



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

EN 52840

April 30, 2020

Mr. B. Joel Burch  
Vice President and General Manager  
BWXT Nuclear Operations Group, Inc.  
P.O. Box 785  
Lynchburg, VA 24505-0785

**SUBJECT: BWXT NUCLEAR OPERATIONS GROUP – NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 70-27/2020-001 AND  
NOTICE OF VIOLATION**

Dear Mr. Burch:

This letter refers to the U.S. Nuclear Regulatory Commission (NRC) inspection oversight activities conducted from January 1, 2020, through March 31, 2020, at the BWXT Nuclear Operations Group, Inc. (NOG) facility in Lynchburg, VA. The purpose of the inspection was to determine whether activities authorized under the license related to the implementation of programs and procedures in the areas of safety operations, radiological controls, and facility support were conducted safely and in accordance with NRC requirements. The results were discussed with you and members of your staff at exit meetings held on January 16 and April 14, 2020.

Based on the results of this inspection, the NRC has determined that two violations of NRC requirements occurred. These violations were evaluated in accordance with the NRC Enforcement Policy. The current Enforcement Policy is included on the NRC's Web site at <https://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html>. The violations are cited in the enclosed Notice of Violation (Notice), and the circumstances surrounding each violation are described in detail in the subject inspection report. The violations are being cited in the Notice because they are considered self-revealing and not identified by the licensee. Specifically, the violations were identified as a result of an event and the NRC recognizes that prior opportunities existed for BWXT to identify the violation.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390 of the NRC's "Rules of Practice and Procedure," a copy of this letter, its enclosure, and your response, if you choose to provide one, will be made available electronically for public inspection in the NRC Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

To the extent possible, your response should not include any personal privacy or proprietary information so that it can be made available to the public without redaction.

If you have any questions concerning these inspections, please contact Noel Pitoniak of my staff at 404-997-4634.

Sincerely,

/RA/

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

Docket No. 70-27  
License No. SNM-42

Enclosure:  
NRC Inspection Report 70-27/2020-001  
w/Attachment: Supplemental Information

cc w/encl: Distribution via LISTSERV®

SUBJECT: BWXT NUCLEAR OPERATIONS GROUP – NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 70-27/2020-001  
dated April 30, 2020

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DATE	4/13/2020	2/13/2020	2/21/2020	2/13/2020	2/7/2020	4/15/2020	4/30/2020

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## NOTICE OF VIOLATION

BWXT Nuclear Operations Group, Inc.  
Lynchburg, Virginia

Docket No. 70-27  
License No. SNM-42

During NRC inspections conducted from January 1, 2020, to March 30, 2020, two violations of NRC requirements were identified. In accordance with the NRC Enforcement Policy, the violations are described below:

- A. Title 10 of the *Code of Federal Regulations* 70.61(e) requires, in part, that the safety program established and maintained pursuant to § 70.62 of this subpart, shall ensure that each item relied on for safety (IRFOS) will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section. § 70.62(d) requires, in part, that management measures shall be established to ensure compliance with the performance requirements of § 70.61. The management measures shall ensure that controls identified as IROFS pursuant to § 70.61(e) are designed, implemented, and maintained, as necessary, to ensure they are available and reliable to perform their function when needed, to comply with the performance requirements of § 70.61 of this subpart.

Contrary to the above, prior to December 18, 2019, the licensee failed to establish adequate management measures to ensure that a control identified as an IROFS was designed, implemented and maintained such that it was available and reliable to perform its function, to comply with the performance requirements of 10 CFR 70.61. Specifically, an engineered IROFS was inadequately implemented and maintained and was therefore a degraded state since installation due to improper initial and periodic testing which failed to ensure it was available and reliable to perform its intended function when needed.

This is a Severity Level IV violation. (Section 6.2.d.1)

- B. Title 10 of the *Code of Federal Regulations* 70.61(e) requires, in part, that the safety program established and maintained pursuant to § 70.62 of this subpart, shall ensure that each IRFOS will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section. § 70.62(d) requires, in part, that management measures shall be established to ensure compliance with the performance requirements of § 70.61. The management measures shall ensure that controls identified as IROFS pursuant to § 70.61(e) are designed, implemented, and maintained, as necessary, to ensure they are available and reliable to perform their function when needed, to comply with the performance requirements of § 70.61 of this subpart.

Contrary to the above, prior to January 8, 2020, the licensee failed to establish adequate management measures to ensure that controls identified as IROFS were maintained such that they were available and reliable to perform their function, to comply with the performance requirements of 10 CFR 70.61. Specifically, engineered IROFS were not maintained because management measures to periodically pressure test the IROFS did not ensure the IROFS reliability and availability to perform their intended function when needed.

This is a Severity Level IV violation. (Section 6.2.d.1)

The NRC has concluded that information regarding the reason for the violations, the corrective actions taken and planned to correct the violations, and the date when full compliance was restored, is already adequately addressed on the attached inspection report 70-27/2020-001. However, you are required to submit a written statement or explanation pursuant to 10 CFR 2.201 if the description therein does not accurately reflect your corrective actions or your position. In that case, or if you chose to respond, clearly mark your response as a "Reply to a Notice of Violation," and send it to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C 20555-001 with a copy to the Regional Administrator, Region II, within 30 days of the date of the letter transmitting this Notice of Violation (Notice).

If you choose to respond, your response will be made available electronically for public inspection in the NRC Public Document Room or in the NRC's Agencywide Documents Access and Management (ADAMS) accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. Therefore, to the extent possible, the response should not include any personal privacy, proprietary, classified, or safeguards information so that it can be made available to the Public without redaction.

In accordance with 10 CFR 19.11, you may be required to post this Notice within 2 working days of receipt.

Dated this 30<sup>th</sup> day of April 2020

**U.S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

**INSPECTION REPORT**

Docket No: 70-27

License No: SNM-42

Report No: 70-27/2020-001

Enterprise Identifier: I-2020-001-0072

Licensee: BWX Technologies, Inc. (BWXT)

Facility: Nuclear Operations Group, Inc. (NOG)

Location: Lynchburg, VA 24505

Inspection Dates: January 1, 2020, through March 31, 2020

Inspectors: A. Alen, Senior Resident Inspector  
B. Adkins, Senior Fuel Facility Project Inspector (Section A.5)  
R. Gibson, Jr., Senior Fuel Facility Project Inspector (Section C.4)  
T. Sippel, Fuel Facility Inspector (Section A.5)

Approved by: E. Michel, Chief  
Projects Branch 2  
Division of Fuel Facility Inspection

Enclosure

## **EXECUTIVE SUMMARY**

BWXT Nuclear Operations Group, Inc.  
NRC Integrated Inspection Report 70-27/2020-001  
January 1, 2020 – March 31, 2020

Inspections were conducted by the senior resident inspectors and regional inspectors during normal and off-normal hours in safety operations, radiological controls, facility support, and other areas. The inspectors performed a selective examination of licensee activities that were accomplished by direct observation of safety-significant activities and equipment, tours of the facility, interviews and discussions with licensee personnel, and a review of facility records.

### **Safety Operations**

- No violations of more than minor significance were identified related to Plant Operations and Operational Safety walkdowns. (Sections A.1 and A.2)
- No violations of more than minor significance were identified related to the Fire Protection Program. (Sections A.3)
- No violations of more than minor significance were identified related to the Nuclear Criticality Safety Program. (Section A.4)
- One NRC identified Severity Level IV violation of NRC requirements was identified related to the Nuclear Criticality Safety Program. (Section A.5)

### **Radiological Controls**

- No violations of more than minor significance were identified related to the Radiation Protection Program. (Section B.1)

### **Facility Support**

- No violations of more than minor significance were identified related to Post-Maintenance Program. (Section C.1)
- One NRC identified Severity Level IV violation of NRC requirements was identified related to the Surveillance Testing. (Section C.2)
- No violations of more than minor significance were identified related to the Identification and Resolution of Problems. (Section C.3)
- No violations of more than minor significance were identified related to the Emergency Preparedness Program. (Section C.4)

### **Other Areas**

- No violations of more than minor significance were identified related to observations of security personnel and activities. (Section D.1)
- Violation 2018-006-03, Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAI<sub>x</sub> Glovebox Systems as Required by 10 CFR 70.62(b), was discussed and remains open. (Section D.2)

### **Attachment**

Key Points of Contact  
List of Items Opened, Closed, and Discussed  
Inspection Procedures Used  
Documents Reviewed



## REPORT DETAILS

### Summary of Plant Status

During the inspection period, routine fuel manufacturing operations and maintenance activities were conducted in the fuel processing areas, Uranium Recovery (UR) facility, and in the Research and Test Reactors (RTR) facility.

#### **A. Safety Operations**

##### 1. Plant Operations (Inspection Procedures 88135 and 88135.02)

###### a. Inspection Scope

The inspectors performed routine tours of plant operating areas housing special nuclear material (SNM) to verify that equipment and systems were operated safely and in compliance with the license and Title 10 of the *Code of Federal Regulations* (10 CFR) 70, "Domestic Licensing of Special Nuclear Material." Daily operational and shift turnover meetings were observed throughout the period to gain insights into process safety and operational issues. The inspectors reviewed selected licensee-identified issues and corrective actions for previously identified issues. These reviews focused on plant operations, safety-related equipment (valves, sensors, instrumentation, in-line monitors, and scales), and items relied on for safety (IROFS) to determine whether the licensee captured off-normal events and implemented effective corrective actions as required.

The inspectors conducted routine tours to verify that operators, front-line managers, maintenance mechanics, radiation protection staff, and process engineering personnel were knowledgeable of their duties and attentive to any alarms or annunciators at their respective stations as required. The routine tours included walkdowns of the RTR, filler, UR areas, and other manufacturing areas where SNM was being processed. The inspectors observed activities during normal and upset conditions to verify compliance with procedures and material station limits. The inspectors reviewed selected safety controls, including IROFS, to verify that they were in place, available, and functional to ensure proper control of SNM. The inspectors reviewed operator log sheets, operating procedures, maintenance records, and equipment and process changes to obtain information concerning operating trends and activities. The inspectors reviewed corrective actions to verify that the licensee actively pursued corrective actions for conditions requiring temporary modifications and compensatory measures.

The inspectors performed periodic tours of the outlying facility areas to verify that equipment and systems were operated safely and in compliance with the license. The inspectors focused on potential wind-borne missile hazards, potential fire hazards with combustible material storage and fire loading, hazardous chemical storage, the physical condition of bulk chemical storage tanks and piping, storage of compressed gas containers, and potential degradation of plant security features. In addition, the inspectors periodically toured or inspected the licensees' emergency response facilities to verify that the facilities were maintained in a readily available status as required.

The inspectors attended various meetings, including the Change Review Board, Safety Review Board, and met periodically with plant senior management and licensing personnel throughout the inspection period to determine the overall status of the plant.

The inspectors evaluated the licensee's response to risk-significant plant issues and their approach to solving various plant problems in accordance with Quality Work Instruction (QWI) 2.1.3, "Integrated Safety Analysis Methodology;" QWI 14.1.4, "Reporting Unusual Incidents;" and QWI 14.1.10, "Safety Evaluation of Unusual Incidents."

b. Conclusion

No violations of more than minor significance were identified.

2. Operational Safety (Inspection Procedure 88135.04)

a. Inspection Scope

The inspectors reviewed safety significant systems, structures, and components involved with the processing and handling of SNM for tri-structural-isotropic (TRISO) acid deficient uranyl nitrate or 'ADUN' solution preparation, particle formation and aging, and washing and drying processes associated with safety analysis report (SAR) 15.17, "Wet-End Processing in Specialty Fuels Facility Operations," to verify compliance with the license and procedures. The inspectors conducted walkdowns of selected process areas to verify the as-built configurations matched approved plant drawings and to verify that there were no conditions which could degrade equipment performance including the operability of IROFS, safety-related devices, or other support systems required for safety. The inspectors observed operator performance at selected processes to verify they complied with safety controls associated with the IROFS systems and instrumentation for maintaining plant safety. The inspectors also reviewed IROFS assumptions and controls to verify proper implementation in the field. The inspectors reviewed the related integrated safety analyses (ISA) to verify the availability, reliability, and capability of the systems to perform their safety functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues.

The inspectors reviewed procedures, drawings, and related ISAs to verify the following, as appropriate, during the walkdowns:

- controls were in place for potential criticality, chemical, radiological, and fire safety hazards
- process and transport configurations were maintained in accordance with nuclear criticality safety evaluations (NCSEs)
- supporting structures, systems, and components were correctly aligned, labeled, lubricated, cooled, and ventilated
- hangers and supports were correctly installed and functional
- cabinets, cable trays, and conduits were correctly installed and functional
- material condition of visible cabling
- no interference of ancillary equipment or debris with system performance

b. Conclusion

No violations of more than minor significance were identified.

3. Fire Protection Quarterly (Inspection Procedure 88135.05)

a. Inspection Scope

The inspectors performed an inspection of the pharmacy and metallurgical laboratory of the filler area to verify compliance with license application Chapter 7, "Fire Safety," and the National Fire Protection Association 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials," as required. The inspectors performed fire safety walkdowns and reviewed the fire detection and suppression capabilities in those areas, as applicable. The inspectors also reviewed relevant portions of the pre-fire plans before and during the walkdowns to verify that key fire-fighting features and information identified in the plans were in place in the field and that fire hazards that existed in the field were reflected in the pre-fire plans. The inspectors reviewed the type of manual firefighting equipment that was provided to verify that it was appropriate for the type of fire that could occur. Fire barriers were examined for proper maintenance and function and fire impairments reviewed for adequate compensatory actions, as required.

Routine plant tours were conducted for other areas of the plant to verify that housekeeping in the areas was sufficient to minimize the risk of fire and that transient combustibles were being controlled and minimized as required.

b. Conclusion

No violations of more than minor significance were identified.

4. Nuclear Criticality Safety (Inspection Procedure 88135.02)

a. Inspection Scope

The inspectors reviewed the Nuclear Criticality Safety (NCS) program to verify compliance with license application Chapter 5, "Nuclear Criticality Safety;" the Nuclear Criticality Safety Manual; and implementing procedures. The inspectors conducted routine production area tours to verify various criticality controls, including the implementation of criticality station limit cards and container sizing to minimize potential criticality hazards as required. The inspectors reviewed a number of NCS-related IROFS to verify operability. The inspectors also observed operator performance to verify compliance with requirements associated with NCS-related IROFS.

As part of routine day-to-day activities onsite, the inspectors reviewed corrective action program (CAP) entries associated with criticality safety. The inspectors evaluated the licensee's response to such entries and, if needed, had discussions with NCS engineers to determine safety significance and to verify compliance with procedures.

b. Conclusion

No violations of more than minor significance were identified.

5. Nuclear Criticality Safety (Inspection Procedure 88015)

a. Inspection Scope

The inspectors evaluated selected aspects of the licensee's NCS program to verify compliance with selected portions of 10 CFR 70, "Domestic Licensing of Special Nuclear Material;" including § 70.24, 70.24(d); License Application Chapter 2, "Organization and Administration;" Chapter 5, "Nuclear Criticality Safety;" and applicable licensee procedures. Specific areas of the NCS program reviewed are detailed below.

Criticality Analysis

The inspectors reviewed selected NCSEs and associated drawings and calculations to verify that they were consistent with the commitments in the license application. These commitments included the double contingency principle, assurance of subcriticality under normal and credible abnormal conditions with the use of subcritical margin and having properly reviewed and approved NCSEs in place prior to conducting new or changed operations. The NCSEs were selected based on whether they were new and/or revised, and their operating history. The NCSEs reviewed included NCS-2006-010, "Overpickling of Elements," NCS-2016-042, "NCS Safety Analysis for SER 16-015 Phase 01 – Re-Analysis of Specialty Fuel Facility (SFF) Dry Gloveboxes," and NCS-2019-274, NCS Safety Analysis for SER 19-040 Phases 01 and 02: 6-Inch TRISO Sintering Furnace – Restart," as well as those listed in Section 4 of the Attachment.

The inspectors reviewed the licensee's generation of accident sequences to determine whether the NCSEs systematically identified normal and credible abnormal conditions in accordance with the commitments and methodologies in the license application for the analysis of process upsets. The inspectors reviewed documented assumptions made for upset conditions to verify they were appropriately conservative and matched the controls applied. Additionally, the inspectors reviewed IROFS for selected accident sequences to determine whether issues such as common mode failure were addressed. The inspectors also reviewed the protection and prevention scores assigned in the accident sequences to determine whether they were consistent with procedural guidance and resulted in the scenario being highly unlikely in accordance with 10 CFR 70.61(b). This review was conducted in the areas of SFF and pickling and included SAR 15.27, "NR Fuel Element Fabrication Process," (sequences EL7E-3b, -6, -7b, -13).

Criticality Implementation

The inspectors performed walkdowns in SFF and pickling to determine whether existing plant configuration and operations were covered by, and consistent with, the process description and safety basis in the selected NCSEs listed above. The inspectors reviewed process and system descriptions, calibration and test procedures, drawings, and interviewed operators to verify that engineered controls established in the NCSEs were included and being implemented as specified. The engineered controls reviewed included the automatic dump system in pickling and the geometry and spacing controls in SFF. The inspectors reviewed operating procedures and postings and interviewed operators and engineers to verify that selected administrative controls were understood and implemented as specified.

The review of administrative controls focused on those in the pickling area. The inspectors also reviewed the ISA summary and supporting ISA documentation to determine whether the controls identified in the ISA (e.g., SAR 15.27 and SAR 15.17, "SFF Wet-End Processing in SFF Operations") were supported by technical bases in the NCSEs (e.g., NCS-2006-010 and NCS-2019-274).

#### Criticality Operational Oversight

The inspectors reviewed NCS-related training material to determine whether operator training included instruction in criticality hazards and control methods, whether the licensee's established NCS-related operator training was consistent with commitments, and whether NCS staff was involved in the development of operator training as required by Section 5.1.4.1, "General Employee Safety Training," of the license application. Additionally, the inspectors interviewed operations staff to determine whether they were cognizant of NCS control methods related to their specific job function. The NCS-related training material reviewed included General Employee Safety Training – 2019 Nuclear Criticality Safety.

The inspectors reviewed the applied management measures for the NCS IROFS that were selected in the pickling area to determine whether the management measures were sufficient to ensure the availability and reliability of NCS IROFS controls.

#### Criticality Programmatic Oversight

The inspectors reviewed NCS program procedures related to NCS engineer training and qualification to determine whether the licensee implemented the license requirements in chapters 2 and 5 of the license application and whether the NCS program was enacted in accordance with them. The NCS program procedures included NCSE-07, "Qualification & Training Requirements for a Nuclear Criticality Safety Engineer," Revision (Rev.) 18. The inspectors conducted interviews and reviewed records to determine whether NCS staff reviewed new and/or revised fissile material operations and procedures, including maintenance plans, consistent with program procedures and at a level commensurate with their significance.

The inspectors reviewed the NCSE listed above to verify that it performed in accordance with NCS program procedures and received appropriate independent review and approval.

The inspectors interviewed two newly hired NCS engineers and reviewed their training and qualification records to verify they had the required education and experience and were being qualified in accordance with license requirements.

#### Criticality Incident Response and Corrective Action

The inspectors reviewed the detector placement calculations contained in NCS-TR-00004, "Placement of Detectors for the CIDAS System," Rev. 5, for the new detectors that will be added to the criticality accident alarm system (CAAS) to determine whether the detector placement met the applicable regulatory requirements in 10 CFR 70.24 and license commitments in the Section 5.1.5, "Nuclear Criticality Monitoring System," of the license application.

The inspectors reviewed documentation and interviewed engineers to determine whether dual detector coverage was provided for all areas required and whether conservative assumptions consistent with license commitments were made concerning the source strength and spectrum, source location, and the amount and location of intervening shielding in accordance with Section 5.1.5.

The inspectors reviewed training, posted instructions, and procedures to determine whether personnel were trained to evacuate in the event of a CAAS alarm as required by Section 5.1.4.1 of the license application. The inspectors reviewed procedures and dose assessments to determine whether assembly areas were located or monitored to minimize the potential for exposing personnel to radiation as required by 10 CFR 70.24(a)(3). The inspectors reviewed evacuations records to determine whether NCS-related evacuation drills were conducted annually as required by Section 4.2.1.3, "Non-Emergency Response Personnel," and Section 4.3, "Drills and Exercises," of the Emergency Plan. Additionally, the inspectors reviewed procedures (RP-07-103, "Maintenance and Testing the CIDAS MkXI Criticality Safety Engineer," Rev. 18, and RP-07-104, "CIDAS MkXI Detector Calibration," Rev. 2) that implement compensatory measures to verify that the procedures implemented the requirements of Section 5.1.5.

The inspectors reviewed the most recent CAAS test records to ensure that the radiation detectors and speakers were tested in accordance with license requirements. The inspectors conducted a walkdown of the CAAS alarm and control panel in the health physics office to determine if the system was active and functioning as designed.

The inspectors reviewed selected NCS-related CAP entries to verify that anomalous conditions were identified and entered into the CAP, that they received the required level of investigation, and that they were closed out consistent with license commitments and procedures. The inspectors reviewed the corrective actions listed in the Attachment to verify that they were sufficiently broad and adequate to prevent recurrence, if required.

b. Conclusion

One Severity Level IV violation of NRC requirements was identified regarding the failure of management measures to ensure the reliability of an IROFS for preventing a criticality in the pickling area. The violation is described below.

Introduction: The NRC inspectors identified a cited Severity Level (SL) IV violation of 10 CFR 70.61(e) and 10 CFR 70.62(d) for BWXT's failure to implement adequate management measures to ensure the reliability of the crane-sensing automatic dump system in the encapsulated SNM pickling area. As a result, the NRC senior resident inspector (SRI) identified that the system would not have activated across the required operating range. The automatic dump system was an IROFS to prevent criticality.

Description: On December 18, 2019, while observing operations in the encapsulated SNM pickling area, the NRC SRI noted that the local yellow light associated with the crane-sensing automatic dump system for Tank 1-2 was not lit. The light provided visual indication that the system was active. This system was an active engineered IROFS that served as an operator backup to prevent criticality by limiting the maximum amount of time that encapsulated SNM components could be pickled. The system drains the tank's pickling solution after it senses the component-carrying crane has been positioned over the tank in excess of the allowed time with the encapsulated material submerged in

the pickling solution. The system was designed with redundant crane detection sensors; one that triggered a programmable-logic-controller or PLC-driven timer and a local yellow light, and another sensor that triggered a redundant (i.e., same duration) hard-wired timer. Each timer sends an independent open signal to the tank's drains valves when the timer times out.

Follow-up review by the licensee and SRI confirmed that the sensors for Tank 1-2 were positioned such that the crane was not being detected over the entire opening of the tank. Specifically, both PLC-driven and hard-wired sensors would not detect the crane if it was positioned near the left corner of the tank. Although operators normally pickled closer to the center of the tank, the potential to pickle near the corners could not be eliminated and, thus, required the sensors to detect the crane over the entire opening of the tank. Additionally, spot locations in other tanks were identified where the hard-wired sensors would not detect the crane; however, the IROFS was expected to perform its safety function due to the redundant PLC sensor. The inspectors reviewed the weekly system test instructions per Section 3.4 of operating procedure (OP-0021001, "Operating Procedure for Pickling," Rev. 88) and noted that the instructions did not test functionality of the hard-wire sensor nor verified that the sensors were able to detect the crane over the entire plausible operating range across the tanks where the IROFS could be needed. The operating procedure was cited in SAR 15.27, "Fuel Element Fabrication," Rev. 133, and SAR 15.37, "Higher Tier Assemblies," Rev. 135, as the management measure to ensure that the IROFS was reliable. This IROFS was an active engineered control with a protection score of 3 and used in several different accident sequences in the SARs. The inspectors determined that some credit for the control was still appropriate given the degraded performance of the IROFS and the fact that operators normally operated closer to the center of the tank.

Analysis: The failure to implement adequate management measures for testing of the crane automatic dump system IROFS in the pickling area was a violation of 10 CFR 70.61(e) and 70.62(d). The inspectors determined the violation was more than minor based on screening question 2, 6, and 8 of Inspector Manual Chapter (IMC) 0616, "Fuel Cycle Safety and Safeguards Inspection Reports," Appendix B, "Examples of Minor Violations." Question 2 asked, in part, "If left uncorrected, the violation would have the potential to lead to a more significant safety concern?" If left uncorrected, the reliability of the auto dump system cannot be ensured, as evidenced by the single and dual-sensor dead-bands identified by the SRI. The violation is also more than minor based on Example 1.c from the Minor/More-than-Minor Examples of Appendix B, because the failure to conduct adequate testing of the IROFS was not isolated, and the failure resulted in the IROFS being unable to perform its intended safety in certain locations. Additionally, the degraded performance of the IROFS resulted in little to no margin beyond the likelihood requirements of 10 CFR 70.61(b), which can be used to screen violations that would otherwise be more than minor as minor.

The inspectors determined there were no actual safety consequence that occurred due to this degradation, and the performance requirement of 10 CFR 70.61(b) was still met despite the degradation; therefore, the potential safety significance of this issue was low. In accordance with Section 2.2.2 of the NRC Enforcement Policy, violations that are less serious but are of more than minor concern and result in no or relatively inappreciable potential safety consequences are characterized as Severity Level IV violations.

Furthermore, Example 6.2.d.1 of the Enforcement Policy stated, in part, that “SLIV violations involve, for example: Under 10 CFR Part 70, Subpart H, a licensee fails to meet the requirements of 10 CFR 70.61, and the failure does not result in a SL I, II, or III violation.”

Enforcement: Title 10 of the *Code of Federal Regulations* 70.61(e) requires, in part, that the safety program established and maintained pursuant to § 70.62 of this subpart, shall ensure that each IRFOS will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section. § 70.62(d) requires, in part, that management measures shall be established to ensure compliance with the performance requirements of § 70.61. The management measures shall ensure that controls identified as IROFS pursuant to § 70.61(e) are designed, implemented, and maintained, as necessary, to ensure they are available and reliable to perform their function when needed, to comply with the performance requirements of § 70.61 of this subpart.

Contrary to the above, prior to December 18, 2019, the licensee failed to establish adequate management measures to ensure that a control identified as an IROFS was designed, implemented and maintained such that it was available and reliable to perform its function, to comply with the performance requirements of 10 CFR 70.61. Specifically, an engineered IROFS was inadequately implemented and maintained and was therefore a degraded state since installation due to improper initial and periodic testing which failed to ensure it was available and reliable to perform its intended function when needed.

The licensee took corrective actions to properly align the affected sensors and improved the detectability of the cranes, restoring compliance on January 8, 2020. Corrective actions also included performing an extent of condition that identified other issues with the sensors and revision of test instructions to test the full range of all sensors. The issue was entered into the licensee’s CAP as CA 2019-1738.

This is a violation of the requirements of 10 CFR 70.61(e) and 70.62(d). A Notice of Violation is attached and will be tracked as VIO 70-27/2020-001-01, “Inadequate Management Measures for Periodic IROFS Tests.”

## **B. Radiological Controls**

### **1. Radiation Protection Quarterly (Inspection Procedure 88135.02)**

#### **a. Inspection Scope**

On February 19, 2020, the inspectors reviewed and observed radiologically controlled areas for radiation work permit (RWP) 19-0083-Task 5, “Ductwork Section Replacement of UR and SFF Process Ventilation Unit,” to verify compliance with license application Chapter 4, “Radiation Safety,” the Radiation Protection Manual; and implementing procedures. The inspectors verified the RWP contained required work instructions, was posted in the work area for employee review, and that workers signed the RWP. In addition, the inspectors performed partial reviews of selected RWPs during the inspection period in different operational areas. Documents reviewed are listed in Section 4 of the Attachment.



The inspectors reviewed the radiation protection program to verify compliance with 10 CFR 20, "Standards for Protection Against Radiation," and license requirements. The inspectors toured the controlled areas to verify that radiological signs and postings accurately reflected radiological conditions within the posted areas. The inspectors observed plant personnel as they removed protective clothing at controlled area step-off pads and as they performed various tasks to verify that required protective equipment was used to prevent contamination. The inspectors also observed plant employees as they performed exit monitoring at the controlled area exits to verify that monitoring instructions were followed at the exit point.

b. Conclusion

No violations of more than minor significance were identified.

C. Facility Support

1. Post-Maintenance Testing (Inspection Procedure 88135.19)

a. Inspection Scope

The inspectors witnessed and reviewed the post-maintenance test (PMT) listed below to verify compliance with license application Chapter 11, "Management Measures," and test procedures and/or work order (WO) instructions to confirm functional capability of safety systems and components (SSCs) following maintenance. The inspectors reviewed the licensee's completed test procedures to verify that SSC safety function(s) that may have been affected by the maintenance activity were adequately tested, that the acceptance criteria were consistent with information in the applicable licensing basis and/or design basis documents, and that the procedure had been reviewed and approved, as required. The inspectors also witnessed and/or reviewed the test data to verify that test results adequately demonstrated restoration of the affected safety function. Furthermore, the inspectors verified that issues associated with the PMT were identified and entered in the licensee's CAP. Additional documents reviewed are listed in Section 4 of the Attachment.

- OP-0021001, Crane Sensor Dump Test (OP Section 3.4.4.4) for Pickle Tanks 1-2, 2-6, and 3-10 following equipment modifications under change package CHG-7592 to reorient photosensors and addition of a pickup target to crane 2-6, conducted on January 6, 2020.
- OP-0021001, Crane Sensor Dump Test (OP Section 3.4.4.4) for Pickle Tank 1-11 following adjustment to crane sensor, conducted on January 7, 2020.
- OP-0061234, Leak Test of Primary Feed Storage Bank 2 Column #1 and associated outlet valve, following their replacement on February 13, 2020. WO 20278114
- OP-0061234, Leak Test of Complexing Column Discharge Header Valve HDL-56, following replacement on February 12, 2020. WO 20278164

b. Conclusion

No violations of more than minor significance were identified.

## 2. Surveillance Testing (Inspection Procedure 88135.22)

### a. Inspection Scope

The inspectors witnessed and/or reviewed completed test data for the surveillance test listed below to verify compliance with license application Chapter 11, "Management Measures," and that risk-significant and safety-related systems met the requirements of the ISA. The inspectors verified the testing effectively demonstrated that the SSCs were operationally capable of performing their intended safety functions and fulfilled the intent of the associated safety related equipment test requirement.

The inspectors discussed surveillance testing requirements with operators and maintenance personnel performing the associated tasks to verify that test equipment or standards used to conduct the test were within calibration. Additional documents reviewed are listed in Section 4 of the Attachment.

- Maintenance Plan (MP)-3161, 6-Month Integrity Leak Test of Main Extraction Condensers in UR Facility, on January 8, 2020
- MP-2292, RTR Vacuum Furnace Cooling Water Shutdown Interlock (Annual Surveillance), on February 4, 2020.
- MP-2163, Small SFF Furnace Facility Alarm System Test, on March 9, 2020.

### b. Conclusion

One SL-IV violation of NRC requirements was identified regarding the failure of management measures to ensure the integrity of heat exchanger IROFSs for preventing a criticality in the UR facility. The violation is described below.

Introduction: The NRC inspectors identified a cited SL-IV violation of 10 CFR 70.61(e) and 70.62(d) for BWXT's failure to implement adequate management measures to test the integrity of condensate heat exchanger IROFSs in the UR facility.

Description: Operations in the UR facility utilized multiple evaporators to concentrate uranyl nitrate (UN) solution. Each evaporator was supported by a condensate cooling heat exchanger or 'condenser' that used cooling water, on the shell side, to condense out moisture, on the tube side, that had evaporated from the UN solution. Although the moisture/steam normally contains residual amounts of U-235, it could be higher if UN solution were to inadvertently enter the condenser. A criticality accident is possible if sufficient UN solution were to enter the cooling water supply system. To prevent this type of accident, the condensers were made of resistant materials and were considered IROFS. SAR 15.9, "Main Extraction and Drum Dryer Processes in Uranium Recovery," Rev. 104, identified periodic pressure tests of the condensers, as a management measure, to ensure their reliability (i.e., integrity). The test was conducted per instructions in MP-3161 by verifying cooling water did not leak into the tube side of the condenser when applying and holding cooling water supply system pressure. On January 8, 2020, the SRI observed pressure testing per MP-3161 under WO 20273867. The SRI identified that operators were not pressurizing the condensers when looking for leakage past the heat exchanger tubes. Specifically, operators would close the cooling water inlet isolation valve to the condenser when establishing test pressure instead of closing the outlet isolation valve.

The inspector determined that this configuration was not adequate to conduct the test because this would isolate the condenser from the water source and pressure needed to detect a leak. The SRI communicated his concern to operations personnel and the test was stopped. After validating the inspector's concern, the test was re-performed, under pressure, by closing the outlet valve with satisfactory results. The inspector reviewed the test instruction (MP-3161) and concluded it was deficient because the step intended to pressurize the condensers simply read "Turn Off Cooling Water"; it did not specify the valves that needed to be manipulated nor that water shall be turned off at the outlet valves.

The inspectors interviewed operators experienced with previous (i.e. historical) tests and determined that due to the deficient test instructions, pressure tests had been historically performed incorrectly.

In addition to the recovery evaporator condensers, MP-3161 required pressure testing of two in-series steam condensate heat exchangers (no. 1 and no. 3) associated with conversion operations. These heat exchangers were IROFSs as well with similar management measures (i.e., pressure testing to verify integrity) per SAR 15.09. The inspector identified that the no. 3 heat exchanger did not have a cooling water outlet isolation valve. It appeared that an outlet valve was never installed as there were no modifications on record and the system drawings matched the as-found configuration. As a result, the inspectors determined the licensee had never properly tested this IROFS heat exchanger. The licensee took corrective actions to satisfactorily test the heat exchanger by disconnecting and applying a water source on the discharge line of the heat exchanger.

Analysis: The failure to implement adequate management measures for testing the integrity of condensate heat exchanger IROFS in the UR facility was a violation of 10 CFR 70.61(e) and 70.62(d). The inspectors determined the violation was more-than-minor based on screening criteria question 3 of IMC 0616, "Fuel Cycle Safety and Safeguards Inspection Reports," Appendix B, "Examples of Minor Violations." Question 3 asked, in part, "Is the violation indicative of a programmatic deficiency." The violation was indicative of a programmatic deficiency because the failure to conduct adequate testing was not an isolated case as the tests had been historically conducted improperly due to deficient instructions and lack of necessary equipment. Additionally, the violation was associated with accident sequences with little to no margin beyond the likelihood requirements of 10 CFR 70.61(b).

The inspectors determined there were no actual safety consequence that occurred due to the failed management measure as the integrity of all heat exchangers was verified when properly tested. Therefore, the performance requirement of 10 CFR 70.61(b) was still met, and the potential safety significance of this issue was low. In accordance with Section 2.2.2 of the NRC Enforcement Policy, violations that are less serious but are of more than minor concern and result in no or relatively inappreciable potential safety consequences are characterized as Severity Level IV violations. Furthermore, the violation aligned with the Enforcement Policy SL-IV violation Example 6.2.d.1 in that it involved the licensee's failure to meet the requirements of 10 CFR 70.61 where the failure did not result in a Severity Level I, II, or III violation.

Enforcement: Title 10 of the Code of Federal Regulations 70.61(e) requires, in part, that the safety program established and maintained pursuant to § 70.62 of this subpart, shall ensure that each IROFS will be available and reliable to perform its intended function when needed and in the context of the performance requirements of this section. §70.62(d) requires, in part, that management measures shall be established to ensure compliance with the performance requirements of § 70.61. The management measures shall ensure that controls identified as IROFS pursuant to § 70.61(e) are designed, implemented, and maintained, as necessary, to ensure they are available and reliable to perform their function when needed, to comply with the performance requirements of § 70.61 of this subpart.

Contrary to the above, prior to January 8, 2020, the licensee failed to establish adequate management measures to ensure that controls identified as IROFS were maintained such that they were available and reliable to perform their function, to comply with the performance requirements of 10 CFR 70.61. Specifically, engineered IROFS were not maintained because management measures to periodically pressure test the IROFS did not ensure the IROFS reliability and availability to perform their intended function when needed.

The licensee took corrective actions to verify the integrity of all affected condensate heat exchangers by appropriately conducting the pressure tests, restoring compliance on January 8, 2020. Additionally, the licensee performed an extent of condition and planned to revise the maintenance plan to provide more detailed instructions. This issue was entered into the licensee's CAP as CA 2020-0041.

This is a violation of the requirements of 10 CFR 70.61(e) and 70.62(d). A Notice of Violation is attached and will be tracked as VIO 70-27/2020-001-02, "Inadequate Pressure Testing of Condensate Heat Exchanger IROFS."

3. Identification and Resolution of Problems (Inspection Procedure 88135.02)

a. Inspection Scope

The inspectors reviewed a sample of items entered into the CAP during the inspection period to ensure that entries pertinent to safety, security, and non-conforming conditions were identified, investigated, and tracked to resolution in accordance with implementing procedure QWI 14.1.1, "Preventive/Corrective Action System." The inspectors conducted interviews with licensee staff and reviewed documents to verify that issues of high safety significance were identified and reviewed for apparent causes as required. The inspectors reviewed issues requiring extent-of-condition and/or extent-of-cause reviews to verify that the reviews were completed and documented in the applicable corrective action records. The inspectors also reviewed corrective actions to prevent recurrence of previous issues to verify that they were identified in the CAP and were reviewed and tracked to completion.

Additionally, the inspectors conducted periodic reviews of licensee audits and third-party reviews, of safety-significant processes to verify effectiveness and alignment with requirements of the CAP.

Specifically, the inspectors reviewed the following:

- Security Organization Audits, August to October 2018

b. Conclusion

No violations of more than minor significance were identified.

4. Emergency Preparedness (Inspection Procedure 88050)

a. Inspection Scope

The inspectors evaluated selected aspects of the licensee's emergency preparedness (EP) program to verify compliance with 10 CFR 70; Chapter 8, "Emergency Management," of the license application; the Emergency Plan; and implementing procedures.

The inspectors interviewed staff and reviewed records to verify that changes made to the Emergency Plan and its supporting documents or within the facility were properly coordinated with the EP program, as applicable. The inspectors reviewed several emergency plan implementing procedures (EPIPs) revised since the last EP inspection (see Section 4 of the Attachment) to verify that they were reviewed annually, that the proposed changes were reviewed by the licensee's EP organization, and that the changes did not result in a decrease in effectiveness of the EP program.

The inspectors reviewed the licensee's emergency call list and call/test records to verify that the list was periodically tested for accuracy and maintained.

The inspectors reviewed training records and interviewed BWXT staff regarding EP training completed since the last inspection. Interviews included a security coordinator, an on-scene director, and other personnel with responsibilities associated with the emergency operations center (EOC) and emergency response activities. The inspectors reviewed the training to verify that the licensee provided emergency management and emergency response training for site personnel. The inspectors reviewed qualification records to verify that individuals responsible for using emergency equipment were qualified as required.

The inspectors reviewed the current letters of agreement in place with off-site support agencies to verify that the organizations required by the Plan had up-to-date agreements. The inspectors interviewed various off-site support agency representatives including the Concord Volunteer Fire Department and the Lynchburg General Hospital to verify that they maintained an understanding of the written agreements and were provided copies of the Emergency Plan. The inspectors also verified that the licensee invited the off-site organizations to participate in exercises and training on an annual or more frequent basis.

The inspectors walked down the storage of emergency equipment at the EOC, the alternate EOC, the off-site EOC, and station one to verify that inventory levels were maintained as required by the Plan. The inspectors also verified that the EOCs were readily accessible and maintained the required amount of communication equipment.

The inspectors reviewed the accountability procedure to verify that the assembly location was present and accessible for the means of performing accountability and mustering during an evacuation. The inspectors also reviewed the control, distribution, and maintenance of the licensee's Pre-Fire Plan, Emergency Plan, and EIPs. The inspectors verified through review of records that the licensee conducted communications testing with all required off-site support organizations at the required frequency.

The inspectors reviewed the licensee's internal, independent audits of the EP program since the last inspection to verify that a system was in place for scheduling, tracking, and resolving audit findings. The inspectors also reviewed records associated with EOC activations to verify the implementation of the Plan during drills or actual emergencies that occurred since the last inspection. The inspectors verified that any problems or deficiencies identified, which were associated with the implementation of the Plan, were documented during the critique process and detailed in the licensee's CAP.

b. Conclusion

No violations of more than minor significance were identified.

**D. Other Areas**

1. Observations of Security Personnel and Activities (Inspection Procedure 88135.02)

a. Inspection Scope

During both normal and off-normal plant working hours, the inspectors conducted observations of security force personnel and activities to verify that the activities were consistent with security procedures and regulatory requirements relating to nuclear plant security. These quarterly resident inspectors' observations of security force personnel and activities did not constitute any additional inspection samples. Rather, they were considered an integral part of the inspectors' normal plant status reviews and inspection activities.

b. Conclusion

No violations of more than minor significance were identified.

2. (DISCUSSED) Violation 2018-006-03: Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAl<sub>x</sub> Glovebox Systems as Required by 10 CFR 70.62(b)

This VIO was opened in NRC Inspection Report (IR) 70-27/2018-006 (ML18067A098) and was discussed in NRC IRs 70-27/2018-005 (ML19030A138), 70-27/2019-002 (ML19107A163), 70-27-2019-003 (ML19211D562), and 70-27-2019-005 (ML20024F642). The events surrounding this VIO were reported to the NRC as EN 52840 and discussed in detail in NRC IR 70-27/2017-007 (ML17251A001). Licensee staff discussed their completed and planned corrective actions in "60-Day Written Report for Event Notification Number 52840," dated August 9, 2017 (ML17226A037) and "60-Day Report Additional Information," dated October 16, 2017 (ML19007A047).

During this inspection, the inspectors reviewed progress toward completion of the corrective actions to establish a set of revision-controlled NCS evaluations containing the safety basis for all processes. Including through review of changes that have been made to a revision-controlled NCS evaluation that was previously implemented to determine if later revisions were being made in accordance with licensee procedures and license requirements. This review was conducted for the latest revision of NCS-PA-17-00001, "Nuclear Criticality Safety Evaluation of SFF Wet Systems."

This item remains open.

**E. Exit Meeting**

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

- On January 16, 2020, regional inspectors presented the EP and NCS inspection results to the licensee's Environmental, Safety, Health, and Safeguards Department Manager, Mr. D. C. Ward, and other members of the licensee staff.
- On April 14, 2020, the resident inspector presented the quarterly inspection results to BWXT's Vice President and General Manager, Mr. B. J. Burch, and other members of the licensee staff.

## SUPPLEMENTAL INFORMATION

### 1. KEY POINTS OF CONTACT

#### Licensee Personnel

<u>Name</u>	<u>Title</u>
J. Burch	Vice President and General Manager
D. Ward	Department Manager, Environmental, Safety, Health, and Safeguards
W. Richardson	Department Manager, Uranium Processing and Research Reactor
A. Rander	Department Manager, Security
D. Spangler	Section Manager, Nuclear Safety and Licensing
L. Morrell	Section Manager, Environmental Protection and Industrial Safety
D. Faidley	Unit Manager, Nuclear Criticality Safety Manager
L. Ragland	Unit Manager, Recovery and Maintenance
C. Terry	Unit Manager, Licensing and Safety Analysis
K. Conway	Unit Manager, Radiation Protection
J. Calvert	Environmental, Safety, Health and Security Program Manager
M. Edstrom	Fire Protection Engineer

### 2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

#### Opened

VIO	2020-001-01	Inadequate Management Measures for Periodic IROFS Test (Section A.5)
VIO	2020-001-02	Inadequate Pressure Testing of Condensate Heat Exchanger IROFS (Section C.2)

#### Discussed

VIO	2018-006-03	Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAl <sub>x</sub> Glovebox Systems as Required by 10 CFR 70.62(b) (Section D.2)
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### 3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88050	Emergency Preparedness
88135	Resident Inspection Program for Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	Operational Safety
88135.05	Fire Protection (Quarterly)
88135.19	Post-Maintenance Testing
88135.22	Surveillance Testing



#### 4. LIST OF DOCUMENTS REVIEWED

##### SAFETY OPERATIONS

##### 88135 and 88135.02 – Plant Operations

###### Corrective Action Program Records

2019-1009, Operation of SFF Conversion Dissolver No. 2 with more than Maximum Allowed Containers, Incident date July 23, 2019, Report date April 9, 2020  
2019-1032, Unmonitored Pathway to the UR Annular Raffinate Waste Tank, Report date January 31, 2020  
2019-1476, Core Assembly Fixture Modified without being Evaluated, Incident date 2020-0041, Degraded/Failed Management Measures for Pressure Testing Steam Condensers in UR Facility, Incident date January 8, 2020, Report date April 9, 2020  
2020-0187, UIR – IROFS Transport Cart Modified to Transport Non-Fuel Component  
2020-0266, Fuel Element Cart End-Spacing Bumper Broke when it Contacted Railing while being Towed, Incident date February 13, 2020, Report date April 9, 2020  
date March 3, 2020  
October 16, 2019, Report date April 9, 2020  
Outside the Change Management Process, Incident date February 6, 2020, Report

###### Corrective Action Written as a Result of Inspection Activities

2019-1738, Pickling Auto Dump Timer IROFS Degraded, Incident date December 18, 2019, Report date April 9, 2020

###### Drawings

15AD2\_1001 E, Annular Waste Tank Piping & Instrumentation Drawing (P&ID), Rev. 18  
LT-5431, 48-Unit Storage Stand, Rev. 1  
UPRR-30116 B, Annular Waste Tank P&ID, Rev. 3

###### Nuclear Criticality Safety Records

NCS Posting 15-17-015, Conversion Area Dissolver 2, Rev. 1  
NCS-2005-264, NCS Evaluation for Core Assembly per SER 05-039, October 26, 2005  
NCS-2006-005, Level 2 NCS Evaluation for Storage Rack Installation in Core Assembly per SER 06-001 Phase 1, January 24, 2006  
NCS-2006-010, Over Pickling of Elements, January 18, 2006  
NCS-2010-007, NCS Analysis for Pickling U-Metal in Conversion: SER 10-008 Phase 1, April 15, 2010  
NCS-2011-224, Re-Evaluation of Backflow Scenarios Associated with Evaporators and Steam Condensate Cooling Heat Exchangers, February 29, 2012  
NCS-2019-104, Safety Concern Analysis for Piece Count Violation in Conversion Dissolver No. 2, (CA201901009), August 5, 2019  
NCS-2019-238, Safety Concern Analysis for Hard Piped Connection to Annular Raffinate Waste Tanks - CA201901032, October 21, 2019  
NCS-2019-263, Safety Concern Analysis for Missing Barriers on 48-Unit Storage Rack (CA19-1476)  
NCS-2019-294, NCS Safety Concern for CA 201901738, Condition Where Pickling Could Occur Without Activation of the Automated Dump System, December 23, 2019  
NCS-2020-010, NCS Safety Concern Analysis for Inadequate Pressure Testing and Sampling of Condensate Cooling Heat Exchangers, (CA20-0041), February 11, 2020

### Procedures

E61-019, Daily Recovery Checklist, Rev. 14  
MP 3161, Recovery Evaporators 1-6 Condenser Integrity Test  
OP-0061127, Raffinate/Waste Collection System Operation, Rev. 18  
OP-1007886, Operating Procedure for Uranium Metal Dissolution Using Dissolver 2 (U), Rev. 15

### Other Documents

2019 Fatigue Management Program Annual Data Report dated February 28, 2020  
JA-DT-0001, Introduction to Safety Analysis Reports and Items Relied on for Safety, Rev. 3  
March 29, 2017  
N-79, Evaluation of Unusual Incidents: Core Assembly Fixture Modified without being Evaluated (CA2019-1476), October 16, 2019  
N-79, Evaluation of Unusual Incidents: Operation of SFF Conversion Dissolver No. 2 with More than Maximum Allowed Containers (CA2019-1009), September 11, 2019  
N-79, Evaluation of Unusual Incidents: Unmonitored Pathway to the UR Annular Raffinate Waste Tank (CA19-1032), October 23, 2019  
Revision to Training Qualification & Equipment Plan dated March 5, 2020  
Safety Review Committee (PPT Slides): IH&S Committee, March 10, 2020  
Safety Review Committee (PPT Slides): Inspection & Audit Trends, March 10, 2020  
Safety Review Committee: Emergency Preparedness Committee Rpt., March 10, 2020  
SAR 15.09 Appendix, Rev. 36  
SAR 15.09, Main Extraction and Drum Dryer Process in Uranium Recovery, Rev. 104  
SAR 15.12, Liquid and Solid Waste Handling Processes in Uranium Recovery, Rev. 81  
SAR 15.21, Low-Level Radioactive Waste Processes Waste Operations, Rev. 78  
SAR 15.27, Appendix, Rev. 60  
SAR 15.27, Fuel Element Fabrication, Rev. 133  
SAR 15.37, Appendix, Rev. 59  
SAR 15.37, Higher Tier Assemblies, Rev. 135  
SAR 15.38, Core Assembly, Disassembly, and Railyard Storage, Rev. 39  
SAR Appendix 15.21, Rev. 30  
SAR Appendix 15.38, Rev 14  
TP-DT-0001, Training Plan for Introduction to SARs and IROFS, Rev. 1, dated

### **88135.04 – Operational Safety**

#### Corrective Action Program Record

2010-0784, Work Station Spill due to Opened Drain Valve, Incident date April 12, 2010, Report date January 31, 2020  
2012-2226, Process Monitoring Issue in SFF Work Station 260, Incident date August 1, 2012, Report date January 31, 2020  
2014-0219, Improper Analysis for Mobile Containers in SFF Work Station 260, Incident date January 30, 2014, Report date January 31, 2020  
COM-79609, Update P&IDs for WS110 for As-Built Conditions, Due on March 2, 2020

### Drawings

B67A-080E, ADUN II Dissolver Tube and Valve Assembly, Rev. 0  
CRF-265, Flow Diagram Forming Feed System, Rev. 5  
CRF-267, Product Container Vessel Assembly, Rev. 2  
CRF-272, KAST Phase Three Tank Detail - Tanks V-10 and V-11, Rev. 0  
CRF-730, ADUN Dissolver II Process and Instrumentation Diagram, Rev. 10

CRF-737, Work Station 260 General Arrangement, August 25, 2003  
CRF-764, AccuRate Feeder Hopper, Rev. 1

UPRR 10044, Work Station 110 Cyclone, Rev. 1  
UPRR 10045, Work Station 100 and 110 Top Elevation View, Rev. 1

#### Procedures/Instructions

MP-3477, SFF WS-100 Steam Block Valve Testing 1-YR  
MP-3478, SFF WS-110 Heater Over Temperature Testing 1-YR  
MP-4680, SFF Workstation 260 HEPA Filter Bank - Pre-Filter Change 1-YR  
MP-4744, SFF Workstation 110 HEPA Filter Bank - Pre-Filter Change 1-YR  
MP-4785, SFF Workstation 100 HEPA Filter Bank - Main HEPA Filter Change 3-YR  
MP-4851, SFF Workstation 110 Columns V-10 and V-11 Overflow Test 1-YR  
OP-1001828, Operating Procedure for FAS Interlocks and Furnace Testing (Section L - Workstations 100 and 110 Annual Testing), Rev. 35  
OP-1014602, Operating Procedure for ADUN Dissolver #2 Solution Preparation for TRISO Fuel, Rev. 23  
OP-1014613, Operating Procedure for Washing/Drying Operations Advanced Gas Reactor Program, Rev. 10  
OP-1014625, Operating Procedure for Broth/Prep Particle Formation/Aging for Advanced Gas Reactor Program, Rev. 15  
WS 260 Restart Procedure, October 17, 2019

#### Work Orders

20276139, Conduct MP-4851, Completed on January 14, 2020  
20275486, Conduct MP-3477 per OP-1001828, Completed on February 13, 2020  
20275488, Conduct MP-3478 per OP-1001828, Completed on February 1, 2020

#### Other Documents

Attachment to CHG-7093, WS110 - TRISO Wash/Dry Restart Plan, January 21, 2020  
Attachment to CHG-7113, WS100 - TRISO Kernel Forming Restart Plan, January 21, 2020  
Attachment to CHG-7119, WS260 - TRISO ADUN Preparation Hood II Restart Plan, September 25, 2019  
NCS Posting 15-17-004, Work Station 110, Rev. 0  
NCS Posting 15-17-005, Work Station 100, Rev. 0  
NCS Posting 15-17-007, Work Station 260, Rev. 0  
SAR 15.17, Appendix, Rev. 32  
SAR 15.17, Wet-End Processing in Specialty Fuels Facility Operations, Rev. 81  
SOJT-SFF-0010, Operate Work Station 260, Rev. 0  
SOJT-SFF-0011, Chemical Preparation for WS100 and 110, Rev. 0  
SOJT-SFF-0012, Operate Work Station 100, Rev. 0  
SOJT-SFF-0013, Operate Work Station 110, Rev. 0

### **88135.05 – Fire Protection Quarterly**

#### Other Documents

ISA Report 00-00005, Safety Evaluation of the Hydrogen Evolution Resulting from Pickling Coupons, Rev. 0  
ISA Report 00-0007, Met Lab Fire Loading Analysis, Rev. 0  
ISA Report 00-00251, Fire Loading Analysis for PHA 15.32. Pharmacy and Fuel Reclamation, Rev. 0

Pre-Fire Plan, Map Section 22, Filler Area /Metallurgical Lab, dated March 27, 2000  
SAR 15.28, Metallographic Laboratories, Rev. 49  
SAR 15.32, Pharmacy Operations, Rev. 40

### **88015 – Nuclear Criticality Safety**

#### Corrective Action Program Records

2019-1494    2019-1588    2019-1610    2019-1678    2019-1738

#### Corrective Action Written as a Result of Inspection Activities

2020-0069

#### Nuclear Criticality Safety Records

Dry Gloveboxes (U), September 01, 2016

Fire Protection Sprinklers (U)

NCS-2006-010, Overpickling of Elements, January 18, 2006

NCS-2016-042, NCS Safety Analysis for SER 16-015 Phase 01 - Re-Analysis of SFF

NCS-2019-259, NCS Justification Analysis Supporting SER 19-034, Phase 01: CP#2

NCS-2019-274, NCS Safety Analysis for SER 19-040 Phases 01 and 02: 6-inch TRISO  
Sintering Furnace – Restart, November 11, 2019

NCS-2019-283, NCS Safety Concern for Mass/Moderation Log Error in the RTR Bay 16  
Pharmacy Glovebox Line (NCS Posting 15-22-013) – CA201901610, November 21,  
2019

NCS-2019-294, NCS Safety Concern Analysis for CA201901738, Condition Where  
Pickling Could Occur Without Activation of the Automated Dump System,  
December 23, 2019

NCS-2020-007, NCS Safety Concern for Recovery Furnace Mass Log Error –  
CA201901678, January 13, 2020

NCS-PA-17-00001, Nuclear Criticality Safety Evaluation of SFF Wet Systems, Rev. 2

NCS-TR-00004, Placement of Detectors for the CIDAS System, Rev. 5

#### Records

NCS Engineer Qualification Records for B. Lollar, January 14, 2020

NOG-L CIDAS MKXI Criticality System Calibration Records, December 27, 2019

RPTWR 2019-001, Summary of 2018 Criticality Monitoring System Alarms, Failures and  
Non-Routine Maintenance dated January 7, 2019

SER 19-034, CP#2 Fire Protection Sprinklers, September 19, 2019

Sounding of the Building Evacuation System Records, August 26 and October 16, 2019

#### Procedures/Instructions

Gage/Instrument Calibration Procedure, Rev. 5

NCSE-07, Qualification & Training Requirements for a Nuclear Criticality Safety  
Engineer, Rev. 18

OP-0021001, Operating Procedure for Pickling, Rev. 88

QWI 02.1.03, Integrated Safety Analysis Methodology, Rev. 16, Attachment 4,  
Likelihood/Prevention/Protection

RP-07-103, Maintaining and Testing the CIDAS MkXI Criticality Monitoring System,  
Rev. 7

RP-07-104, CIDAS MkXI Detector Calibration, Rev. 2

#### Other Documents

General Employee Safety Training – 2019 Nuclear Criticality Safety  
Memo from K. Conway to C. Terry, D. Spangler, D. Faidley, RE: Evacuation Distances,  
dated January 4, 2020

### **RADIOLOGICAL CONTROLS**

#### **88135.02 – Radiation Protection Quarterly**

##### Procedures

RP-05, Respiratory Protection, Rev. 15  
RP-06, Radiation Work Permit, Rev. 14

##### Other Documents

RWP 19-0083, General Maintenance in Bays 12A, 13A, 14A, and 15A for Industrial  
Engineering and Contractor Personnel, Rev. 00

### **FACILITY SUPPORT**

#### **88135.19 – Post-Maintenance Testing**

##### Corrective Action Program Records

2019-1738, Pickling Auto Dump Timer IROFS Degraded, Incident date December 18,  
2019, Report date April 9, 2020

##### Nuclear Criticality Safety Records

NCS-2011-010, Nuclear Criticality Safety Release Supporting Phase 1 of SER 10-054,  
"Pickle Area Control System Upgrade," dated January 19, 2011

##### Drawings

5AE4\_1003 C, Bay 5A Pickle Acid Automated Dump System Schematic, Rev. 1  
5AE4\_1005 E, 2003 Refurbishment Control Schematic, Pickle House Line 2, Rev. 2  
5AE4\_1006 E, Control Schematic Pickle House Line 1, Rev. 2  
5AE4\_1007 E, 2003 Refurbishment Control Schematic, Pickle House Line 3, Rev. 2  
5AM2\_1004 D, Bay 5A Pickle Nil-Cor Butterfly Valve Installation Tanks 1-2; 1-11; 2-6;  
3-10, Rev. 0  
5AM7\_1011 E, Bay 5A Pickle House Details & Tank Volumes / Drains, Rev. 3

##### Procedures

OP-0021001, Operating Procedure for Pickling, Rev. 88 and 91  
OP-0061234, Operating Procedure for Maintenance in UPRR

##### Work Orders

20275497, Orient Sensors - Crane on Pickle Line 1 Bay 5A, compl. on January 14, 2020  
20275498, Move Sensors - Crane on Pickle Line 3 Bay 5A, compl. on January 10, 2020  
20275499, Orient Sensors - Crane on Pickle Line 2 Bay 5A, compl. on January 14, 2020

##### Other Documents

CHG-00007592, Pickle Line Crane Auto Dump Sensors  
Datasheet for Telemecanique XUC9ARCTL2 Photo-Electric Sensor  
E61-691, Checklist for UPRR Maintenance Work Order Assessment for WOs 20278114  
and 20278164

M11-P-029, Pickle Area Quality and Safety Checks January 6 to 12, 2020  
N-350, Industrial Engineering Work Requests, Bay 5A, dated December 19, 2019  
SAR 15.05, High-Level Dissolution Process in Uranium Recovery, Rev. 141  
SAR 15.27, NR Fuel Element Fabrication, Rev. 133  
SAR 15.37, Higher Tier Assemblies, Rev. 135

### **88135.22 – Surveillance Testing**

#### **Corrective Action Written as a Result of Inspection Activities**

2020-0041, Degraded/Failed Management Measures for Pressure Testing Steam  
Condensers in UR Facility, Incident date January 8, 2020, Report date April 9, 2020

#### **Procedures**

MP 3161, Recovery Evaporators 1-6 Condenser Integrity Test, Conducted on December  
2016, June 2017, December 2017, June 2018, December 2018, and June 2019  
OP-1001077, Vacuum Furnace Testing for RTRT Controlled Area, Rev. 08  
OP-1001828, Operating Procedure for FAS Interlocks and Furnace Testing, Rev. 35  
OP-1046049, BR2 Vacuum Annealing BR1 Compacts, Rev. 1  
OP-1046323, Operating Procedure for TRISO FAS Detector Calibrations (U), Rev. 1

#### **Drawings**

UPRR 30046, Steam Condensate P&ID, July 19, 2011

#### **Work Order**

20273867, SC Evaporator Cooling Condensate Integrity Test 6-Month, completed on  
January 8, 2020  
20280286, Small SFF Furnace Facility Alarm System Test, completed on March 9, 2020

#### **Other Documents**

SAR 15.09, Main Extraction and Drum Dryer Process in Uranium Recovery, Rev. 104  
SAR 15.18, SFF Dry-End Processing SFF Operation, Rev. 126  
SAR 15.22, RTRT Fuel Powder and Compact Processes, Rev. 94  
Document No. 06-3009.001, Design Basis Document for Facility Alarm System, Rev. 2

### **88050 – Emergency Preparedness**

#### **Corrective Action Program Records**

2019-0331	2019-0332	2020-0057	2020-0074
COM-75189	COM-78660	COM-80697	

#### **Procedures**

EPR-01-01 (EP-HS-002), Emergency Plant Evacuation, Rev. 23  
EPR-02-03, Radiological Procedure for an Unannounced Sounding of the Howler,  
Rev. 13  
EPR-02-04, Notification of Off-Site Agencies During an Emergency, Rev. 33  
RP-10-02, Training of On- and Off-Site Emergency Support Personnel in Radiation  
Safety, Rev. 0

#### **Records**

2019 Annual EMO – ERO Training  
2019 Annual Evacuation Drill  
2019 Biennial Emergency Drill

2019 BWXT Emergency Team Training and Inspection Schedule  
2019 EOC Emergency Activation  
2020 1<sup>st</sup> Quarter Audit  
Annual Positions Specific Training for Emergency Directors/Coordinators  
Current Office Agency Call List  
Inspection of the Radiological Response Van  
  
Inventory of the Engine (white truck)  
Inventory of the Medic Unit  
Inventory of the Rescue Vehicle (red truck)  
Mutual Aid Letters, October 2018