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July 28, 2016

SUBJECT: WESTINGHOUSE REPORTED EVENT # EN51974 60 DAY FOLLOW-UP REPORT

The following information is being provided by Westinghouse Electric Company LLC (Westinghouse) in accordance with 10CFR70 Appendix A(b)(2) and 10CFR70.50(c)(2). A copy of the initial notification report, Event Report #EN51974, pertaining to the Columbia Fuel Fabrication Facility (CFFF) can be found in Enclosure 1 and provides the applicable information required by 10CFR70.50(c)(1). The information required in accordance with 10CFR70.50(c)(2) is provided in Enclosure 2. Supplemental information for 10CFR70.50(c)(2)(iii) is provided in Enclosure 3.

Please know that Westinghouse remains deeply committed to continuous compliance with all governing regulations and license commitments.

If you have any questions regarding this information, please contact me at (803) 647-3338.

Sincerely,

Nancy Blair Parr

Nancy Blair Parr, Manager
Licensing
Westinghouse Columbia Fuel Fabrication Facility
Docket 70-1151 License SNM -1107

Enclosure 1: Original Event Report #EN51974 dated June 3, 2016.
Enclosure 2: 10CFR70.50(c)(2) Required Information
Enclosure 3: Supplemental Information for 10CFR70.50(c)(2)(iii)

cc:

U. S. Nuclear Regulatory Commission
11555 Rockville Pike
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Attn: Mr. Christopher Ryder
Mail Stop: T-4A60

U. S. Nuclear Regulatory Commission, Region II
245 Peachtree Center Avenue NE, Suite 1200
Atlanta, GA 30303-1257
Attn: Mr. Thomas Vukovinski

ENCLOSURE 1

Original Event Report #EN51974 dated June 3, 2016.

Caller Identification and Facility Information
Carl Snyder, Nuclear Criticality Safety Engineering Manager. Westinghouse Electric Company LLC, Commercial Fuel Fabrication Facility, Columbia SC.
Low enriched (≤ 5.0 wt.% U-235) fuel fabricator for commercial light water reactors. License: SNM-1107.
Call-Back Number (803) 647-3550.

24 Hour Event Notification based on 10CFR70 Appendix A(b)(2) "*Loss or degradation of IROFS that results in failure to meet the performance requirements of 10CFR70.61.*"

Description of the Event
On June 2, 2016 at 1245 [EDT], it was reported to the Environment, Health and Safety (EH&S) department that the two administrative verifications of ventilation clean-out containers were not performed. The Conversion Area nitric acid scrubber was scheduled for annual inspection and cleaning May 27 thru June 1. On May 18th, 25 disposable clean-out containers were obtained from the storeroom in preparation for the annual scrubber cleaning. The clean-out containers are used to collect special nuclear material (SNM) from scrubber and filter house cleanings. After obtaining new clean-out containers from the storeroom and prior to using them with SNM, one container from each lot is required to be measured by an operator to assure proper dimensions (IROFS STORAGE-GEN-126). An independent measurement by a process engineer to assure proper dimensions is also required prior to use with SNM (IROFS STORAGE-GEN-127). An additional 20 clean-out containers were obtained from the storeroom on May 31st.

On June 2nd, a process engineer discovered that the measurement verifications were not performed. EH&S was notified of the event by phone and the 'Redbook' reporting system. (Redbook Issue #71225). At no time was there any actual or potential health and safety consequence to the workers, the public, or the environment.

The safety function of these IROFS [Items Relied on for Safety] is to preclude using an incorrect container size. The ventilation clean-out containers are a standard stocked storeroom item. They have an approximate volume capacity of 1.5 gallons, providing a substantial safety margin to the minimum requirement of 5.7 gallons in the Criticality Safety Evaluation (CSE) which assumes an optimum uranium/water mixture and full 12-inch water reflection. The CSE also requires more than 64 close packed containers with an optimum uranium/water mixture; while the containers are limited to maximum array of 25 (IROFS STORAGE-GEN-112). Additionally, the clean-out containers remained spaced 18 inches apart at all times.

Based on available IROFS, this accident sequence was unlikely, a failure probability of [10E-3], and not highly unlikely, a failure probability of [10E-4] or less. Therefore, this geometry accident sequence does not meet the performance requirements of 10CFR70.61. As stated above, the actual configuration remained safe.

Immediate Corrective Actions
The clean-out container dimensions were verified as correct.

This event has been entered into the facility Corrective Action Prevention And Learning system (CAPAL) #100388517.

ENCLOSURE 2

10CFR70.50 (c)(2) Information:

(i) Complete applicable information required by § 70.50(c)(1);

This information has been provided in Enclosure 1 of this correspondence.

(ii) The probable cause of the event, including all factors that contributed to the event and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned;

An Apparent Cause Analysis (ACA) was completed and determined that the procedure for this activity was missing information. The procedure for the inspection and cleanout of the S-1030 scrubber did not contain the administrative Item Relied On For Safety (IROFS) controls (STORAGE-GEN-126, STORAGE-GEN-127) or reference a control form where the IROFS are also stated. These IROFS were implemented in a general roof ventilation system clean-out procedure for the Conversion area, but the IROFS were not mentioned in the S-1030 equipment specific procedure. In addition, the nuclear criticality safety function was not present for the pre-job brief for the scrubber clean-out activity on May 31 because the invitation had been sent via email on a holiday week-end.

(iii) Corrective actions taken or planned to prevent occurrence of similar or identical events in the future and the results of any evaluations or assessments;

Corrective Actions:

- The following corrective actions were taken:
    1. The ventilation cleanout containers were verified to meet the required dimensions.
    2. All ventilation cleanout containers outside of the site's Maintenance, Repair, and Overhaul storeroom (MRO) storeroom were destroyed.
    3. A prohibition on the issue of ventilation cleanout containers from the MRO storeroom to other than nuclear criticality safety personnel was put in place.
    4. An internal Operating Experience (OE) was created and distributed.
    5. An Apparent Cause Analysis was conducted.
    6. The procedure for the S-1030 Scrubber Inspection and Cleanout was revised to include IROFS STORAGE-GEN-126 and STORAGE-GEN-127 and a reference to the control form that also lists these administrative IROFS. There were no other Conversion area equipment specific procedures that needed to be revised to correct the error likely situation.
    7. An evaluation was conducted regarding the credibility of a criticality accident due to failure of these IROFS. This evaluation is included as Enclosure 3.
- Commitments are established to perform the following planned actions:
    1. Revise and implement the criticality safety evaluation for common containers (CSE-16-K) to add the upset scenario for use of incorrectly designed ventilation cleanout containers. As part of the implementation process, the ventilation cleanout containers will be added to site procedure *RA-120-20, Regulatory Policy - Safety Significant Controls - Inspection of Procured Items Relied On For Safety*. This procedure requires a formal procurement and inspection process for IROFS prior to issue to the MRO storeroom.
    2. Revise and implement the criticality safety evaluation for ventilation cleanout containers to remove the upset scenario for use of incorrectly designed ventilation cleanout containers.

These commitments are being tracked to completion by management in the corrective action system.

(iv) For licensees subject to Subpart H of this part, whether the event was identified and evaluated in the Integrated Safety Analysis.

The CFFF is subject to Subpart H, and the event was identified and evaluated in the Integrated Safety Analysis (ISA) and associated ISA Summary. As a result of this event, the accident sequence was re-evaluated. The revised analysis will be incorporated into the ISA Summary in the January 2017 annual submittal.

ENCLOSURE 3

Supplemental Information for 10CFR70.50 (c)(2)(iii):

Ventilation Cleanout Container Incident Evaluation

The S-1030 Scrubber, including the inlet transition, is periodically cleaned to prevent accumulation of large amounts of uranium bearing material within the equipment. Material that is removed from the scrubber is placed in paper pails, commonly referred to as popcorn buckets. Verification of the dimensions (one per batch) of the pails by an Area Process Operator (STORAGE-GEN-126) and independent verification by an Area Process Engineer (STORAGE-GEN-127) is required prior to use to ensure that they are within the bounds of the associated criticality safety calculations. For the scrubber cleaning evolution that occurred 5/28/16, one paper pail per batch was not measured. Failure to measure a pail by either an operator or engineer resulted in the probability for the criticality scenario (use of an incorrect container design) to increase from 10^{-7} to 10^{-3}. The performance requirement for a criticality event is 10^{-4}. A paper pail from the batch that was available on the roof was measured after the cleaning and found to meet the required dimensions.

Although not explicitly credited as a control for the scenario, FLOOR-110 is a chemical area control that prohibits placing any SNM in a container unless that container is authorized by a criticality safety evaluation and procedure. Since 4/29/2010, the paper pails are the only SNM container authorized for cleanout evolutions on the roof. As such, operations personnel are aware of the proper container for the scrubber cleanout and use of a container other than the paper pails is not expected. Use of paper for the material allows for easy disposal once the container has been used and is considered contaminated. The paper pails are also a unique item in the storeroom because other similar size containers are either plastic or metal.

In the licensing basis safety analysis of the paper pails, the assumptions for the models are very conservative. First, the container modeled is slightly larger than the controlled limits for the pails. Second, each pail is modeled as being completely full, which is not practical for handling purposes. Third, for a large planar array (8x8x1), the material in the pail is modeled as homogenous, optimally moderated UO_2 and water. Instead, the vast majority of the material removed from the scrubber is uranium and fluorine in crystalline form which has been scraped from the transition surfaces. Flourine is a neutron absorber. Fourth, the reflection conditions for the modeled array (6 inches of concrete below and 1 inch of tight fitting water on the remaining sides) greatly increase the reactivity of the system and would be very difficult, if not impossible, to duplicate. For this particular cleanout, the number of pails used was 37, approximately 58% of the analyzed array size. The uranium mass in the material removed from the scrubber was 87.2 kg U. The large array of containers as modeled contains 723 kg U material (11.3 kg U/pail) which equates to approximately 8.3 times the Uranium mass of the cleanout material. Stacking of the pails and bounding materials (UO_2 and oil) were also evaluated.

In order for a criticality to be credible, the following upsets would have to occur based on the discussion above: an unauthorized container would have to be obtained for the scrubber cleanout; all involved in the cleanout process, normally the cognizant process engineer and up to 12 operators (4/shift x 3 shifts), would not recognize that an unauthorized container is in use; the unauthorized container would have to significantly exceed the dimensions modeled based on the conservative nature of the materials analyzed, reflection conditions, and amount of uranium actually available for cleanout in the scrubber; and an array larger than 64 pails, or multiple stacking violations would have to occur before the geometry exceeded that analyzed. Due to the multiple, unlikely upsets required, criticality due to failure to use the correct containers for the scrubber cleanout is considered to be incredible.