waste disposal container with no further analysis performed. Each container will contain less than 10 grams U-235, based on the survey measurements of contained items; and, the total U-235 on all surveyed items in all such containers is limited to 150 grams in any material balance period."

The enriched uranium in Sea Land WEC700 is in the form of surface contamination only on the inside surface of empty zirconium fuel tubes. The quantity of uranium was determined using a standard radiological survey measurement method as approved by the NRC and documented in

the Fundamental Nuclear Material Control (FNMC) Plan, Rev 38, on page 6.21.

Generation of this type of scrap occurs when loaded fuel rods are rejected and cannot be repaired. These rejected fuel rods are scrapped by cutting off end plugs and removing all pellets. The tubes are confirmed to be empty by two operators and a bundle, normally consisting of 35 tubes, is wrapped in plastic and weighed in accordance with COP-831001, "Handling, Processing & Disposing LLRS". The weight of the zirc tubing is multiplied times a contamination factor to provide the U/U-235 content. Each bundle contains approximately 37 pounds of metal with an estimated U235 content of 0.02 grams.

Previously, this material was placed in containers smaller than a Sea Land, such as a 55 gallon drum. However, this scrap metal is no longer placed in such smaller containers, but is placed directly into one or more Sea Land containers which are gradually filled over the Material Balance Period (MBP). In the case of contaminated zirc tubing, the tubes are bundled together in manageable numbers and weighed; as noted above, each bundle averages 0.02 grams U-235. The 10 gram U-235 limit per container will always be exceeded if the container is a Sea Land. Consequently, this limit is no longer necessary and would preclude the allowance of 150 grams U-235 per Material Balance Period (MBP). The 150 gram U-235 per MBP limit alone provides the necessary limitation on the amount of material measured by this technique as it impacts our ability to account for SNM within a MBP. Therefore, the statement "Each container will contain less than 10 grams U-235, based on the survey measurements of contained items" will be removed from the FNMC as a 70.32 revision. This change will not reduce the effectiveness of material control and accounting at this facility since the 150 gram limit per MBP will remain.

The reporting requirements of 10 CFR 20.2203(a)(3)(ii) were triggered in that concentrations of radioactive material in unrestricted areas were in excess of 10 times the applicable limit set forth in 10 CFR 20, Appendix C, for posting and labeling as required by 10 CFR 20.1902(e), 10 CFR 20.1904, and 10 CFR 20.1905(a). Therefore, Westinghouse Electric Company LLC (Westinghouse) provides the required written report meeting the content requirements of 10 CFR 20.2203(b), which states:

Contents of reports. (1) Each report required by paragraph (a) of this section must describe the extent of exposure of individuals to radiation and radioactive material, including, as appropriate:

(i) Estimates of each individual's dose; and

(ii) The levels of radiation and concentrations of radioactive material involved; and

(iii) The cause of the elevated exposures, dose rates, or concentrations; and

(iv) Corrective steps taken or planned to ensure against a recurrence, including the schedule for achieving conformance with applicable limits, ALARA constraints, generally applicable environmental standards, and associated license conditions.

Radiological surveys were performed of a sample of typical contaminated Zircaloy tubing on 11-30-09 to relate quantity of uranium per surface area to material net weight. Weighing the contaminated zirc metal in bundles is more accurate than counting tubes as the basis for estimating uranium quantity. The results of this survey and calculations used to arrive at the factors are documented in Calc Note CN-SB-07-13 rev 1, "Determination of the Quantity of Uranium as surface contamination on scrap metal".

The factors derived as described in the calc note are as follows:

0.0123 grams U/pound Zirc

0.000528 grams U-235/pound Zirc

The total weight of Zirc in Sea Land container WEC700 is 30,017 pounds in approximately 816 - 37 pound bundles. The total uranium and U-235 are:

Total Uranium: 30,017 pounds * 0.0123 grams U/pound = **368 grams U**

Total U-235: 30,017 pounds * 0.000528 grams U-235/pound = **16 grams U-235**

In addition to the contaminated Zirc tubing, the Sea Land container itself has loose contamination on the inside walls. This was surveyed by HP on 12/1/2009 and determined to be 1,423 dpm/100 cm² and the inside surface area was also measured and is 713,495 cm². This contributes another 2 grams uranium and 0.1 gram U235 to the total contamination inside the Sea Land.

Total Contamination:

Total Uranium: = **370 grams U**

Total U-235: = **16 grams U-235**

Activity: = **1,030 µCi uranium**

(876 µCi U-234, 34 µCi U-235, 1 µCi U-236, 119 µCi U-238)

Potential Dose Analysis:

In an effort to alleviate crowding in the shipment preparation areas within the CAA, empty containers are periodically moved outside the CAA fence. Sea Land Container WEC700, which contained 30,017 pounds of contaminated Zirc tubing, had not been posted and was thought to be empty. This container was already on a trailer and was moved outside the CAA on Monday 11-23-09. On Wednesday 11-25-09 it was discovered that this container had not been correctly posted and tamper-sealed and it was moved back inside the CAA. Therefore a potential dose was estimated for an individual who might have been exposed to the container over this 48 hour period.

1. 10 CFR 20.2203(b)(1)(i) - Estimates of Each Individual's Dose

An individual who entered the sea land container and stayed inside for the full 48 hours could have received a total dose of 0.048 REM or .48 mSv.

External Dose

The uranium contamination is evenly spread out over the inside of approximately 28,000 tubes. There is little or no contamination on the outside of the tubes and they are wrapped in plastic. Although the survey readings indicated no measurable dose rate conservatively assume the dose rate to be 0.5 mR/hr for 48 hours for a total of 24 mrem external dose.

Internal Dose

The removable contamination on the walls and the exposed floor of the Sea Land (1,400 dpm/100 cm²) were on the same order of magnitude of contamination as found in our contaminated production areas. A conservatively high airborne concentration in the conversion operation is 10% DAC. Assume the airborne in the sea land to be double this average since there was no ventilation or an average of 20% DAC. If an individual was inside the sea land for 48 hours he would have received a maximum inhalation dose of (0.2 dac * 48 hr * 5 rem/2000 dac-hr) 24 mrem.

Personnel Involved

No personnel are known to have accessed the container while outside of the CAA.

2. 10 CFR 20.2203(b)(1)(ii) - Levels of Radiation and Radioactive Material Concentrations

Involved

The Sea Land was surveyed on 12-1-09

Outside Sea Land

Removable Alpha: 72 dpm/100 cm²

Contact Dose rate: <0.1 mR/hr (8 µR/hr reading not detectable above background)
3 feet Dose rate: <0.1 mR/hr (8 µR/hr reading not detectable above background)

Inside Sea Land

Removable Alpha: 1,490 dpm/100 cm²
Contact Dose rate: <0.1 mR/hr (8 µR/hr reading not detectable above background)
3 feet Dose rate: <0.1 mR/hr (8 µR/hr reading not detectable above background)

3. 10 CFR 20.2203 1)(iii) - Cause of the Elevated Exposures, Dose Rates, or Concentrations

The cause of this event: The apparent cause of this event was a lack of planning to recognize the importance and urgency of labeling the sea/land containers when they were no longer empty. No pre-job briefing was held to identify the need for labeling the containers and no one was assigned responsibility for changing the labeling during the loading operation. There were several reminders after the sea/land container was filled to properly label the container. This was not done primarily due to the lack of understanding of the significance of the labeling. Had the container been properly labeled, the transport operator would have recognized the labeling and not moved the container outside of the CAA.

Reasons for the Event – Sequence of Events

The task initially being performed was to package zirc tubing for offsite shipment. The intended outcome was to fill the sea/land container and ship the contaminated scrap tubing off site for processing. While the logistics were being developed for this shipment the backlog of zirc tubing had been stagnant at the CFFF.

During the October 5th 2009 plant maintenance outage, personnel loaded this sea land container with packaged zirc tubing inside the container which was stored inside the CAA. At this point the container should have been properly labeled and the empty labeling removed. An error

precursor was that there was no pre-job brief in place prior to loading. This was the first time that the tubes were not part of a normal low level radioactive waste shipment and were intended to be recycled. It was assumed that there was time to label the container because the final shipment logistics had not been finalized. The container did not move for over a month. There were verbal discussions about labeling the container but these were not followed through and the container remained labeled as "empty".

On November 23, 2009, in order to alleviate spacing concern near the shipping area, empty sea/land containers were moved outside the CAA near an overflow parking area located on Westinghouse property. The container with the scrap zirc tubes was moved along with other similar "empty" containers.

On November 25, 2009 it was discovered the container loaded with the scrap zirc tubing had been moved outside the CAA. It was then relocated back inside the CAA and properly labeled. A Corrective Action issue (#09-334-C001) was initiated for this event on November 30, 2009.

4. 10 CFR 20.2203 (b)(1)(iv) - Corrective Steps Taken or Planned to Ensure Against a Recurrence

- a. Remedial Action: Upon discovery of the container on November 25, 2009, the container was move inside of the CAA and properly labeled.
- b. Corrective Action to Ensure Against Recurrence: CFFF personnel will verify other sea/land containers on site are labeled properly. This will be completed by December 31, 2009. In addition, a pre-job brief and checklist will be developed to govern the loading and packaging of scrap fuel tubing for recycling shipments off-site. Appropriate training will be completed on this process and this process will be in place before any off-site shipments of contaminated scrap zirc tubing are loaded. This will be completed by January 20, 2009.