RECOMMENDED AREAS FOR REVIEW AT THE WESTINGHOUSE COLUMBIA FUEL FABRICATION FACILITY

Integrated Safety Analysis Summary Changes

On January 16, 2013, the Westinghouse Electric Company, LLC, submitted a list of changes that were made in calendar year 2012 to the Columbia Fuel Fabrication Facility (Ref. 1).

The Office of Nuclear Material Safety and Safeguards licensing project manager reviewed each of the changes in the context of the Integrated Safety Analysis (ISA) (Ref. 2). Some of the changes involved items relied on for safety (IROFS) and commitments made to the U.S. Nuclear Regulatory Commission (NRC) staff. The licensee implemented those changes to accomplish the following:

- remove unused components, pipes, and wires;
- replace obsolete equipment with new and more reliable versions of equipment performing the same function;
- improve ergonomics and safety of equipment;
- relocate pipes to improve access for operations and maintenance; and replace corroded parts.

The review confirmed the licensee's perspective that all of the criteria listed in Title 10 of the *Code of Federal Regulations* (10 CFR) § 70.72(c) have been met. Therefore, prior NRC approval was not required.

The NRC staff should give attention to Item 1 below. Here the facility change report indicates that PELSINT-903, PELSINT-904, PELSINT-905, were replaced. The January 2013 ISA submittal indicates that PELSINT-903, PELSINT-904, PELSINT-905, were removed as IROFS.

IROFS cited in the facility change report are described with endnotes of excerpts from the ISA summary.

Facility Changes for Inspection Consideration

Based on our review of the facility changes, the following items may be considered during the next routine inspection to ensure that the changes were properly implemented.

1. The current common pressure switch does not allow testing of PELSINT-903 without tripping all 18 pellet sintering furnaces. This is a major inconvenience that results in production downtime and maintenance costs that will be avoided as the furnaces are transferred to individual pressure switches. This Configuration Control Form (CCF) simplifies PELSINT-903[(1)] and makes it more reliable by eliminating an interposing relay which has a dangerous failure mode. Replace obsolete equipment and improve accuracy and stability of temperature measurements. This is identical to the controls upgrade that was recently completed on 4C furnace. Solenoid valves are a poor choice for final elements in interlocks because the state of the valve cannot be verified when performing interlock verifications and they are prone to leak-through. This modification is identical to the one on other furnaces ex. 4C furnace. With this CCF results in the following changes:

- Install individual N_2 pressure switch. This CCF is to transfer the low nitrogen pressure interlock wiring from the common switch to the new individual switch for individual furnaces. All sintering furnaces in ADU and Erbia have a low nitrogen pressure interlock (PELSINT-903[2] from a pressure switch on the main nitrogen header that is located on the thermal stability furnace mezzanine. A new header with 19 individual pressure switches has been installed under CCF 09630. This will enable each furnace to have its own pressure switch for this interlock. This change was implemented on several furnaces already.
- Replace temperature control Robicon SCR's for Ameteks due to obsolescence. Install Ammeters. The following SSC's are impacted: PELSINT-903[1], PELSINT-904[1], PELSINT-905[1], PELSINT-907[2], and PELSINT-908[3].
- Replace solenoid valves: SV1A9, SV1A10 and SV1A11 with air actuated ball valves - Jamesbury 9FB-3600XT with linkage kit and spring return actuator, model VPVL100SR4-5. PELSINT-915[4] will be affected.
- Modify the PLC code: Remove ramp issues associated with Start-ups. Westinghouse CFF number 11575.

2. At the UF_6 Bay and Hydrolysis for ADU Line 5, add a third IROFS to certain CSE Cases. SSCs affected are: New: ADUHFS-901[5], ADUHYD-106[6], ADUHYD-912[7], ADUVAP-147[8], ADUVAP-148[9], ADUVAP-936[10], and ADUVAP-937[11]. Modified: ADUHYD-105[12], ADUPCP-901[13], ADUVAP-115[14], ADUVAP-122[15], ADUVAP-928[16], and ADUVAP-929[17]. Westinghouse CCF number 10390.

3. Install 6 Kerotest Valves in Line 1 Vaporizers UF6 Lines to support third IROFS addition for Line 1. The ADU Line 1 Vaporizer System UF6 piping was modified for addition of third IROFS so that if one of the existing two IROFS fails, an additional IROFS is in place. Kerotest valves are installed to act as redundant blocking valves on the UF6 piping segments containing XV-102H and XV-102I. A Kerotest valve will be installed on the UF6 line exiting each Line 1 Vaporizer. In addition, XV-102-I and XV-102H Xomox valves will be replaced with Kerotest fail closed bellows sealed globe valves. The Kerotest valves installed as vaporizer shut off valves and the redundant blocking valves for XV-102H/XV-102I will be activated under a separate CCF at a later date. These valves are pinned in the open position so they do not change how the process operates currently. XV102H and XV102I Kerotest replacement valves will be installed and activated by this CCF. Westinghouse CCF number 10762.

4. A non-safety GE Line PLC functions were migrated to a Honeywell C200 so that all process control is being done from one system. SSCs affected are ADUSCR-902[18], ADUSCR-903[19], ADUCAL-406[20], ADUCAL-901[21], ADUCAL-907[22], ADUx12-402, and ADUSCR-405[23]. Westinghouse CCF number 11029.

5. The existing configuration of ADUVAP-910[24] uses a general purpose PLC to initiate the safety function. A Safety Integrity Level (SIL) rated stand alone logic solver (Moore STA) initiates the safety function. The remaining process controls were removed from the Plant One PLC under this CCF. Westinghouse CCF number 11058.

6. To meet new requirements to prevent spills from vessels containing HF, NH_4OH and nitric acid, valves and level transmitter were installed on V-106. The six control valves were installed and configured so that process lines will not be affected. A new 10 inch by 3 inch

instrument tee was attached to the bottom of V106 so that a new diaphragm level transmitter can be physically installed. ADUHFS-901[25] is affected because the new the 10 inch by 3 inch instrument tee attached to the bottom of V106 changed the height of the tank requiring recalibration of the level transmitter. The interlock check associated with ADUHFS-901[25] needed to be performed since the dip tube level transmitter piping associated with this SSC was touched during the addition of the new bottom and level transmitter installation. Westinghouse CCF numbers 11463, 11464, 11465.

7. V717 is the knockout pot for the vessels in SOLX. Recent ISA changes have required taking credit for the high level alarm for this vessel as an SSC. This is an existing circuit with one switch and alarm. If this alarm were not to function when tested and/or required, this will possibly be a NRC reportable event. Replace LSH-717 on V-717 knockout pot with two independent level switches, alarms, and controls. The new switches will be Rosemount 2120 fork level switches and will replace the existing Warrick level switch (LSH 717). The new switches are tagged LSH-717A and LSHH-717B. LSH-717A replaces the existing switch and be mounted in the same inch NPT connection. Westinghouse CCF number 11473.

8. This project fulfills a commitment made to NRC. New High level alarms and High High level interlocks are implemented for the ADU V-216[26] Q-Tanks. When 85% level is reached in the on-line Q-Tanks, all the six Q-Tank pumps turn off. When 95% level is reached in the on-line Q-Tanks all the six Q-Tank pumps turn off. Although this functionality will be implemented in the Safety PLC system, this is not a Safety Significant Control. Westinghouse CCF numbers 11695 and 11696.

9. The new automatic shut-off valve was installed as part of the strategy to prevent overflow of the Q-Tanks. The new line supplying ammonium hydroxide to the Scrap Cage and Fluoride Stripping is required so that ammonium hydroxide will always be available to the scrubber systems even in the event that the new automatic shut-off valve closes. The shut-off valve is part of a new interlock that closes the valve and stop ammonium hydroxide flow to the ADU Conversion lines whenever a high, high level is detected in the Q-Tanks. A new line from upstream of the new automatic shutoff valve ties into the existing ammonium hydroxide line that supplies the Scrap Cage Area and the Fluoride Stripping Area. This CCF is for mechanical installation only. Westinghouse CCF numbers 12045, 12046, and 12099.

10. Pilot gas solenoid valves SV-509F, SV-509G, SV-509H, SV-509I, SV-509J & SV-509K were replaced with Swagelok SS-8BK-33798-1CRI. CAPS 11-237-C015 requires a plan to replace solenoid valves that are final elements in SSC's with valves that are more reliable and have open/closed indication. Twenty-five years of experience with Swagelok air actuated bellows seal plug valves on thermal stability furnaces indicate that the valves performed well. The valves are light and compact and can be installed with minimal piping changes. ADUCAL-403[27] was tested to verify correct operation of the valves after completion of the modification and prior to startup. The action addressed CAPS-11-237-C015 and concerns about verification of SSC's when valve status is uncertain. The valves are part of the following SSC's: ADUCAL-403[27]; ADUCAL-905[28]; ADUCAL-906[29]; ADUCAL-907[30]; ADUCAL-908[31]. Westinghouse CCF number 12089, 12090, 12091, 12092, and 12093.

11. During an NRC fire safety inspection, the NRC identified concerns regarding the site emergency battery powered lighting. There is one PM which requires the battery powered

emergency light to be tested every 26 weeks. The standard requires that battery powered emergency lights be tested monthly. Another PM is needed to test the battery powered lights on an annual basis to assure they burn for at least 1.5 hours before shutting off. The 26wk PM was modified to reflect the Monthly Std. With this CCF we will be replacing obsolete battery powered backup lights. The replacement meets NFPA requirements of a 90-minute run time. The obsolete units either do not work, or do not meet the NFPA requirement of lasting 90 minutes. Battery replacements cannot be found for the obsolete units. Westinghouse CCF number 12087.

12. People working inside the hot oil room are unable to hear the Criticality Alarm Sound (CAS). A criticality alarm horn was installed in the hot oil room. Westinghouse CCF number 12124.

13. On Furnace 3C Saturator DI Water SSC, existing Drexelbrook level sensor and wire sensor contacts directly to a safety relay. Modify existing warrick high high level sensor and wire sensor contacts directly to a second safety relay. A high level on either sensor will close the two in series DI water shutoff valves. Valves shall be configured for fail closed on loss of power, air, or high level from either sensor via the safety relays. Independent alarms shall indicate which level switch has tripped. Circuit will not clear until a safe level is obtained and operations manually resets the trip. The current direct wired PLC inputs from the Warrick and Drexelbrook will be removed. The existing SV-9 BPCS will be removed from the plc and hardwired. Contacts from the safety relays will tie into the PLC as Alarms Only. This is a commitment to NRC. Westinghouse CCF number 12185.

14. CSE-8-D implementation requires an SSC on the feed tank that credits an overfill drain. On Line 6 Centrifuge Feed Tank Drain, an overfill drain was added to the Centrifuge Feed Tank. This is the tank directly behind the Line 6 grinder that feeds into the centrifuge system. The overfill drain added will be almost identical to the centrifuge coolant tank overfill drain. Westinghouse CCF numbers 12210 and 12211.

15. To meet the intent of CSE-1-G to eliminate the potential backflow into the process supply stream, the Process Water Supply Line to Conversion 2A/B Scrubber was relocated. Plans are to remove the existing makeup process water supply lines that are tied into the discharge side of the pumps for 2A and 2B scrubber in Conversion. See for construction drawing 313F01PI01 sheet 1. Plans are to reroute piping to the top of the scrubber sump tank per drawings 313F01PP01, 1 and 313F01PP02, 1. Westinghouse CCF number 12248 and 12249.

16. A second UF_6 storage pad was installed in the CAA. The pad requires criticality alarm coverage. An analysis was completed by the Crit engineering group and determine that the space identified for the new pad was outside the current Criticality Accident Alarm System (CAAS) coverage. A recommendation was made to add a CAAS station in shipping dock 2 to provide the necessary coverage of the desired space. Therefore, a Criticality Gamma Alarm Detector pair and Alarm System Station were installed. Westinghouse CCF number 12311.

17. Hot oil room doors have gap between door and floor that exceeds the allowable fire code ¾ inch limit. Hot oil room doors. A metal plate to the concrete under doors was installed to fill the gap. Westinghouse CCF number 12520.

18. The CAS Loop 5 has areas in the plant that cannot hear the horns. The current horns use 24 VAC. The long distances that many of these horns are from the front desk causes a significant voltage drop to the affect that the outlying horns do not operate at their peak sound levels. By increasing the voltage, the voltage drop may not be as much of a factor. In addition, the 120 VAC rated horns use 1/3 of the amperage than the current 24 VAC horns. Additional horns can be added to the loop. Westinghouse CCF number 12628.

References

1. G. Couture, Westinghouse, "Westinghouse 10 CFR 70.72 Facility Change Report", January 16, 2013. ADAMS accession number ML130220705.

2. G. F. Couture, Westinghouse, "Westinghouse Revised Integrated Safety Analysis (ISA) Summaries", January 23, 2013. ADAMS accession number ML130800094.

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[1] In the 2013 ISA summary, the IROFS is indicated as being removed.

[2] In the 2013 ISA summary, the IROFS is indicated as being removed.

[3] Not listed in the ISA summary.

[4] Not listed in the ISA summary.

[5] Line 5. High level control on V-x06A column. Prevent overfilling the 06 column, and overflowing to the floor. Terminate flow into V-506A columns.

[6] Line 5 Hydrolysis column low recirculation flow interlock. Prevent UF6 release and prevent backflow from precipitator. UF6 emergency shut-off valves and shut-off valves to the precipitator are closed if recirculation flow is < 3 gallons per minute.

[7] Line 5 Hydrolysis column high level backup interlock. Prevent backflow of moderator to UF6 cylinder. Close DI water, UF6, and nitrogen supply valves on both vaporizers at >21.25 inches of level.

[8] Failure of Control. Hydrolysis column high - high level interlock that closes a minimum of two inline DI water shut-off valves and a minimum of two inline UF6 shut-off valves if high level is detected in the hydrolysis column as measured by LIT-S-X02-10.

[9] The UF6/nitrogen block valves, XV-S-X01X-l, 2 and 4 shall be interlocked to close when the line pressure falls to a minimum of 40 psig or greater.

[10] Prior to heating, a pressure test shall be performed on the pigtail. The safety PLC shall sense a negligible differential pressure between the pigtail pressure at PIT-S-XOIX-12 and the nitrogen line pressure in order to start heating a cylinder in the autoclave.

[11] The heating circuit shall be interlocked to shut down if the autoclave temperature exceeds 235 of at TE S-X01X-5.

[12] Failure of recirculation flow interlock to shut off UF6 gas upon low recirculation flow. Hydrolysis column recirculation flow transmitter interlock that closes UF6 supply valves (XV-S-XOIAIB-l, 2 & 4) and (XV-S-X02-10 & 13), if the flow rate drops below 3 gpm.

[13] Failure of precipitator high level interlock to shut off DI water flow. Precipitator column high level interlock that shuts off U02F2 feed valves, UN feed valves, ammonia feed valves, nitric acid feed valves,

and DI water feed valves upon high level. Only the DI water feed valves shutoff is required for NCS control.

[14] Prior to heating and during operation, the safety PLC shall sense an initial autoclave nitrogen pressure of at least 8 psig on PIT-S-X01X-2.

[15] The safety PLC shall be interlocked to prevent or terminate heating and close the nitrogen safety block valve (XV-S-X01X-4) if the autoclave pressure exceeds 22 psig on PIT-S-XOIX-2.

[16] The heating circuit shall be interlocked to shut down if the autoclave temperature exceeds 235 deg F at TIT-S-X01X-9.

[17] The heating circuit shall be interlocked to shut down if UF6 pressure exceeds 40 psig at PIT-S-XOIX-I1.

[18] Low-Low V-x12 Tank Level. Prevents air from being pumped into scrubber. At 1 0% tank level, shuts off both pumps to stop flow from V-x12 tank (P-x12A, OM81203 B).

[19] Low-Low V-x12 Tank Level. Prevents air from being pumped into scrubber. At 1 0% tank level, shuts off power to both pumps to stop flow from V-x12 tank (P-x12A, B).

[20] Not listed in the ISA summary.

[21] Calciner Low Process Pressure. Prevent explosion causing distortion of calciner tube and potential release of material. If calciner pressure < - 0.125 inches water, injects N2 (30 psig; SV-x31B) into calciner scrubber system.

[22] UV burner flame sensor.

[23] Not listed in the ISA summary.

[24] Not listed in the ISA summary.

[25] High level control on V-x06A column. Prevent overfilling the 06 column, and overflowing to the floor. Terminate flow into V-506A columns when level >85%; close valves XV -S-506 3, XV S 506-4, XV-S-506-5, XV-S 506-6, XV-S-506-7, XV-S-506-8, SVS-506-9, and SV-S-506-10.

[26] Not listed in the ISA summary.

[27] Not listed in the ISA summary.

[28] High natural gas pressure control on the calciner. Shown in sequence figure but not in an event probability table.

[29] High temperature control on the calciner. Shown on a sequence figure, but not in an event probability table.

[30] UV burner flame sensor of calciner. Shown on a sequence figure, but not in an event probability table.

[31] Low combustion air pressure on burners of calciner. Shown on a sequence figure, but not in an event probability table.