



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION II  
245 PEACHTREE CENTER AVENUE NE, SUITE 1200  
ATLANTA, GEORGIA 30303-1257

July 25, 2017

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 70-27/2017-003**

Dear Mr. Burch:

This letter refers to the inspections conducted from April 1 through June 30, 2017, at the BWXT Nuclear Operations Group, Inc. (NOG) facility in Lynchburg, VA. The inspections were conducted to determine whether activities authorized under the license were conducted safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. The enclosed report presents the results of these inspections. The results were discussed with you and members of your staff at exit meetings held on May 18 and July 17, 2017.

During the inspections, NRC staff examined activities conducted under your license, as they related to public health and safety, to confirm compliance with the Commission's rules and regulations and with the conditions of your license. Areas examined during the inspections are identified in the enclosed report. Within these areas, the inspections consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel. Based on the results of these inspections, no violations were identified.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390 of the NRC's "Rules of Practice," 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 70-27/2017-003  
w/Attachment: Supplementary Information

cc:  
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SUBJECT: BWXT NUCLEAR OPERATIONS GROUP – NUCLEAR REGULATORY  
COMMISSION INTEGRATED INSPECTION REPORT 70-27/2017-003

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**U. S. NUCLEAR REGULATORY COMMISSION**

**REGION II**

Docket No: 70-27

License No: SNM-42

Report No: 70-27/2017-003

Licensee: BWX Technologies (BWXT)

Facility: Nuclear Operations Group, Inc. (NOG)

Location: Lynchburg, VA 24505

Dates: April 1 through June 30, 2017

Inspectors: C. Stancil, Senior Resident Inspector, RII/DFFI/PB2  
B. Adkins, Senior Fuel Facility Inspector, RII/DFFI/SB  
G. Goff, Fuel Facility Inspector, RII/DFFI/PB2  
J. Munson, Fuel Facility Inspector, RII/DFFI/SB  
N. Pitoniak, Senior Fuel Facility Inspector, RII/DFFI/PB2  
T. Sippel, Fuel Facility Inspector, RII/DFFI/SB

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 70-27/2017-003  
April 1 – June 30, 2017

Inspections were conducted by the senior resident inspector 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 BWXT activities that were accomplished by direct observation of safety-significant activities and equipment, tours of the facility, interviews and discussions with BWXT personnel, and a review of facility records.

### **Safety Operations**

- No violations of more than minor significance were identified related to Plant Operations and Safety System Walkdowns. (Paragraphs A.1 and A.2)
- No violations of more than minor significance were identified related to the Fire Protection Program. (Paragraphs A.3, A.4, and A.5)
- No violations of more than minor significance were identified related to the Nuclear Criticality Safety Program. (Paragraphs A.6 and A.7)

### **Radiological Controls**

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

### **Facility Support**

- No violations of more than minor significance were identified related to Post-Maintenance and Surveillance Testing Programs. (Paragraphs C.1 and C.2)
- No violations of more than minor significance were identified related to items entered into the Corrective Action Program. (Paragraph C.3)
- No violations of more than minor significance were identified related to the Emergency Preparedness Program. (Paragraph C.4)

### **Other Areas**

- One violation, "Inadequate Management Measures for Sprinkler System Items Relied on for Safety," was closed. (Paragraph D.1)

### **Attachment**

Supplementary Information

## 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. Daily operational and shift turnover meetings were observed throughout the period to gain insights into process safety and operational issues. The inspectors reviewed selected BWXT-identified issues and corrective actions (CAs) 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 BWXT appropriately captured off-normal events and implemented effective CAs.

The routine tours included walkdowns of the RTR, filler, UR areas, and other manufacturing areas where SNM was being processed. During routine tours, the inspectors verified 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. The inspectors observed activities during normal and upset conditions for compliance with procedures and material station limits. The inspectors noted that safety controls, including IROFS, were in place, available, and functional to ensure proper control of SNM. The inspectors verified the adequacy of communications between supervisors and operators within the operating areas. The inspectors reviewed operator log sheets, operating procedures (OPs), maintenance records, and equipment and process changes to obtain information concerning operating trends and activities. The inspectors verified that BWXT actively pursued CAs for conditions requiring temporary modifications and compensatory measures.

The inspectors performed periodic tours of the outlying facility areas and determined 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 BWXT's emergency response facilities to ensure the facilities were maintained in a readily available status.

During these tours, the inspectors also verified that the required NRC Form 3, "Notice to Employees," were appropriately and conspicuously posted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) Part 19.11.

The inspectors attended various BWXT meetings, including the Change 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 BWXT's response to 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," Revision (Rev.) 16; QWI 14.1.4, "Reporting Unusual Incidents," Rev. 12; and QWI 14.1.10, "Safety Evaluation of Unusual Incidents," Rev. 16.

b. Conclusion

No violations of more than minor significance were identified.

2. Safety System Walkdown (Inspection Procedure 88135.04)

a. Inspection Scope

The inspectors inspected the low-level dissolver system located in UR, a safety-significant system involved with the processing of SNM. As part of the walkdowns, the inspectors verified as-built configurations matched approved plant drawings. The inspectors interviewed operators to confirm that plant personnel were familiar with the assumptions and controls associated with the IROFS systems and instrumentation for maintaining plant safety. The inspectors also verified that IROFS assumptions and controls were properly implemented in the field. The inspectors reviewed the related integrated safety analysis (ISA) to verify system abilities to perform functions were not affected by outstanding design issues, temporary modifications, operator workarounds, adverse conditions, or other system-related issues. The inspectors also verified that there were no conditions that degraded plant performance and the operability of IROFS, safety-related devices, or other support systems essential to safety system performance for the inspected system.

To determine the correct system alignment, the inspectors reviewed procedures, drawings, related ISAs, and regulatory requirements such as 10 CFR 70.61, "Performance Requirements." During the walkdowns, the inspectors verified all or some of the following as appropriate:

- controls in place for potential criticality, chemical, radiological, and fire safety hazards
- process vessel configurations maintained in accordance with nuclear criticality safety evaluations (NCSEs)
- correct valve position and potential functional impacts such as leakage
- electrical power availability
- major system components correctly aligned, labeled, lubricated, cooled, and ventilated
- hangers and supports correctly installed and functional
- lockout/tag-out program appropriately implemented
- cabinets, cable trays, and conduits correctly installed and functional
- visible cabling in good material condition
- 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

Inspectors performed an inspection of Bay 17, including Vault 7, to verify compliance with the license and National Fire Protection Association (NFPA) 801, "Standard for Fire Protection for Facilities Handling Radioactive Materials." 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 Plan before and during the walkdowns to verify that key features identified on the Plan (e.g., sprinkler control valves) were in place in the field and that fire hazards that existed in the field were reflected in the Pre-Fire Plan. The inspectors reviewed the type of manual firefighting equipment that was provided to confirm that it was appropriate for the type of fire that could occur. Various fire barriers and doors were examined for proper maintenance and function and fire impairments reviewed for adequate compensatory actions.

Routine plant tours were conducted for other areas of the plant. The inspectors verified that housekeeping in the areas was sufficient to minimize the risk of fire and that transient combustibles were being adequately controlled and minimized.

b. Conclusion

No violations of more than minor significance were identified.

4. Fire Protection Triennial (Inspection Procedure 88054)

a. Inspection Scope

The inspectors reviewed BWXT programs, procedures, surveillances, maintenance records, functional tests, drawings, and CA reports for the fire protection system to ensure that designated programs met license requirements and were adequate to preclude or mitigate the consequences of a fire.

The inspectors conducted interviews and reviewed documentation to verify that BWXT's organizational structure was consistent with license requirements. The inspectors reviewed recent audits of the fire protection program to determine the adequacy of the audits and whether identified findings were entered into the corrective action program (CAP).

The inspectors toured plant areas containing safety controls and IROFS to assess the material condition of fire protection equipment, systems, and features. The inspectors verified that copies of the approved site Pre-Fire Plan were being maintained in the Emergency Operations Center (EOC) and Station 1 locations as required by the BWXT License Application section 7. Emergency equipment locations for various fire extinguishers, eyewash stations, and fire hoses were walked down by the inspectors and compared to the locations required by the Pre-Fire Plan. The inspectors verified that



flammable materials were stored in marked cabinets as specified in procedure HS-03-05, "Control of Flammable and Combustible Liquids," Rev. 6, and that housekeeping and the control of combustible materials were consistent with the approved procedure. Building exterior fire barriers were also inspected to ensure barrier integrity and verify no combustible storage in the areas.

The inspectors walked down fire suppression systems, the fire water storage tanks, and distribution system to verify that the systems were properly maintained and capable of performing the intended safety function. Within these areas, the inspectors verified that backflow preventers matched drawing locations. The inspectors also reviewed the latest maintenance record for these backflow preventers to verify that maintenance was performed annually as per approved procedures.

The inspectors conducted facility walkdowns and reviewed records of fire walls and dampers in accordance with HS-FP-018, "Fire Barrier/Fire Damper Inspection," Rev. 10 to evaluate the condition of passive fire barriers. The inspectors reviewed records to determine if fire detectors were tested annually as required by section 7.5.1 of the License Application and that the test procedures were based on applicable NFPA standards.

The inspectors reviewed BWXT fire protection system impairment records. The inspectors walked down three active fire impairments and reviewed 66 closed impairment records to determine whether impairments were controlled as required per procedure HS-03-10, "Control of Fire Protection System Impairments," Rev. 16.

The inspectors reviewed the potential impact to the environment as a result of firefighting efforts and the impact of fire suppression agents on nuclear criticality safety (NCS) as addressed in section 7.5.1 of the License Application. The inspectors walked down specified sections within UR that had enclosed SNM and a water-based suppression system (i.e., moderator). These few areas were not designated as moderator-controlled areas. The inspectors walked down these particular areas to verify postings and no reduction to criticality safety. The inspectors observed that all SNM was contained in sealed enclosures (gloveboxes and borated column tubes). The inspectors also observed that no floor drains, which would direct sprinkler water runoff outside the contaminated areas, existed in UR. The inspectors noted that other safety-related controls or equipment would not be adversely impacted by a suppression discharge. The inspectors also walked down several moderator-controlled areas in UR to verify that no water-based suppression systems existed.

The inspectors toured the firehouse and EOC to determine if portable and fixed communication systems were operable and capable of performing the intended function. The inspectors interviewed fire brigade personnel and reviewed documentation pertaining to the portable emergency communications equipment. The inspectors observed fire brigade personnel perform required daily communication checks.

The inspectors reviewed procedure HS-IS-002, "Inspection of Emergency Lights," Rev. 008, and observed monthly testing of the emergency lighting system to verify that the system would be capable of functioning in the event that power is lost during a fire. The inspectors also reviewed documentation to verify that back-up system power was available and tested for the required duration.

The inspectors verified compliance with NFPA 600, "Standard on Facility Fire Brigades," and NFPA 1081, "Standard for Industrial Fire Brigade Member Professional Qualifications," by reviewing fire brigade training records. Fire brigade qualification records reviewed were up-to-date and members had participated in drills at the appropriate frequency. The inspectors observed a fire brigade walk-through training activity involving medical egress of non-ambulatory personnel.

The inspectors verified that Memorandums of Understanding for offsite fire support existed and renewed every four years as specified in BWXT's Emergency Plan Section 2.3, "Local Offsite Assistance," Rev. 29. The inspectors reviewed training records to verify that offsite responders received annual training in the areas of NCS, radiological safety, and site emergency response.

The inspectors reviewed recent design changes that impacted fire safety to ensure that applicable NFPA codes and standards were incorporated into the design. The inspectors reviewed recent authority having jurisdiction decisions to determine if deviations from applicable codes and standards were properly justified.

b. Conclusion

No violations of more than minor significance were identified.

5. Fire Protection Annual (Inspection Procedure 88135)

a. Inspection Scope

On May 6, 2017, the inspectors observed fire brigade training as part of BWXT's annual emergency team training program to verify compliance with the license and NFPA 600, "Standard on Industrial Fire Brigades." The inspectors specifically observed hands-on training on the new confined space tripod lifts and confined space training using the HIP furnace access cage in the burn building and the de-nitrification facility man-hole accessible discharge tunnel. The inspectors observed fire brigade leader command and control, proper donning and use of turnout gear and self-contained breathing apparatus, sufficient availability of firefighting equipment, clear and effective radio communications, coordination of unnecessary personnel, investigation of the incident, and implementation of pre-planned strategies.

b. Conclusion

No violations of more than minor significance were identified.

6. Nuclear Criticality Safety (Inspection Procedure 88135.02)

a. Inspection Scope

During daily production area tours, the inspectors observed various criticality controls, that personnel followed criticality station limit cards, and that containers were adequately controlled to minimize potential criticality hazards. The inspectors reviewed a number of criticality-related IROFS for operability. The inspectors oversaw that operators were knowledgeable of the requirements associated with IROFS.

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

b. Conclusion

No violations of more than minor significance were identified.

7. Nuclear Criticality Safety (Inspection Procedure 88015)

a. Inspection Scope

The inspectors reviewed the NCS program to verify requirements with 10 CFR 70 and the license. The inspectors reviewed selected NCSEs to determine whether properly reviewed and approved NCSEs were in place prior to conduct of new or changed operations and were of sufficient detail and clarity to permit independent review. The inspectors reviewed the selected NCSEs to determine whether calculations were performed within their validated areas of applicability and consistent with the validation report. The inspectors reviewed the selected NCSEs and associated assumptions and calculations to verify that they were consistent with the commitments in the License Application, including the consideration of the Double Contingency Principle, assurance of subcriticality under normal and credible abnormal conditions with the use of subcritical margin, technical practices and methodologies, and treatment of NCS parameters. The NCSEs were selected based on factors such as risk significance, whether or not they were new and/or revised, complexity, reliance on administrative controls, the use of new technology or unusual control methods, and operating history. The NCSEs reviewed included those listed in Section 4 of the Attachment.

The inspectors reviewed BWXT'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. This review was conducted in the areas for the NCSEs listed in Section 4 of the Attachment.

The inspectors verified there were no changes to the validation report since the last NCS inspection.

The inspectors performed walkdowns in the met lab, the Specialty Fuel facility, and the mixed waste warehouse 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 in the Attachment. The inspectors reviewed process and system descriptions and specifications to verify that engineered controls established in the NCSEs were included. The engineered controls reviewed included, passive geometry controls, backflow preventers, overflows and other items relied on for safety in Specialty Fuel facility. The inspectors reviewed OPs and postings to verify that selected administrative controls established in the NCSEs were included. The inspectors interviewed operators and engineers to verify that administrative actions established in the NCSEs were understood and implemented properly.

The inspectors reviewed the ISA summary and supporting ISA documentation to determine whether the controls identified in the ISA were supported by technical basis in the NCSEs.

The inspectors reviewed records of the most recent NCS audit, NCS-2017-059, "NCS Violation and Observation Summary – 1<sup>st</sup> Quarter 2017," and accompanied a BWXT NCS engineer on a walkdown of the mixed waste warehouse to determine whether NCS staff routinely assesses field compliance with established NCS controls. Additionally, the inspectors interviewed NCS auditors; reviewed NCSE-03, "Nuclear Criticality Safety Audits and Inspections," Rev. 28; and the weekly inspection schedule to verify that NCS engineers performed weekly inspections that meet the requirements of section 5.1.3 of the License Application.

The inspectors reviewed the safety basis of the met lab saw and observed the operation to verify that long-term accumulation within piping was considered. Additionally, the inspectors reviewed the controls designed to prevent an unsafe concentration of saw-cutting fluid from reaching the downstream unfavorable geometry retention tank. This included in-line particulate filters, an administrative sample taken to determine discarded cutting fluid concentration, and in-line monitors.

The inspectors reviewed revised NCS program procedures to determine whether BWXT implemented license requirements and whether the NCS program was enacted in accordance with them. The revised NCS program procedures included NCSE-03 and NCSE-07, "Qualification and Training Requirements for a Nuclear Criticality Safety Engineer," Rev. 17. The inspectors interviewed NCS staff and reviewed records to determine whether NCS staff reviewed new and/or revised fissile material operations and procedures consistent with program procedures.

The inspectors reviewed selected NCSEs to verify that they were performed in accordance with NCS program procedures and received appropriate independent review and approval. The inspectors reviewed the NCSEs and interviewed BWXT NCS engineers to verify that NCS staff members only performed those functions for which they were qualified.

The inspectors reviewed various aspects of the criticality accident alarm system (CAAS) to determine whether the CAAS features met regulatory requirements and license commitments. These aspects included whether the CAAS was designed and implemented so as to minimize false alarms, whether detector failure was self-announcing, and whether there was adequate emergency power for detectors and electricity to ensure the CAAS annunciators would continue to annunciate until manually reset. The inspectors reviewed changes to NCS-TR-00004, "Placement of Detectors for the CIDAS System," Rev. 4, to determine whether dual alarm coverage was provided for all areas where required in accordance with section 5.1.5 of the License Application. The inspectors reviewed records to determine whether alarm signals were audible within the areas required to be evacuated. The records reviewed included:

- TP-07-103 Form 1, "Sounding of the Building Evacuation System," Rev. 6
- RP-07-103 Form 4, "Functionality Test of Speakers and NAWLS," Rev. 6
- RPTWR 14-012, "NOG-L CIDAS CAAS Site-Wide Sound Survey," Rev. 1

The inspectors reviewed records and interviewed the cognizant BWXT engineer to determine whether CAAS detector operability was maintained, including whether detectors were calibrated and whether all components were functionally tested.

The inspectors reviewed emergency preparedness (EP) procedures EPR-01-01, "Emergency Plant Evacuation," Rev. 20, and EPR-02-03, "Radiological Procedure for an Unannounced Sounding of the Howlers," Rev. 12, to determine whether the procedures specify that personnel evacuate to accountability points in the event of a CAAS alarm and whether evacuation routes and accountability points are designed to minimize the potential for exposing evacuating personnel to radiation.

The inspectors reviewed selected NCS-related CAP entries to determine whether anomalous conditions were promptly identified and entered into the CAP, whether they received the appropriate level of investigation consistent with license commitments and procedures, whether proposed CAs were sufficiently broad, whether they were prioritized on a schedule commensurate with their significance, and whether they were completed as scheduled and were adequate to prevent recurrence. Additionally, the inspectors reviewed NCS-related CAP entries (2016-1022, 2017-128, 2017-324, 2017-479, and 2017-627) to assess NRC reportability.

b. Conclusion

No violations of more than minor significance were identified.

**B. Radiological Controls**

1. Radiation Protection Quarterly (Inspection Procedure 88135)

a. Inspection Scope

The inspectors performed a review and observation of posted radiologically controlled areas for Radiation Work Permit (RWP) 17-46, "Replace and Dispose of Wet HEPA and Pre-Filters at Work Station WS-401." This RWP included use of multiple boundaries, ventilation controls, and respirators. The inspectors reviewed the RWP to verify that it contained required work instructions, was posted in the work area for employee review, and that workers signed the RWP. In addition to the detailed review noted above, the inspectors performed numerous partial reviews of RWPs during the inspection period in different operational areas.

The inspectors reviewed BWXT's radiation protection program to verify compliance with 10 CFR 20, "Standards for Protection Against Radiation," and License Application 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 the inspectors observed plant personnel as they performed various tasks to verify that proper protective equipment was used to prevent contamination. The inspectors also observed plant employees as they performed exit monitoring at the controlled areas' exits to verify that monitoring instructions were followed at the exit point. The inspectors observed employees using the exit monitors in the controlled area exit to verify whether monitors were being used as required.

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 tests (PMTs) listed below to verify that procedures and test activities confirmed safety systems and components (SSCs) operability and functional capability following the described maintenance. The inspectors reviewed BWXT's completed test procedures to ensure any of the SSC safety function(s) that may have been affected 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 properly reviewed and approved. The inspectors also witnessed and/or reviewed the test data to verify that test results adequately demonstrated restoration of the affected safety function. The inspectors verified that PMT activities were conducted in accordance with applicable work order (WO) instructions or licensee procedural requirements. Furthermore, the inspectors verified that problems associated with PMTs were identified and entered into BWXT's CAP.

- Maintenance Plan 3926, "Work Station 401 Tube Inspection," and RWP 17-26, "Disconnect Main Tube from Furnace for Inspection"
- CA-2017-599, "Side Rail of Element Cart Damaged," as repaired under Job Order 1179084
- WO 20221634, "Primary Scrubber Column Replacement"
- Maintenance Plan 4301, "Semi-Annual Probe Functional Test," and WO 20220296, "Hydrogen Fluoride Day Tank Catch Tray Replacement"

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 reviewed completed test data for Maintenance Plan 898, "Low-Level Dissolver Reagent Addition Lines Verification" (surveillance test). This test verified that this risk-significant and safety-related system met the requirements of the ISA, commitments, and procedures. The inspectors confirmed 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. The inspectors verified that test equipment or standards used to conduct the test were within calibration. The inspectors determined that effective communications between personnel performing these tests were used to complete each activity.

b. Conclusion

No violations of more than minor significance were identified.

3. Corrective Action Program (Inspection Procedure 88135)

a. Inspection Scope

The inspectors reviewed a sample of items entered into BWXT's CAP during the inspection period to ensure that entries pertinent to safety, security, and non-conforming conditions were identified, investigated, and tracked to closure. The inspectors verified through interviews with BWXT staff and document reviews that issues of high-safety significance were identified and reviewed for apparent causes as required. The inspectors verified that, for those issues requiring extent-of-condition and/or extent-of-cause reviews, the reviews were completed and documented in the applicable CA. The inspectors verified that CAs to prevent recurrence were identified in the CAP and were reviewed and tracked to completion in accordance with implementing procedure, QWI 14.1.1, "Preventive/Corrective Action System," Rev. 33.

Furthermore, the inspectors conducted periodic reviews of BWXT audits and third-party reviews of safety-significant processes to determine their effectiveness and necessary entries into the CAP. Specifically the inspectors reviewed the following:

- LMS-2017-002, "Radiation Protection Audits, Inspections 1<sup>st</sup> Quarter 2017," dated April 20, 2017
- 261-6A, "Annual Material Control and Accounting Assessment, March, April, and May 2017"
- GL 2015-01, "NPH, BWXT Response and Staff Safety Evaluation Request Review," TI 2600-16
- 2016 As Low As Reasonably Achievable (ALARA) Report dated May 2017

b. Conclusion

No violations of more than minor significance were identified.

4. Emergency Preparedness (Inspection Procedure 88135)

a. Inspection Scope

On May 20, 2017, the inspectors participated in the BWXT second quarter emergency team exercise initiated by a simulated vehicle collision into the recovery low-level waste acid line with injuries. The emergency team exercise was intended to identify any BWXT weaknesses and deficiencies in classification and protective action recommendations in accordance with BWXT's Emergency Plan, EP Manual, and licensee conformance with other applicable emergency plan implementing procedures. The inspectors participated

in the post-exercise critique to compare any inspector-observed weaknesses with those identified by BWXT to verify whether BWXT staff were properly identifying EP-related issues and entering them into the CAP, as appropriate.

b. Conclusion

No violations of more than minor significance were identified.

D. Other Areas

Follow-Up on Previously Identified Issue

1. (CLOSED) Violation (VIO) 70-27/2015-005-01: Inadequate Management Measures For Sprinkler Systems IROFS

This event occurred on September 3, 2015, and involved isolation of supply water to the Container Storage facility wet sprinkler system, which is designated as an IROFS in the facility ISA. This event involved the failure to provide adequate management measures, specifically configuration management, as required by section 15.1 of the facility ISA.

In following up on this violation, the inspectors reviewed documents including HS-03-10, "Control of Fire Protection System Impairments," Rev. 16; HS-FP-002, "Weekly Fire Pump Procedures," Rev. 13; Engineering Change Package 00000160, "Pressure Switch Installation;" root cause analysis and associated CAs; and interviewed operators, engineers, and managers. Specifically, the inspectors reviewed how BWXT implemented procedure revisions and system design modifications to maintain configuration management controls for systems that could affect IROFS.

The inspectors reviewed HS-FP-002 and determined that steps were added to ensure that all scheduled fire pump testing activities require that a fire impairment be initiated prior to conducting the pump testing in accordance with HS-03-10. The inspectors identified that additional procedural steps were also added to HS-03-10, which require personnel initiate a review of each new fire protection impairment against the active Fire Protection System Impairment List to determine the aggregate impact of all existing fire impairments on IROFS.

The inspectors also walked down the Container Storage facility wet sprinkler system and verified that pressure alarm switches were installed in the system per Engineering Change Package 00000160 to provide early indication of degrading sprinkler system pressure and potential impact on IROFS in being able to perform the required safety function of fire mitigation in the Container Storage facility.

This item is considered closed.

E. Exit Meeting

On May 18 and July 17, 2017, the inspectors presented the inspection results to Mr. B. J. Burch and members of the BWXT staff. No dissenting comments were received from BWXT. Proprietary information was discussed, but not included in the report.



## **SUPPLEMENTARY INFORMATION**

### **1. KEY POINTS OF CONTACT**

#### Licensee Personnel

<u>Name</u>	<u>Title</u>
J. Burch	Vice President and General Manager
J. Calvert	Environmental, Safety, Health & Security Program Manager
B. Dilling	Industrial Health and Safety Manager
D. Faidley	Nuclear Criticality Safety Manager
W. Lemon	Filler Manufacturing Operations
L. Ragland	Unit Manager, Uranium Processing Operations
A. Rander	Security Manager
C. Reed	Operations Manager
H. Shaffer	Engineering Manager
D. Spangler	Section Manager, Nuclear Safety and Licensing
C. Terry	Unit Manager, Licensing and Safety Analysis
D. Ward	Department Manager, Environmental, Safety, Health, and Safeguards

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

#### Closed

70-27/2015-005-01	VIO	Inadequate Management Measures for Sprinkler System IROFS (Paragraph D.1)
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### **3. INSPECTION PROCEDURES USED**

88015	Nuclear Criticality Safety
88054	Fire Protection (Triennial)
88055	Fire Protection (Annual)
88135	Resident Inspection Program for Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.19	Post-Maintenance Testing
88135.22	Surveillance Testing

#### 4. **DOCUMENTS REVIEWED**

##### Drawings:

13AD2 1000, Low-Level Dissolvers Piping and Instrumentation Drawing, Rev. 13  
 LP4464, Low-Level Dissolvers Hood Modifications, Rev. 9  
 LT-4797, Multipurpose Fuel Element Transfer Cart, Rev. 10  
 9138400, RICO Tank Assembly (3.48 gallon), Rev. 0

##### Records

2016 ALARA Report dated May 2017  
 2016 Annual Inspection of Fire Sprinklers HS-2017-018, 2016/2017 Annual Sprinkler System Inspection dated February 20, 2017  
 2016 Annual Offsite Emergency Responder Training Records  
 Annual Testing of SW, PW/DI, and Hydrant Backflow Preventers dated December 8, 2016  
 CHG-2292, Install In-Line Water Heater in Recovery  
 CHG-2496, Replacing Stainless Steel Tray with a Kynar Tray under the HF Day Tank  
 E-Mail Chain Jared Pfahler (RICO Equipment) to Mike Edstrom (BWXT) dated May 8, 2017  
 E-Mail Clayton McElroy to Mike Edstrom dated May 9, 2017  
 Engineering Change Package 00000160, Pressure Switch Installation  
 Engineering Change Package 00000947, Fire Pump Removal  
 Form E61-477, Recovery Foremen's Daily Shift Activity Log dated May 1 and 2, 2017  
 Form E61-648, UPRR Maintenance Work Request Form dated May 2, 2017  
 Form E61-670, Recovery Shift Exchange Log dated May 2, 2017  
 HS-2001-003, Vault 7 Materials Fire Properties dated July 6, 2017  
 HS-2016-025, Offsite Responder Training dated February 29, 2016  
 HS-2016-110, Emergency Team Training dated October 15, 2016 (IH&S Technical Work Record)  
 HS-2017-021, Emergency Team Training dated February 18, 2017 (HAZMAT-Incident Command)  
 HS-2017-023, Compressed Air/Gas Quality Testing Report dated February 19, 2017  
 HS-2017-041, HAZMAT Training dated May 6, 2017  
 Hydraulic Calculations for BWXT Container Storage Facility Campbell County dated September 25, 2006  
 NCS-1989-078, RTRFE 4-Tier Tray Storage Racks/LER8895 dated March 21, 1989  
 NCS-1998-310, NCS Evaluation for the Material Composition Change Request for the LLD Trays and Filter Bowls  
 NCS-2009-158, Low-Level Dissolver Upgrades-Mobile Containers SER 08-045 dated October 8, 2009  
 NCS-2015-008, Safety Concern Analysis for Cleanup Piles in LLD Enclosure that were Larger than 2.5 Liters  
 NCS-2015-086, NCS Review of SEBP Sample Analysis for 2011, 2013, and 2015 dated December 1, 2016  
 NCS-2016-029, NCS Safety Analysis for Revised Boron Content for Vault 7 and Closure of CA 201402140 dated October 11, 2016  
 NCS-2017-021, NCS Safety Concern Analysis for Moderator Places in a ≤2.5-Liter Container Rack dated February 14, 2017  
 NCS-2017-024, NCS Justification Analysis Supporting SER 16-039 Phase 01 – Helium Recovery System dated November 15, 2016

NCS-2017-025, NCS Justification Analysis Supporting SER 16-041 Phase 01 – Installation of a New G&L RT 1600 dated November 15, 2016  
 NCS-2017-032, NCS Safety Concern Analysis for Legacy Fuel Stored on Racks Not Posted for Them dated February 21, 2017  
 NCS-2017-039, Revised NCS Analysis Supporting U-Metal Dissolution in Conversion Facility Dissolver #2 – SER 16-032, Phase 01 dated March 15, 2017  
 NCS-2017-041, NCS Justification Analysis for Installing a Chiller Unit on the High Level Mezzanine to Cool Main T-Duct dated March 2, 2017  
 NCS-2017-044, NCS Justification Analysis Supporting CHG-2292 – Installation of In-Line Water Heater in Recovery dated March 8, 2017  
 NCS-2017-046, Safety Concern Analysis for Steam Leak from Autoclave dated March 9, 2017  
 NCS-2017-058 NCS Safety Analysis for Specialty Fuel Facility Area Calcining Furnace (Workstation 130) for SER 15-012 – Ceramic Boats dated April 19, 2017  
 NCS-2017-059, NCS Violation and Observation Summary – 1<sup>st</sup> Quarter 2017  
 NCS-2017-063, NCS Justification Analysis to Support RTR per CA 201700582 – Time Saver/Plate Polisher in RTR Machine Shop Use for RTR Fuel Plate Fabrication dated April 24, 2017  
 NCS-2017-065, NCS Safety Release for Repair of Damaged Horizontal Element Cart dated April 26, 2017  
 NCS-TR-00004, Placement of Detectors for the CIDAS System, Rev. 4  
 Pre-Fire Plan, Map Section 12A, Bay 17 (Checkpoint 7) dated March 7, 2017  
 RP-07-103 Form 1, Sounding of the Building Evacuation System, Rev. 6  
 RP-07-103 Form 2, CIDAS CAAS Failure and Non-Routine Maintenance Log, Rev. 6  
 RP-07-103 Form 4, Functionality Test of Speakers and NAWLS, Rev. 6  
 RP-07-104 Form 1, NOG-L CIDAS MkXI Criticality System Calibration, Rev. 2  
 RPTWR 14-012, NOG-L CIDAS CAAS Site-Wide Sound Survey, Rev. 1  
 RPTWR 2017-001, Summary of 2016 Criticality Monitoring System Alarms, Failures, and Non-Routine Maintenance dated April 24, 2017  
 SAR 15.6, Low-Level Dissolution Process in Uranium Recovery, Rev. 69  
 SAR 15.33, Vault 7 Operations, Rev. 39  
 SAR 15.36, Generator and UPS Power Systems, Rev. 16  
 SER 16-045, Convert CSF Row 'B' Back to Storage in 235R001 Shipping Containers  
 WO 20204502  
 WO 20204503  
 WO 20220296  
 WO 20221634

#### Procedures:

EPR-01-01, Emergency Plant Evacuation, Rev. 20  
 EPR-02-03, Radiological Procedures for an Unannounced Sounding of the Howlers, Rev. 12  
 EPR-03-05, Management of Fire Water System, Rev. 7  
 HS-03-05, Control of Flammable and Combustible Liquids, Rev. 6  
 HS-03-10, Control of Fire Protection System Impairments, Rev. 16  
 HS-ET-001, Emergency Team Training, Rev. 12  
 HS-ET-002, Response to Emergency Team Assembly Alarm, Rev. 007  
 HS-ET-003, Monthly Inventory and Maintenance of the Emergency Response Vehicles, Rev. 09  
 HS-ET-003, Attachment 1, Inventory of Equipment – Medical Unit, Rev. 16  
 HS-ET-004, Mt. Athos Fire Training Facility: Live Fire Evolutions, Rev. 006

HS-ET-008, Standard Operating Procedure for Hazardous Materials Incidents, Rev. 5  
 HS-ET-011, Standard Operating Procedure: Fire, Rescue, and HAZMAT Responses, Rev. 009  
 HS-FP-03, Air Quality Analysis of the Eagle Air Compressor, Rev. 06  
 HS-FP-002, Weekly Fire Pump Procedures, Rev. 13  
 HS-FP-018, Fire Barrier/Fire Damper Inspection, Rev. 10  
 HS-FP-020, 5-Year Testing of the Water Loop, Rev. 07  
 HS-IS-002, Inspection of Emergency Lights, Revision 008  
 NCSE-03, Nuclear Criticality Safety Audits and Inspections, Rev. 28  
 NCSE-07, Qualification and Training Requirements for a Nuclear Criticality Safety Engineer, Rev. 17  
 OP-1000312, Tamper-Safing of SNM Stored on Site, Rev. 23  
 OP-1045374, Use of In-Line Respirators in Recovery, Specialty Fuel Facility, and Research Test Reactors, Rev. 0  
 OP-0061450, General Safety and Safeguards Guidelines-UPRR, Rev. 36  
 OP-0061556, Recovery Conversion Furnace Operation, Rev. 17  
 QWI 2.1.3, Integrated Safety Analysis Methodology, Rev. 16  
 QWI 5.1.26, Nuclear Criticality Safety Postings, Rev. 10  
 QWI 14.1.1, Preventive/Corrective Action System, Rev. 33  
 QWI 14.1.4, Reporting Unusual Incidents, Rev. 12  
 QWI 14.1.10, Safety Evaluation of Unusual Incidents, Rev. 16  
 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:

259-4E, Internal Audit Summary Report – February 2017  
 2016 Annual EMO Training  
 2016 Emergency Team Training, NCS  
 2017 BWX Technologies NOG-L Emergency Team, Company 18 Training Schedule  
 Pre-BWX Technologies Emergency Team Roster, Rev. 26  
 2017 GEST Employee Safety Training, NCS  
 Essentials of Fire Fighting, Rev. 6  
 Facility Siting Review, Flammable Liquid Storage Building, Rev. 4  
 Fire Plan Mt. Athos Site dated June 17, 2015  
 Harris Technology P7300 Portable Radios Technical Specifications  
 Harris Technology XG-75/XG-75 Two-Way Portable Radio Battery Technical Specifications  
 List of Emergency Lights in the Filler Area  
 OSHA – 29 CFR 1910.120  
 Weekly Inspection Schedule

Corrective Actions:

2015-1380, 2016-1022, 2016-1106, 2016-1527, 2016-1572, 2016-1681, 2017-128,  
 2017-183, 2017-253, 2017-264, 2017-324, 2017-447, 2017-473, 2017-479, 2017-599,  
 2017-627, 2017-656, 2017-665, 2017-696, 2017-697, 2017-721, 2017-727, 2017-739,  
 2017-786

Commitments:

55283, 55284, 55285, 55286, 55287, 55288, 55289, 55290