



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200  
ATLANTA, GEORGIA 30303-1200

January 14, 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 07001151/2021004

Dear Mr. Annacone:

This letter refers to the Nuclear Regulatory Commission (NRC) inspection oversight activities conducted from October 1 to December 31, 2021 for the Columbia Fuel Fabrication Facility. On October 8 and November 19, 2021, the NRC inspectors discussed the results of two inspections during this period with you and other members of your staff. The results of these inspections are documented in the enclosed report.

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

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 01/14/22

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 07001151/2021004 Dated January 14, 2022

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OFFICE	RII/DFFI/PB2	RII/DFFI/PB2	RII/DFFI/PB2		
NAME	N. Peterka	E. Michel	T. Vukovinsky		
DATE	1/12/2022	1/14/2022	1/12/2022		

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

Docket Number: 07001151

License Number: SNM-1107

Report Number: 07001151/2021004

Enterprise Identifier: I-2021-004-0129

Licensee: Westinghouse Electric Company

Facility: Columbia Fuel Fabrication Facility

Location: Hopkins, SC

Inspection Dates: October 04, 2021 to November 19, 2021

Inspectors: B. Adkins, Sr. Fuel Facility Projects Inspector  
N. Pitoniak, Sr. Fuel Facility Project Inspector  
P. Startz, Fuel Facilities Inspector  
T. Vukovinsky, Sr. Fuel Facility Project Inspector  
R. Womack, Fuel Facility 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

Type	Issue Number	Title	Report Section	Status
WER	07001151/2021-001-00	24 Hour Report - Unplanned Medical Treatment (EN 55412)	88072	Closed

## PLANT STATUS

The Westinghouse Facility converts uranium hexafluoride (UF<sub>6</sub>) 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 70.24, 70.61, 70.62, and Chapter 11, "Management Measures," 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, fire 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:

- accident sequence 4.1.1.3, lines 1-4 ADU conversion area cylinder loss of containment, initiating event 1, high vaporizer steam
- accident sequence 4.1.1.3, lines 1-4 ADU conversion area cylinder loss of containment, initiating event 3, defect in cylinder valve
- accident sequence 4.1.1.3, lines 1-4 ADU conversion area cylinder loss of containment, initiating event 5, overfilled (overweight) cylinder received
- accident sequence 4.1.1.3, lines 1-4 ADU conversion area cylinder loss of containment, initiating event 6, overweight cylinder produced
- accident sequence 4.1.1.7, ADU conversion area loss of containment of hot oil leading to potential fire in the hot oil room

## 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, hot oil system 3 and 4 structural integrity, chemical/fire safety, passive engineered control
- ADUFIRE-901, fire protection program combustible control, criticality/fire safety, administrative control
- ADUVAP-111, UF6 delivery line block valve (outside vaporizer, but beyond PIT-S-x01-A/B/C-2) shall be closed and the cylinder valve opened prior to cylinder heating, chemical safety, administrative control, criticality/chemical/fire safety
- ADUVAP-902, vaporizer pressure relief valve, criticality/chemical/fire safety, active engineered control
- ADUVAP-903, vaporizer high pressure steam interlock, criticality/chemical/fire safety, active engineered control
- ADUVAP-906, vaporizer high interlock, criticality/radiation safety, active engineered control
- ADUVAP-907, vaporizer high-high Interlock, criticality/radiation safety, active engineered control
- ADUVAP-909, UF6 cylinder high pressure interlock, criticality/chemical/fire safety, active engineered control
- ADUVAP-911, failure of 1st weight verification, criticality/chemical/fire safety, administrative control with computer/alarm assist
- ADUVAP-912, failure of 2nd weight verification, criticality/chemical/fire safety, administrative control with computer/alarm assist
- ADUVAP-920, visually inspect cylinder valve, criticality/chemical/fire safety, administrative control
- ADUVAP-921, visually inspect external parts of cylinder, criticality/chemical/fire safety, administrative control
- ADUVAP-933, valve isolation between hot and cold cylinders, criticality/chemical/fire safety, passive engineered control
- ADUVAP-934, vaporizer block valve and UF6 block valve, criticality/chemical/fire safety, administrative control

## 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 applicable sections 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:

- observed the annual surveillance test of the Line 2 vaporizer hi and hi-hi level interlocks associated with IROFS ADUVAP-906 and ADUVAP-907 (COP-815417)
- reviewed mechanical integrity inspection records and conducted a system walkdown of IROFS ADUHOS-907, hot oil system 3 & 4 structural integrity
- reviewed inspection records and observed nameplate pressure rating/lock wire installation for line 2 vaporizer pressure relief valve (ADUVAP-902)
- reviewed procedures COP-810094, COP-810096 through COP-810099, COP-814604, and COP-816020 associated with IROFS ADUVAP-906, ADUVAP-907, ADUVAP-920, and ADUVAP-921
- observed operations perform heel cylinder and pigtail removal, new cylinder weighing, and new cylinder installation in the line 3 vaporizer. The following IROFS were observed: ADUVAP-912, ADUVAP-914, ADUVAP-918, ADUVAP-919, ADUVAP-920, and ADUVAP-922

#### 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 applicable sections of the license application. Specifically, the inspectors conducted the following:

- reviewed the following CAP entries associated with failed/degraded IROFS: 2021-4738, 2021-4739, 2021-6912, 2021-7140, 2021-8809, and 2021-6144
- reviewed the last four quarterly Nuclear Criticality Safety Facility Walkthrough Assessments for the Conversion area
- reviewed the most recent use of SYP-300-2, "Housekeeping Inspection," in the Hot Oil Room
- reviewed operator training/qualification for two conversion area operators
- reviewed the conversion area organizational chart

## **FACILITY SUPPORT**

#### 88072 - Plant Modifications (Triennial)

The inspectors conducted an extensive review into the licensee's configuration management system for plant modifications to ensure that safety-related systems and components (i.e., IROFS or credited safety controls) could adequately perform their intended safety function and that system changes had not adversely impacted plant safety and operability. The inspectors' review focused on verifying compliance with the applicable requirements in 10 Code of Federal Regulations (CFR 70), License Application, Chapter 3, "Conduct of Operations," and Integrated Safety Analysis (ISA) Chapter 13, "Low Level Radioactive Waste System."

#### Selection of Modifications (IP Section 02.01)

The inspection team leader reviewed licensing documents and coordinated with the licensee to discuss plant modifications in risk-significant areas/processes with the licensee. The inspectors selected the following process for an in-depth review of historical modifications identified as Configuration Control Forms (CCF).

Incinerator System (ISA-13, Low Level Radioactive Waste System)

- CCF 06392, Scrubber Liquid Recirculation Loop
- CCF 06488, FN-949 Drain Hole
- CCF 06542, Incinerator Sump Emergency Drain Size Increase
- CCF 12155, Tie-in for Incinerator BFP and Area Contaminated Drain Inputs
- CCF 16159, Modifications to Incinerator Ram Controls and Safety System Upgrades
- CCF 05120, Incinerator Safety PLC
- CCF 09339, Incinerator/ABF Torit Level Probe
- CCF 06610, PLC Level Probe Input
- CCF 06605, Incinerator PLC Fault
- CCF 05361, Incinerator Mass Control
- CCF 16178, Install drain line in incinerator duct just prior to "C" demister
- CCF 17494, Demolition of Incinerator System 6A Ventilation
- CCF 17495, 6A Incinerator Ventilation System

Design Process Review (IP Section 02.02)

For the selected modifications listed above, the inspectors reviewed the design process to verify the licensee followed the applicable configuration management requirements in the license application and 10 CFR 70. Specifically, the inspectors conducted the inspection activities listed below:

- Interviewed licensee staff, performed walk-downs, and reviewed configuration management packages and supporting documentation to verify that plant modifications were developed, reviewed, classified, approved, and implemented in accordance with 10 CFR 70.72, "Facility Changes and Change Process," and 70.62(d), "Management Measures."
- Interviewed licensee staff, performed walk-downs, and reviewed the ISA, ISA Summary, and safety program information impacted by the modifications to verify compliance with 10 CFR 70.62, 10 CFR 70.72, and the baseline design criteria of 10 CFR 70.64, as applicable.
- Interviewed licensee staff, performed walk-downs, and reviewed configuration management packages and supporting documentation to verify that safety systems and components impacted by the modification, including interactions with other systems, would perform their intended safety function as described in the ISA and safety program documentation.
- Interviewed licensee staff, performed walk-downs, and reviewed design information for the selected modifications to verify that design assumptions, including Natural Phenomena Hazards (NPH) analysis and set points for instrumentation and control equipment, were supported by adequate technical basis consistent with the design bases and licensing bases of the facility.
- Interviewed licensee staff, performed walk-downs, and reviewed documentation to verify the licensee applied management measures to the



- IROFS affected by the modifications in accordance with 10 CFR 70.62
- Interviewed licensee staff, performed walk-downs, and reviewed corrective action documents for plant modification issues, including configuration management audits, to verify compliance with the corrective action program activities described in Chapter 3 of the License Application. The scope of the corrective action review included outstanding design and operational issues for the processes selected for in-depth review.
- Interviewed licensee staff to verify that system/responsible engineers had an adequate understanding of their assigned systems and the impact of selected modifications on the systems' function.

### System Condition and Capability Review (IP Section 02.03)

For the selected modifications, the inspectors reviewed the system condition and tested capability to verify they were consistent with the applicable design requirements and licensing basis. Specifically, the inspectors conducted the inspection activities listed below:

- Interviews, records reviews, and plant walk-downs were conducted to verify whether the selected modifications to the Incinerator were adequately implemented consistent with the configuration management package.
- Interviews, record reviews, and plant walk-downs were conducted to verify assumptions in the ISA or safety basis applicable to the modification were valid based on the actual configuration and operation of the modified processes.
- Interviews, record reviews, and plant walk-downs were conducted to verify whether management measures were properly implemented to ensure that IROFS or other safety controls were available, capable, and reliable to perform their function when needed.
- Interviews, record reviews, and plant walk-downs were conducted to verify that administrative controls that involve operator action could be accomplished as assumed in the licensee's ISA.

### Post-Modification Testing (IP Section 02.04)

For the selected modifications, the inspectors interviewed licensee staff and reviewed post-modification testing records to determine whether the plant was in a safe configuration during post-modification testing. The inspectors reviewed the following post-modification tests to determine whether post-modification testing ensured adequate implementation of the design and safety system functionality.

Integrated Safety Analysis (ISA) Chapter 13, "Low Level Radioactive Waste System, Incinerator System."

- Work Order (WO) 813557, 8/15/2018
- WO 813558, 8/15/2018
- WO 854156, 8/7/2019
- WO 854337, 8/7/2019
- WO 859681, 9/25/2019
- Dispatch 10387, 10/22/2020
- Dispatch 10388, 10/22/2020

- Dispatch 10389, 11/9/2020

Documentation Review (IP Section 02.05)

The inspectors reviewed a sample of plant documents impacted by the modifications selected for review to verify the licensee had either updated or was in the process of updating such documents to reflect the modifications in accordance with the license application requirements and 10 CFR 70.72. The inspection sample included:

- COP-830210, Incinerator Operation, Rev. 55
- TA-500, Configuration Control Program, Rev. 39
- training records for Incinerator operators and area/system engineers associated with the incinerator system
- ISA Chapter 13, Low Level Radioactive Waste System
- Criticality Safety Evaluations (CSE)
  - CSE-1-A, Incinerator Filter Housings, Rev. 0, 5, 12
  - CSE-13-1, Incinerator System, Rev. 3 through 16

**INSPECTION RESULTS**

WER (Closed)	24 Hour Report - Unplanned Medical Treatment (EN 55412) WER 07001151/2021-001-00	88072
<p>Description: On August 17, 2021, a Westinghouse employee was washing piping over a container of nitric acid in the Conversion Decontamination Area. The piping fell into the container of nitric acid and employee reached into the container to retrieve the piping and received nitric acid burns to hands and left wrist. Appropriate treatment for exposure to nitric acid was provided by on-site medical response staff. As a precautionary measure, the employee was transported to an off-site medical facility. Per procedure, the employee's hands and arm were wrapped in plastic, and the employee was transported to an off-site medical facility accompanied by plant health physics personnel for evaluation. The licensee reported this event to the NRC as EN55412 on August 17, 2021; and submitted their 30-day follow-up report dated September 15, 2021 (ADAMS Accession Number: ML21258A403), in accordance with 10 CFR 70.50. This event was also entered into the licensee's corrective action program.</p> <p>The inspectors reviewed licensee records to verify that the potential spread of contamination was minimized by wrapping contaminated areas in plastic prior to transport by ambulance and that a licensee HP technician accompanied the worker in the ambulance in accordance with licensee procedures. Smear samples taken at the site, ambulance, and hospital confirmed that smearable contamination was below the licensee's free release limits and there was no spread of contamination.</p> <p>The Written Event Report was reviewed. No violations of NRC requirements were identified. This item is considered closed.</p>		

## **EXIT MEETINGS AND DEBRIEFS**

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

- On October 8 and November 19, 2021, 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	Drawings	347F04PI02	HOT OIL ROOM / FACILITIES	Rev. 28	
	Miscellaneous	ECL-80004	UF6 Installation and Removal Employee Checklist	11/18/21	
	Procedures	CF-81-002	UF6 Cylinder Record		Rev. 60
		CM-81026	39501: 52 Weeks OM81026 SI-SAFETY, XOMOX3-WAY VALVE VERIFICATION		04/29/2021
		COP-810094	REPLACEMENT OF PLUGGED PIGTAIL PROCEDURE ON UF6 CYLINDER		09/03/2020
		COP-810096	COLD PRESSURE CHECKING OF UF6 CYLINDER		09/06/2018
		COP-810097	UF6 BAY HANDLING OF UF6 CYLINDERS		02/13/2020
		COP-810098	UF6 CYLINDER INSTALLATION PROCEDURE AND REMOVAL		04/29/2021
		COP-810099	UF6 VAPORIZER		12/05/2018
		COP-814604	UF6 CYLINDER VACUUM PRESSURE PROCEDURE MEASUREMENT		06/11/2021
		COP-816020	UF6 Cylinder Installation and Removal for Line 5		10/13/2016
		OM81025	36664: 52 Weeks OM81205 SI-SAFETY ITEMS,ADU LINE 5		
		SYF-220-1	PIPELINE INSPECTION SHEET		05/27/2021
		W2-5.1-101.W03	Issue Review Committee Work Instruction		10/27/2021
	Radiation Surveys	ROF-07-001-7	Health Physics Response to a UF6 Release		08/12/2021
	Self-Assessments	RAF-316-1	Nuclear Criticality Safety Checklist for NCS Facility Walkthrough Assessments, Conversion – Conversion Operations and Various Containers, 4Q20		12/18/2020
		RAF-316-1	Nuclear Criticality Safety Checklist for NCS Facility Walkthrough Assessments, Conversion – Conversion Operations and Various Containers, 1Q21		03/31/2021
		RAF-316-1	Nuclear Criticality Safety Checklist for NCS Facility Walkthrough Assessments, Conversion – Conversion Operations and Various Containers, 2Q21		06/29/2021
		RAF-316-1	Nuclear Criticality Safety Checklist for NCS Facility Walkthrough Assessments, Conversion – Conversion Operations and Various Containers, 3Q21		09/29/2021
		SYF-300-2	HOUSEKEEPING INSPECTION, CHEM-05 HOT OIL ROOM		02/18/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
	Work Orders	CFFF Dispatch 27829	26 Weeks PM20206 SI-SAFETY - PRESSURE RELIEF VALVES - 26 WEEK PM	02/15/2021
		CFFF Dispatch 27830	26 Weeks PM20206 SI-SAFETY - PRESSURE RELIEF VALVES - 26 WEEK PM	02/15/2021
		CFFF Dispatch 39442	52 Weeks SI-SAFETY EXTERNAL MECHANICAL INTEGRITY INSPECTION - 52 WEEK PM	05/07/2021
		Checklist OM81201	SI-SAFETY ITEMS, ADU LINE 1 - 52 WEEK OM	03/14/2021
		Checklist OM81203	SI-SAFETY ITEMS, ADU LINE 3 - 52 WEEK OM	08/09/2021
		Checklist OM81204	SI-SAFETY ITEMS, ADU LINE 4 - 52 WEEK OM	07/26/2021
88072	Corrective Action Documents	IR-2017-736	Incident Reports	various
		IR-2020-8885		
		IR-2020-9268		
		IR-2020-13960		
		IR-2020-14085		
		IR-2021-7742		
		IR-2020-13168		
	Drawings	304F07PI02	Scrubber System Modifications	Rev. 12, 13, 21
	Engineering Changes	CCF 05210	Incinerator Safety PLC	04/07/2005
		CCF 05361	Incinerator Mass Control	08/11/2005
		CCF 06488	FN-949 Drain Hole	10/6/2006
		CCF 06605	Incinerator PLC Fault	01/11/2007
		CCF 06610	PLC Level Probe Input	1/31/2007
		CCF 09339	Incinerator/ABF Torit Level Probe	05/31/2009
	Engineering Evaluations	CAF-203-5	Readiness Review Plan	Rev. 1
		CSE-13-A	Criticality Safety Evaluation for the Incinerator System	Rev. 3-16
		PSEDoc-0001912	Independent Technical Review for CCF12155 Incinerator Backflow Preventer Installation	Rev. 1
		PSEoc-0003557	Qualification Plan for Incinerator PLC Modifications to Remove Ram Controls	Rev. 0
	Miscellaneous	06542	Incinerator Sump Emergency Drain Size Increase	01/08/2008

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		16178	Install drain line in incinerator duct just prior to "C" demister	03/15/2016
		17494	Demolition of Incinerator System 6A Ventilation	11/03/2017
		17495	6A Incinerator Ventilation System	04/15/2018
		CCF 06392	Scrubber Liquid Recirc Loop	05/21/2007
		CCF 12155	Tie in for Incinerator BFPs and Area Contaminated Drain Inputs	08/24/2014
		CCF 16159	Modifications to Incinerator RAM Controls and Safety System Upgrades	12/27/2017
	Operability Evaluations	CF-20-010	Incinerator Safety Significant Interlocks Functionality Verification Form	Rev. 4
	Procedures	COP-830210	Incinerator Operation	Rev. 55
		CSE-1-AP	Incinerator 6A Ventilation System	Rev. 0
		ISA-13	Low Level Radioactive Waste System	Various Revisions
		TA-500	Columbia Manufacturing Plant Configuration Control	Rev. 39