



UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
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ATLANTA, GEORGIA 30303-1200

July 20, 2022

Mr. Mike Annacone
Vice President, Columbia Fuel Operations and Manager, Columbia Plant
Westinghouse Electric Company
5801 Bluff Road
Hopkins, SC 29061

SUBJECT: COLUMBIA FUEL FABRICATION FACILITY – INTEGRATED INSPECTION
REPORT 07001151/2022002

Dear Mr. Annacone:

This letter refers to the Nuclear Regulatory Commission inspection activities conducted from March 1 to June 30, 2022 for the Westinghouse Columbia Fuel Fabrication Facility. On May 20 and June 1, 2022 the NRC inspectors discussed the results of these inspections with you. The results of these inspections are documented in the enclosed report.

No violations of more than minor significance were identified during this inspection.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

A handwritten signature in blue ink, appearing to read "Eric C. Michel".

Signed by Michel, Eric
on 07/20/22

Eric C. Michel, Chief
Projects Branch 2
Division of Fuel Facility Inspection

Docket No. 07001151
License No. SNM-1107

Enclosure:
As stated

cc w/ encl: Distribution via LISTSERV

SUBJECT: COLUMBIA FUEL FABRICATION FACILITY – INTEGRATED INSPECTION REPORT 07001151/2022002 DATED JULY 20, 2022

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**U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report**

Docket Number: 07001151

License Number: SNM-1107

Report Number: 07001151/2022002

Enterprise Identifier: I-2022-002-0057

Licensee: Westinghouse Electric Company

Facility: Columbia Fuel Fabrication Facility

Location: Hopkins, SC

Inspection Dates: May 16, 2022; June 02, 2022

Inspectors: M. Greenleaf, Technical Assistant
N. Peterka, Senior Project Engineer
T. Vukovinsky, Senior Fuel Facility Project Inspector

Approved By: Eric C. Michel, Chief
Projects Branch 2
Division of Fuel Facility Inspection

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Columbia Fuel Fabrication Facility, in accordance with the fuel cycle facility inspection program. This is the NRC's program for overseeing the safe operation of licensed fuel cycle facilities. Refer to <https://www.nrc.gov/materials/fuel-cycle-fac.html> for more information.

List of Violations

No violations of more than minor significance were identified.

Additional Tracking Items

None.

PLANT STATUS

The Westinghouse Facility converts uranium hexafluoride (UF₆) into uranium dioxide using a wet conversion process and fabricated fuel assemblies for use in commercial nuclear power reactors. During the inspection period, normal production activities were ongoing.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Inspections were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2600, "Fuel Cycle Facility Operational Safety and Safeguards Inspection Program." The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

SAFETY OPERATIONS

88020 - Operational Safety

The inspectors evaluated selected aspects of the licensee's Operational Safety program to verify compliance with selected portions of 10 CFR 70, including 70.61, 70.62, and Chapter 3, "Conduct of Operations," of the facility's license application, and applicable licensee procedures.

Identification of Safety Controls and Related Programs (IP Section 02.01)

The inspectors selected specific process areas for inspection based on the safety basis information of the facility, the risk/safety significance of the process areas, the description of plant changes submitted to the NRC, and past plant performance documentation. For the process areas of interest, the inspectors selected a sample of accident sequences in nuclear criticality safety, radiation safety, and chemical safety based on the information provided in the integrated safety analysis (ISA) summary. The inspectors conducted a general plant tour of each major plant operating area. The process areas and accident sequences selected for review are listed below:

- ISA-3, ADU Conversion System Summary - Vaporization
 - Section 4.1.1.7, Loss of Containment of Hot Oil
 - Accident Sequence: Initiating Event 1, Mechanical Integrity Failure
 - Accident Sequence: Initiating Event 2, Over-pressurization
 - Discussion of Therminol-66

- ISA-03, ADU Conversion System Summary
 - Section 4.1.1.14, Seismic Induced Release from Vaporizer System Accident Sequence
 - Accident Sequence: Initiating Event 1, Seismic Induced Release from Vaporization System

- ISA-02, Uranyl Nitrate (UN) Bulk Storage System
 - Section 4.1.1, Accident Sequence for Fire Safety, Chemical Safety, Radiological Safety and Environmental Protection
 - Accident Sequence: UN Accident Sequence Due to Failure of UN Bulk Storage Tank
 - Earthquake Initiated Failure of UN Bulk Storage System
 - Discussion of seismic upgrades to the bulk storage tanks (70.72 changes)

Review of Safety Controls and Related Programs (IP Section 02.02)

The inspectors reviewed information related to administrative, engineered, and passive safety controls or items relied on for safety (IROFS) for the accident sequences selected above, including the identification of the licensee's assumptions and bounding cases as they apply to each of the selected accident sequences, safety controls, or IROFS. This review was performed to verify that the controls or IROFS were available and reliable to perform their intended safety functions and that the design basis assumptions were reflected in the actual conditions in the field. The specific safety controls selected for review are listed below:

- ADUHOS-907
- ADUFIRE-901/902
- ADUHOS-407, 901, 902, 908, 909
- ADUVAP-945, 946, 949, 950, 948, 947
- PLANT-SEP-901, 903, 905
- Boiler-905, 906
- UN-901, 912, 915

Implementation of Safety Controls (IP Section 02.03)

For the selected safety controls listed above, the inspectors reviewed management measures to verify proper implementation in accordance with 10 CFR 70 and Section 3.0, "Conduct of Operations," of the license application. This review was performed to verify that selected safety controls or IROFS were present, available, and reliable to perform their safety function and that the design basis assumptions were reflected in the actual conditions in the field. The inspectors conducted the following activities to verify the implementation of selected safety controls:

- walk-downs performed to verify implementation of safety controls or IROFS listed above
- walk-down of the 'C' Isolation Valve and discussion with conversion control room operators on closure of the valve following a seismic event
- walk-down of the S-2A/2B sump maintenance activities
- reviewed change to procedure COP-836047, "Uranyl Nitrate Offloading from LR-230 Containers"
- reviewed postings and operator aids for IROFS listed above

- reviewed seismic qualification data for the UN Bulk Storage Tanks and seismic IROFS
- observed safety significant testing conducted by operations and maintenance personnel
- observed morning turnover and shift briefings for Conversion and Uranium Recycling and Recovery Services operators.
- observed pre-job briefings for S-1030 Scrubber duct work inspections and S-2A/2B Scrubber sump inspection and cleanout.

Safety Control Support Programs (IP Section 02.04)

The inspectors assessed additional management measures, that support the availability and reliability of the selected safety controls to verify these were implemented in accordance with 10 CFR 70 and Section 3.0 of the license application. Specifically, the inspectors conducted the following:

- reviewed operator training/qualification for multiple conversion and URRS area operators
- reviewed annual compliance and program audits for the operations organization
- reviewed the following CAP entries associated with failed/degraded IROFS: 2021-12133, 2021-13082, 2021-13508, 2021-13868, 2021-4738, 2021-4739, 2022-2000, 2022-209, 2022-4352, and 2022-4576

OTHER AREAS

88075 - Event Follow-up

An event follow-up inspection was conducted for Event Notice (EN) 55911, "Procedural Noncompliance with Administrative Items Relied on for Safety (IROFS)."

Event Follow-up

Administrative IROFS WT-165 and WT-166 require independent operators to sample and verify the V-1170 tanks' uranium concentration is below an administrative limit prior to discharge to the V-1160 tank. These IROFS were correctly performed on May 18, 2022, for both the V-1170A and V-1170B tanks. In between May 18th and the 23rd, the warm caustic filter was water washed with the process solution sent to the V-1170 tanks. On May 23, 2022, the contents of V-1170A and V-1170B tanks were then pumped to the T-1160B tank without the tank uranium concentration being updated following the warm caustic filter wash. On May 23, 2022, an evaluation into the reportability of the event was initiated when a Uranium Recovery and Recycling Services (URRS) team manager contacted Criticality Safety Engineering to report the transfer without the test results required by procedure. After reviewing updated tank test results, performing calculations to determine risk, and discussing actions taken by the operators, IROFS WT-165 and WT-166 were considered failed.

Per CSE-15C-S1-G3, the remaining safety margin was 1.000E-2, which was below the required 1.000E-4. The result is reportable per 10 CFR Part 70 Appendix A (b)(2), "Loss or degradation of items relied on for safety that results in failure to meet the performance requirements of 10 CFR 70.61." Following the event, the contents of V-1170A and T-1160B were tested and historical tank level indication data was reviewed with results well within the IROFS limits.

An on-site inspection of this event was conducted using Inspection Procedure (IP) 88075, "Event Follow-up." The inspectors walked down the system and reviewed the sample data associated with the tanks involved. Operators, area engineers, criticality safety engineers, and plant management were interviewed. The inspectors reviewed CAP IR 2022-4718, "White Paper to NRC justifying event performance requirements." In conclusion, the incident resulted in failed IROFS as depicted on the fault tree which resulted in a scenario that required a report to the NRC. The licensee's evaluation demonstrated that controls were in place to assure performance requirements required by 10 CFR 70.61 were met and the plant was not in an unsafe condition. The licensee conducted an extent of condition, and corrective actions were put in place to improve both procedures and forms for administrative controls as well as reviewing fault trees to determine if proper credit is being applied to available IROFS. There was no safety impact as a result of the failed IROFS.

EN 55911 will remain open pending review of the 60-day letter submittal by the licensee and a final review of the extent of condition and corrective actions. This EN will be closed in the third quarter report 2022-003 which will be issued by October 31, 2022.

INSPECTION RESULTS

No issues were identified.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On May 20 and June 1, 2022, the inspectors presented the integrated inspection results to Mike Annacone and other members of the licensee staff.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
88020	Corrective Action Documents	Inspection Reports: 2021-4739, 2021-12133, 2021-13082, 2021-13508, 2021-4738, 2022-2000, 2022-4352	Corrective Action Reports	Various
	Drawings	333F08PI03	UN Valve Station	Rev. C2
		334F01P101	Vaporizer V-101B	Rev. 29
		334F04PI02	Hot Oil Dryer System - Sheet 1	Rev. 27
		335F11EL01	ADU Line #2/Control Systems	Rev. 5
		347F04PI01	Hot Oil Pump Seal Cooling System - Sheet 1	Rev. 7
		347F04PI02	Hot Oil Systems 3 & 4 Catch Tank T-1399 - Sheet 06	Rev. 7
		347F04PI02	Hot Oil System 4 - Sheet 02	Rev. 13
		347F04PI02	Hot Oil Systems 3 & 4 Supply and Return - Sheet 05	Rev. 9
		347F04PI02	Hot Oil Systems 3 & 4 Distribution Manifold - Sheet 04	Rev. 3
		347F04PI02	Hot Oil System 3- Sheet 1	Rev. 28
		347F04PI04	Hot Oil, FL-1389 and FN-1389 P&ID - Sheet 1	Rev. 4
		600F07EL01	Storm Drainage Control Structure "C" Electrical Schematic - Sheet 01	Rev. 2
	622F01PI01	Uranyl Nitrate Storage Tanks	Rev. C2	
	Engineering Changes	CCF 21058	Tank 1040 Seismic Modifications	02/09/2021
	Engineering Evaluations		'C' Valve Information	
		CSE-2-A	Criticality Safety Evaluation for Uranyl Nitrate Bulk Storage	Rev. 12
		CSE-3-H	Criticality Safety Evaluation for Conversion Lines Oil Dryers and Bucket Elevators	Rev. 11
		CSE-99-M	Criticality Safety Evaluation for the CFFF Design Basis Seismic Event	Rev. 4
	Miscellaneous		Work Week 2220 Cycle Schedule	
	Procedures	CF-83-239	LR-230 OFFLOAD CHECKLIST	Rev. 5

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		COP-810099	UF6 Vaporizer	Rev. 38
		COP-814532	General Safety Requirements - Conversion	Rev. 27
		COP-815417	Functional Verification of Safety Significant Controls Conversion Area	Rev. 24
		COP-836047	Uranyl Nitrate Offloading from LR-230 Containers	Rev. 23
		CSE-99-M	CFFF Design Basis Seismic Event	Rev. 4
		MCP-108246	Operating the Cleaver Brooks Boilers	Rev. 2
		PM81109	Seismic SSC Verification - 52 week PM	
		SEP-002	Classification	Rev. 6
		SEP-009	Emergency Response Organization Check Sheets	Rev. 19
		SS4210-1-104528	PM81018	05/06/2021
	Self-Assessments	EHS-AUDIT-21-3	Formal Compliance Audit Report	04/16/2021
		EHS-AUDIT-22-1	Regulatory Component Audit for Maintenance, Incident Investigations, and Corrective Action	02/09/2022
		EHS-AUDIT-22-5	Audit Report for the SNM-1107 Chemical Safety Program	03/31/2022
	Work Orders	WO 62948	SSC Testing T-1042 Valve	05/17/2022
		WO 78991	52 Weeks OM81213 SI - Safety Interlocks, Hot Oil Systems	11/24/2021
		WO 80478	SI-SAFETY, SLUICE GATE VALVES - 13 WEEKPM	12/15/2021
		WO 874434	Seismic SSC Verification - 52 week PM	04/21/2020
		WO 97805	SI-SAFETY, SLUICE GATE VALVES - 13 WEEKPM	03/15/2022
	88075	Corrective Action Documents	IR 2022-4718	Warm Caustic Failure to Meet Performance Requirements
Procedures		CF-83-213	Warm Caustic Filtrate SSC Verifications	Rev. 3
		COP-830524	Operation of F-1168 - Warm Caustic Water-Glass Cake Dissolution and Filtration	Rev. 10
		CSE-15-C	Criticality Safety Evaluation (CSE) for Waterglass Liquid Waste Effluent Treatment System	Rev. 10
		CSE-15-D	Criticality Safety Evaluation for Warm Caustic Waterglass Cake Dissolution System	Rev. 7
Work Orders		Dispatch 106881, 109441, 109442, 109443, 96195,	Various gamma monitor and pH probe calibration records	Various

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		96217		