



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

April 17, 2019

EN53612
EN52840

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 70-27/2019-002**

Dear Mr. Burch:

This letter refers to the inspections conducted from January 1 through March 31, 2019, 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 and implementation of programs and procedures in the areas of safety operations, radiological controls, and facility support were conducted safely and in accordance with U.S. Nuclear Regulatory Commission (NRC) requirements. The results were discussed with you and members of your staff at exit meetings held on January 31 and April 11, 2019.

Based on the results of these inspections, no violations of more than minor significance were identified.

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 70-27/2019-002
w/Attachment: Supplemental Information

cc:
Joel W. Duling, President
BWXT Nuclear Operations Group, Inc.
2016 Mount Athos Road
Lynchburg, VA 24505

Christopher T. Terry, Manager
Licensing and Safety Analysis
BWXT Nuclear Operations Group, Inc.
P.O. Box 785
Lynchburg, VA 24505-0785

Steve Harrison, Director
Division of Radiological Health
Department of Health
109 Governor Street, Room 730
Richmond, VA 23219

SUBJECT: BWXT NUCLEAR OPERATIONS GROUP – NUCLEAR REGULATORY
COMMISSION INTEGRATED INSPECTION REPORT 70-27/2019-002

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 70-27

License No: SNM-42

Report No: 70-27/2019-002

Licensee: BWX Technologies, Inc. (BWXT)

Facility: Nuclear Operations Group, Inc. (NOG)

Location: Lynchburg, VA 24505

Dates: January 1 through March 31, 2019

Inspectors: A. Alen, Senior Resident Inspector
C. Stancil, Senior Resident Inspector
B. Adkins, Senior Fuel Facility Inspector (Sections A.6, D.2, D.3)
R. Gibson, Jr., Senior Fuel Facility Project Inspector (Section C.5)
T. Sippel, Fuel Facility Inspector (Sections A.6, C.5, D.2, D.3)

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

EXECUTIVE SUMMARY

BWXT Nuclear Operations Group, Inc.
NRC Integrated Inspection Report 70-27/2019-002
January 1 – March 31, 2019

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 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 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 and A.4)
- No violations of more than minor significance were identified related to the Nuclear Criticality Safety Program. (Sections A.5 and A.6)

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 and Surveillance Testing Programs. (Sections C.1 and 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. (Sections C.4 and C.5)

Other Areas

- No violations of more than minor significance were identified related to observations of security personnel and activities. (Section D.1)
- Violation 2017-006-01, Failure to Appropriately Consider Accident Sequences Involving Seismic Events, was closed. (Section D.2)
- Violation 2018-006-03, Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAI_x Glovebox Systems as required by 10 CFR 70.62(b), was discussed and remains open. (Section D.3)

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 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 captured off-normal events and implemented effective CAs 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 CAs to verify that BWXT actively pursued CAs 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 BWXT's emergency response facilities to verify that the facilities were maintained in a readily available status as required.

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

The inspectors reviewed Event Notification (EN) 53612 submitted on September 17, 2018, for a potentially unanalyzed condition associated with a small release of nitrous oxide, 'NOx', in the Specialty Fuel Facility (SFF) conversion area during uranium dissolution operations with the supporting wet scrubber ventilation system shut down for maintenance. This EN was subsequently withdrawn by BWXT on September 20, 2018, after locating documentation that supported that the condition was analyzed and that it met the performance requirements of 10 CFR 70.61. The inspectors evaluated BWXT's response to this EN and other 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 inspected safety-significant systems involved with the processing of SNM in the metallographic and chemistry laboratory areas to verify compliance with the license, procedures, and applicable Safety Analysis Reports (SAR) (e.g. SARs 15.28, "Metallographic Laboratories," and 15.29, "Chemistry Laboratory"). The inspectors conducted walkdowns of the selected process areas to verify the as-built configurations matched approved plant drawings. The inspectors interviewed operators to verify that plant personnel were familiar with the assumptions and controls associated with the IROFS systems and instrumentation for maintaining plant safety as required. 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 also reviewed the selected systems to verify that there were no conditions that degraded plant performance including the operability of IROFS, safety-related devices, or other support systems essential to safety system performance.

The inspectors reviewed procedures, drawings, related ISAs, and regulatory requirements such as 10 CFR 70.61, "Performance Requirements," to determine the correct system alignment and to verify the following as appropriate during the walkdowns:

- 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/tagout program implemented per HS-11-01, “Lockout/Tagout/Testing of Hazardous Energy Sources”
- cabinets, cable trays, and conduits 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 shop bays BC, 1A, 2A, and 3A to verify compliance with License Application Chapter 7, “Fire Safety,” and the National Fire Protection Association (NFPA) 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 features identified in the plan (e.g., locations of fire hose stations and portable extinguishers, locations of sprinkler isolation valves, etc.) 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. Various fire barriers and doors 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 adequately controlled and minimized as required.

b. Conclusion

No violations of more than minor significance were identified.

4. Fire Protection Annual (Inspection Procedure 88135.05)

a. Inspection Scope

On March 16, 2019, the inspectors observed annual emergency team (fire brigade) training to verify compliance with the license and NFPA 600, “Standard on Industrial Fire Brigades.” The inspectors observed training in emergency medical services protocols and procedures including pediatric splint, scene safety, personal protective equipment, nature of illness, mechanism of injury, additional resources, immobilization, and primary assessment.

b. Conclusion

No violations of more than minor significance were identified.

5. 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 daily 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 criticality-related IROFS to verify operability. The inspectors also interviewed and observed operators to verify knowledge of requirements associated with NCS IROFS.

As part of routine day-to-day activities, the inspectors reviewed corrective action program (CAP) entries associated with criticality safety. The inspectors evaluated BWXT'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.

6. Nuclear Criticality Safety (Inspection Procedure 88015)

a. Inspection Scope

The inspectors reviewed the NCS program to verify compliance with License Application Chapter 5, "Nuclear Criticality Safety." Specific areas of the NCS program reviewed are detailed below.

Criticality Analysis

The inspectors reviewed selected NCSEs and associated assumptions and calculations to verify that they were consistent with the commitments in Chapter 5 of the license. These included the commitment to the double contingency principle, assurance of sub-criticality under normal and credible abnormal conditions with the use of sub-critical margin, having properly reviewed and approved NCSEs in place prior to conducting new or changed operations, and specified technical practices and methodologies. The NCSEs were selected based on factors such as whether or not they were new, revised, and their complexity. The criticality safety analyses reviewed are listed in Section 4 of the Attachment and primarily focused on NCS-PA-26-00001, "Nuclear Criticality Safety Process Analysis of the Conventional Fuel Pack Assembly Process."

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 included the review of accident sequences/upsets that BWXT determined to be not credible to determine whether the bases for incredibility were consistent with the commitments, definitions, and methodologies in the license application, and were documented in sufficient detail to permit an independent assessment of credibility. Additionally, the inspectors reviewed selected accident

sequences designated as not credible to determine whether the bases for incredibility relied on any items which should be identified as formal NCS controls or IROFS. This review was conducted for the conventional fuel pack assembly process as documented in NCS-PA-26-00001.

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

Criticality Implementation

The inspectors performed walkdowns of waste handling areas and RTR to determine whether existing plant configuration and operations were covered by and consistent with NCS postings and training material. The inspectors reviewed postings to verify that selected administrative controls established in the NCSEs were included. The administrative controls reviewed included spacing and moderator controls as well as a control on the position of an isolation valve. The inspectors interviewed operators and engineers to verify that administrative actions established in the NCSEs were understood and implemented as specified.

The inspectors reviewed the ISA summary and supporting ISA documentation (e.g., SAR 15.27, "NR Fuel Element Fabrication Process") to determine whether the controls identified in the ISA were supported by technical bases in the NCS analyses. These controls included the control on the position of an isolation valve.

Criticality Operational Oversight

The inspectors reviewed training material and exams to determine whether operator training included instruction in criticality hazards and control methods, whether BWXT's established operator training was consistent with commitments in Section 5.1.4.2, "Specialized Instruction," of the license, and whether NCS staff was involved in the development of operator training as required. Additionally, the inspectors interviewed operators in several areas of the facility to determine whether they were cognizant of NCS hazards and control methods related to their specific job function.

The inspectors reviewed NCS-2019-004, "NCS Violation and Observation Summary - 4th Quarter 2018," and accompanied a BWXT NCS engineer on a weekly inspection of the mixed waste storage area to determine whether NCS staff routinely assessed field compliance with established NCS controls. Additionally, the inspectors interviewed NCS engineers and reviewed NCSE-03, "Nuclear Criticality Safety Audits and Inspections," and weekly inspection schedules to verify that the NCS function performed weekly inspections and quarterly audits such that the entire site is audited biannually and that at least once a month weekly inspections were performed on weekends or backshift, as required by Section 5.1.3, "Nuclear Criticality Safety Audits and Inspections," of the license.

The inspectors reviewed the applied management measures for selected NCS IROFS to determine whether the management measures were sufficient to ensure the availability and reliability of NCS IROFS controls. The management measures and NCS IROFS reviewed focused on NCS-2018-183, "Safety Concern Analysis for an Isolation Valve Left Unlocked."

Criticality Programmatic Oversight

The inspectors reviewed selected NCSEs to verify that they were performed in accordance with the NCS program procedures and received appropriate independent review and approval as required by Section 2.1.6, "Nuclear Criticality Safety Engineers," of the license.

The inspectors reviewed NCS staff qualification records to verify that NCS engineers had the necessary education and experience required by Section 5.1.3 of the license and were qualified in accordance with NCSE-07, "Qualification and Training Requirements for a Nuclear Criticality Safety Engineer."

Criticality Incident Response and Corrective Action

The inspectors interviewed emergency response personnel to determine whether BWXT maintained NCS-related emergency response capability consistent with emergency plans and procedures. The inspectors interviewed BWXT emergency response staff and reviewed emergency procedures to determine whether procedures specified personnel evacuate to accountability points in the event of a criticality accident alarm system alarm, whether the new evacuation routes and accountability points were able to minimize the potential for exposing evacuating personnel to radiation, and whether evacuation drills were conducted consistent with license commitments. The inspectors conducted a walkdown of the BWXT emergency equipment vehicles to verify that BWXT had monitoring instrumentation to promptly assess dose to potentially exposed individuals and to aid in safe re-entry and recovery, and whether provisions were in place for the prompt decontamination and medical treatment of exposed individuals as specified in Appendix F, "Emergency Equipment Storage Locations," of BWXT's Emergency Plan and as required by 10 CFR 70.24, "Criticality Accident Requirements."

The inspectors reviewed selected NCS-related CAP entries and related documents to verify that anomalous conditions received the required level of investigation. The inspectors reviewed the associated CAs to verify they were sufficiently broad, and they were consistent with program procedures and appropriate to correct the condition. Additionally, the inspectors reviewed NCS-2018-179, "Safety Concern Analysis for an Oil Leak in the Filler Area," and NCS-2018-183, "Safety Concern Analysis for an Isolation Valve Left Unlocked," to assess whether BWXT followed regulatory requirements and procedures with regards to reporting plant conditions to the NRC.

b. Conclusion

No violations of more than minor significance were identified.

B. Radiological Controls

1. Radiation Protection Quarterly (Inspection Procedure 88135.02)

a. Inspection Scope

The inspectors reviewed and observed radiologically controlled areas for radiation work permit (RWP) 19-0010, "RTRT U308 Press Oil and Sight Glass Replacement," 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 to the RWP. In addition, the inspectors performed partial reviews of select 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 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 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.

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 compliance with License Application Chapter 11, "Management Measures," and test procedures to confirm functional capability of safety systems and components (SSCs) following maintenance. The inspectors reviewed BWXT'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 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 reviewed PMT activities to verify that they 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.

- WO 20254543, "Recovery High-Level Dissolver General Purpose Hood Door Gasket Material and Plumbing Port Seal Needed Repair Following Performance of Maintenance Plan (MP) 1185, Integrity Inspection"
- WO 20255163, "Primary Strip Column Bottom Flange Leak"
- WO 20255165, "Primary Scrub Column Bottom Flange Leak"
- WO 20258767, "Recovery High-Level Dissolver Recirculation Process Line Thermocouple Replacement"
- SER 17-048, Phase 01, "Recovery Drum Dryer and Weigh/Sample Glove Box 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 the surveillance tests 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.

- MP 1806, "Primary Feed, Raffinate Feed, and Contractor Recirculation Filter Housing High-Pressure Alarm and Pump Shut-Off Sensor," WO 20255305
- MP 1658, "Recovery Inline Monitor No. 4 Interlock Test of Raffinate Collection Column Transfer Pump," WO 20255994

b. Conclusion

No violations of more than minor significance were identified.

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

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 resolution in accordance with implementing procedure QWI 14.1.1, "Preventive/Corrective Action System." The inspectors conducted interviews with BWXT 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 CA records. The inspectors also reviewed CAs 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 BWXT 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:

- BWXT NOG-L Fatigue Management Program Annual and 6-Month Performance Data Reports dated February 20, 2019

- LMS-2018-004, "RP Audits, Inspections, 4th Quarter 2018"
- NCS-2019-004, "NCS Violation & Observation Summary – 4th Quarter, 2018"
- Semi-Annual Effluent Monitoring Report

b. Conclusion

No violations of more than minor significance were identified.

4. Emergency Preparedness (Inspection Procedure 88135)

a. Inspection Scope

On January 10, 2019, the inspectors observed a site emergency drill as a planned carryover from the 4th quarter 2018. The emergency operations center (EOC) was activated for a simulated earthquake, natural gas service building fire, and a bay 8 rack failure fatality.

In addition, on March 14, 2019, the inspectors observed a security emergency director team exercise that simulated a fire near the construction trailer with one individual being transported to a local hospital. Specifically, the exercises were intended to identify any BWXT weaknesses and deficiencies in EOC activation and response; state, local, and regulatory notifications; and employee notification and response to emergency alarms in accordance with BWXT's Emergency Plan, Emergency Preparedness (EP) Manual, and licensee conformance with applicable emergency plan implementing procedures (EIPs). The inspectors reviewed the post-exercise summary and lessons learned to determine whether BWXT staff were properly identifying EP-related issues and entering them into the CAP, as required.

b. Conclusion

No violations of more than minor significance were identified.

5. Emergency Preparedness (Inspection Procedure 88050)

a. Inspection Scope

The inspectors reviewed BWXT's EP program to verify compliance with 10 CFR 70; License Application Chapter 8, "Emergency Management;" 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 were properly coordinated with the EP program, as applicable. The inspectors reviewed several EIPs revised since the last EP inspection. The inspectors reviewed EIPs to verify that they were reviewed annually, that the proposed changes were reviewed by BWXT EP organization, and that any changes did not result in a decrease in effectiveness of the EP program as required by the Plan.

The inspectors reviewed BWXT's emergency call list to verify that the list was periodically tested for accuracy and maintained as required by the Plan.

The inspectors reviewed training records and interviewed BWXT staff regarding EP training completed since the last inspection. Interviews included emergency directors, security coordinator, on-scene directors, incident commanders, and other personnel with responsibilities associated with the EOC and emergency response activities. The inspectors reviewed the training to verify that it was conducted in accordance with the Plan. The inspectors verified that BWXT provided emergency management and emergency response training for site personnel as required by the Plan. Based on a review of records, the inspectors verified that individuals responsible for using emergency equipment were qualified as required by the Plan and EIPs.

The inspectors reviewed 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 off-site support agency representatives including the Concord Rescue Squad and the Virginia Department of Health's Office of Radiological Health to verify that they maintained an understanding of the written agreements and were provided copies of the Plan. The inspectors also verified that BWXT invited the off-site organizations to participate in exercises on an annual or more frequent basis as required by the Plan.

The inspectors walked down the storage of emergency equipment at the EOC, the alternate EOC, and the off-site EOC including 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 as required by the Plan. The inspectors reviewed the accountability procedure to verify that the new assembly points were present and accessible for the means of performing accountability and mustering during an evacuation. The inspectors also reviewed the control, distribution, and maintenance of BWXT's Pre-Fire Plan, Emergency Plan, and EIPs to verify that BWXT was in compliance with the Plan. The inspectors observed a successful communication test with the NRC phone line and verified through review of records that BWXT conducted communications testing with all required off-site support organizations at the required frequency as outlined by the Plan and procedures.

The inspectors reviewed BWXT'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 BWXT's CAP.

b. Conclusion

No violations of more than minor significance were identified.

6. Permanent Plant Modifications (Inspection Procedure 88135.17)

a. Inspection Scope

The inspectors reviewed the following risk-significant plant modifications to verify compliance with the license and the requirements of 10 CFR 70. Specifically, the

inspectors evaluated the impacts to associated IROFS and ISA accident sequences in the selected modifications. The inspectors conducted field walkdowns of portions of the modifications to validate that the as-found plant configurations were in alignment with the change request documentation and to evaluate the material condition of any associated IROFS. In addition, the inspectors reviewed updates and changes to the ISA/SAR and procedures affected by the modifications, as applicable.

The inspectors reviewed change request packages for accuracy and to verify adherence to BWXT's change management process, QWI 5.1.12, "Change Management." The inspectors also reviewed the packages to verify that applicable post-maintenance installation and testing requirements were identified in the change request documentation as required; and to verify that BWXT identified and addressed any impacts to the ISA/SAR resulting from modifications as required.

- SER 17-048, Phase 01, "Recovery Drum Dryer and Weigh/Sample Glove Box Replacement"
- Change (CHG) 5795, "Update High-Level Dissolution IROFS"

b. Conclusion

No violations of more than minor significance were identified.

D. Other Areas

1. Observations of Security Personnel and Activities

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 BWXT 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. (CLOSED) Violation 2017-006-01: Failure to Appropriately Consider Accident Sequences Involving Seismic Events

In NRC Inspection Report (IR) 70-27/2017-006 (ADAMS Accession Number ML17233A035), a violation (VIO) was issued for the failure to appropriately consider accident sequences involving seismic events. Specifically, NRC inspectors identified racks that were not bounded by those analyzed by BWXT and that errors had been made in calculations of seismic forces acting on components. In a standalone document, NCS-TR-0002, "Likelihood of a Criticality Accident Initiated by a Seismic

Event at Mt. Athos,” BWXT demonstrated that the potential for an earthquake to cause items to fall off shelves into a critical configuration is less than 10^{-5} per year.

During this inspection, the inspectors reviewed BWXT’s Integrated Safety Analysis (ISA) Summary (Introduction and Generic Accident Analyses) to verify that information relating to accident sequences involving seismic events has been appropriately incorporated into the ISA. This item is considered closed.

3. (DISCUSSED) Violation 2018-006-03: Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAl_x Glovebox Systems as required by 10 CFR 70.62(b)

This VIO was opened in NRC IR 70-27/2018-006 (ML18067A098) and was discussed in NRC IR 70-27/2018-005 (ML19030A138). 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).

During this inspection, the inspectors interviewed managers and NCS staff regarding progress toward completion of the CAs identified in “60-Day Report Additional Information,” dated October 16, 2017, (ML19007A047). Additionally, the inspectors reviewed NCS-PA-26-00001, “Nuclear Criticality Safety Process Analysis of the Conventional Fuel Pack Assembly Process,” and BWXT’s schedule to complete the NCS process analysis program. This item remains open.

E. Exit Meeting

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

- On January 31, 2019, regional inspectors presented the EP and NCS inspection results to BWXT’s Vice President and General Manager, Mr. B. J. Burch, and other members of the BWXT staff.
- On April 11, 2019, the resident inspectors presented the quarterly inspection results to Mr. B. J. Burch and other members of the BWXT staff.

SUPPLEMENTAL 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 and Security Program Manager
K. Conway	Manager, Radiation Protection
M. Edstrom	Fire Protection Engineer
D. Faidley	Nuclear Criticality Safety Manager
V. Mauney	UPRR Department Manager
L. Morrell	Environmental Protection and Industrial Safety Manager
L. Ragland	Unit Manager, Recovery and Maintenance
A. Rander	Security Department Manager
C. Reed	Operations Department Manager
H. Shaffer	Engineering Department Manager
D. Spangler	Section Manager, Nuclear Safety and Licensing
C. Terry	Unit Manager, Licensing and Safety Analysis
D. Ward	Environmental, Safety, Health, and Safeguards Department Manager

2. LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

VIO	2017-006-001	Failure to Appropriately Consider Accident Sequences Involving Seismic Events (Section D.2)
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Discussed

VIO	2018-006-003	Failure to Maintain Adequate Process Safety Information for Process Systems Associated with the UAI _x Glovebox Systems as Required by 10 CFR 70.62(b) (Section D.3)
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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 / Annual)
88135.17	Permanent Plant Modifications
88135.19	Post-Maintenance Testing
88135.22	Surveillance Testing

4. **DOCUMENTS REVIEWED**

Records

2018 2nd Quarter EOC Emergency Activation Drill
 2018 3rd Quarter EOC Emergency Activation Drill
 2018 4th Quarter Emergency Drill
 2018 Annual EMO – ERO Training
 2018 Annual Evacuation Drill
 2019 BWXT Emergency Team Training and Inspection Schedule
 2019 EOC Emergency Activation
 Annual Positions Specific Training for Emergency Directors/Coordinators
 Calculation 000239, Complete Failure of Ventilation System While Dissolving, dated
 November 12, 1999
 Chemistry Laboratory Waste Inline Monitor Calibration Record, Lab No. C18-01006,
 Completed on December 13 and June 12, 2018; December 15 and June 16, 2017
 CHG 5795, Update High-Level Dissolution IROFS, dated January 11, 2019
 Environmental Protection Daily Inspection Log
 HS-2017-002, Smoke Detectors Visual 2016, dated January 3, 2017
 HS-2017-117, Smoke Detectors Visual 2017, dated January 3, 2018
 HS-2018-141, Smoke Detectors Visual 2018, dated January 2, 2019
 Inspect and Track Outside Report for Chem. Lab Smoke Detectors, Report Range:
 June 2016 – February 2019
 Inspection of the Radiological Response Van
 Integrated Safety Analysis (ISA) Summary (Introduction and Generic Accident
 Analyses), Revision (Rev.) 24 and Rev. 26
 Inventory of the Engine (White Truck)
 Inventory of the Medic Unit
 Inventory of the Rescue Vehicle (Red Truck)
 LMS-2018-004, RP Audits, Inspections, 4th Quarter 2018, dated January 28, 2019
 Management Program Annual and 6-Month Performance Data Reports dated
 February 20, 2019
 Mutual Aid Letters, September 2018
 NCS Weekly Inspection Forms
 NCS-1989-305, Anocut Saw Filtration System/LER89143/KIDD, dated
 November 7, 1989
 NCS-1990-086, Nuclear Safety Release LER 89-143, dated April 26, 1990
 NCS-1993-37, NCS Evaluation for Changes to Met Lab Sludge Tank Operations, dated
 February 25, 1993
 NCS-1995-052, NCS Evaluation of the General Purpose Area in Fuel Recovery - LER
 95-28, dated August 24, 1995
 NCS-2000-256, NCS Evaluation for Replacement of Met Lab Hot Saw per SER 00-62,
 dated September 20, 2000
 NCS-2001-15, Nuclear Safety Release for SER 00-62, dated January 19, 2001
 NCS-2009-182, NCS Safety Evaluation Revising Appendix to SAR 15.28 in Response to
 CA-2009-1787, dated January 13, 2010
 NCS-2011-125, NCS Safety Evaluation to Revise the Safety Basis of the Four Quadrant
 Element Card and Other Miscellaneous Changes, dated August 11, 2011
 NCS-2014-025, NCS Safety Analysis to Revise the Chem. Lab Safety Basis per
 CR-1041931 in Response to COM-39943
 NCS-2017-171, NCS Justification Analysis to implement COM-60631 per CA201601433,
 Review Safety Basis for the Chemistry Lab Scrubber System

NCS-2018-105, Qualification of Hannah Morbach as an NCS Auditor, dated July 10, 2018
 NCS-2018-172, Qualification of Matthew Nash as an NCS Auditor, dated November 9, 2018
 NCS-2018-179, Safety Concern Analysis for an Oil Leak in the Filler Area, dated November 16, 2018
 NCS-2018-183, Safety Concern Analysis for an Isolation Valve Left Unlocked, dated January 18, 2019
 NCS-2019-004, NCS Violation & Observation Summary - 4th Quarter 2018, dated January 24, 2019
 NCS-2019-006, Qualification of Alex Tilton as an NCS Auditor, dated January 28, 2019
 NCS-2019-007, Handling Fuel, Dummy Fuel, and Non-Fuel Components, Rev. 13
 NCS-2019-010, Safety Concern Analysis for Fuel Pack Spacing Violation between Transfer Lift Table and a Storage Rack, dated January 24, 2019
 NCS-2019-016, Acid Drain Line Valve Closure Detection Assumptions Validation, dated January 29, 2019
 NCS-2019-019, Safety Concern Analysis for Dummy Elements on Non-Fuel Rack, dated February 6, 2019
 NCS-PA-26-00001, Nuclear Criticality Safety Process Analysis of the Conventional Fuel Pack Assembly Process, Rev. 0
 PM10032, Preventive Maintenance Instructions – Fume Scrubber Inspection Report – Mechanical, Rev. 7
 Q2-177, On-the-Job Training (Checklist) For Chemistry Lab Personnel, Rev. 12
 RWP 19-0010, RTRT U308 Press Oil and Sight Glass Replacement
 Semi-Annual Effluent Monitoring Report dated February 22, 2019
 SER 00-003, Chemistry Laboratory Waste Dilution, January 2000
 SER 17-048, Phase 01, Recovery Drum Dryer and Weigh/Sample Glove Box Replacement, dated April 18, 2018
 Specialized NCS Training 2018 Annual Refresher dated August 23, 2018
 Technical Work Record RVY-2019-004, Rev. 0
 Weekly Inspection Schedule for 1st Quarter 2019 dated December 14, 2018
 Weekly Inspection Schedule for 4th Quarter 2018 dated September 24, 2018

Procedures

EP-07-10, Hazardous Material Bulk Storage Tanks and Pipeline Inspection, Rev. 12
 EPR-01-01 (EP-HS-002), Emergency Plant Evacuation, Rev. 22
 EPR-01-03, Activation of Emergency Organization after an Unannounced Howler Sounding, Rev. 14
 EPR-01-06, LTC Receptionist's Emergency Instructions, Rev. 11
 EPR-01-08, Off-Site Government Agency Response, Rev. 5
 EPR-02-04, Notification of Off-Site Agencies during an Emergency, Rev. 33
 EPR-02-07 (EP-HS-031), Emergency Shutdown of Facility, Revision 6
 EPR-03-16 (EP-NM-001), Transportation Emergency Procedure, Rev. 10
 EPR-03-18, Obtaining Meteorological Data, Rev. 10
 EPR-05-01, Post-Incident Reviews, Rev. 13
 EPR-06-01 (EP-HS-001), Emergency Organization, Rev. 17
 EPR-06-02 (EP-HS-004), Mt. Athos Site Emergency Plan Distribution, Rev. 16
 EPR-06-04 (EP-HS-009), Emergency Drills, Rev. 19
 EPR-06-05, Inspection of Emergency Operations Center Readiness, Rev. 29
 ERP-01-09, Management Action during an Unannounced Howler Sounding, Rev. 6

HS-2018-127, Determination of NO₂ Generated from Conversion Dissolver #2, dated November 27, 2018
 HS-FP-006, Portable Fire Extinguisher Inspection, Rev. 12
 HS-FP-017, Inspection, Test, and Maintenance of Fire Alarm System, Rev. 11
 NCSE-02, Nuclear Criticality Safety Analyses & Quality Assurance Reviews, Rev. 46
 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-0001003, Operating Procedure for Oxidation Operations, Rev. 25
 OP-1003449, Control of Fuel Residue in Met Lab Preparation Rooms, Rev. 5
 OP-1004074, Operating Procedure for Uranium Accountability and Waste Handling for the Chemistry Laboratory, Rev. 5
 OP-1004605, Operation of the Chemistry Lab Waste Dilution Column and Inline Monitor, Rev. 7
 OP-1004709, Operation of Savage Hot Side Saw, Rev. 12
 OP-1006833, Operating Procedure for Chemistry Lab General Safety Procedure, Rev. 7
 OP-1009412, Verifying the U-235 Content of Samples and Waste Materials in the Laboratory, Rev. 1
 OP-1016063, Contactor Inline Waste Monitoring System, Rev. 5
 OP-1021605, Chemistry Lab Spill and Leak Procedure, Rev. 2

Other Documents

Critique Meeting Minutes CA 2018-01704
 Determining NO_x Generated from Conversion Dissolver #2 (Calculation) dated September 21, 2018
 Memo to File from Michael W. Edstrom Re: CA-2018-1227 dated September 20, 2018
 MP 1658, Recovery Inline Monitor No. 4 Interlock Test of Raffinate Collection Column Transfer Pump
 MP 1806, Primary Feed, Raffinate Feed, and Contactor Recirculation Filter Housing High-Pressure Alarm and Pump Shut-Off Sensor
 NFPA 600, Standard on Facility Fire Brigades, 2015 Edition
 NFPA 801, Standard for Fire Protection for Facilities Handling Radioactive Materials, 2014 Edition
 Post-Critique for CA 2018-1704 dated January 10, 2019
 Posting 15-27-049, Rev. 0
 SAR 15.6, Low-Level Dissolution Process in Uranium Recovery, Rev. 74
 SAR 15.26, Fuel Pack Assembly Process Naval Reactors Operation, Rev. 83
 SAR Appendix 15.26, Rev. 33
 SAR 15.27, NR Fuel Element Fabrication, Rev. 131
 SAR 15.28, Metallographic Laboratories, Rev. 49
 SAR 15.29, Chemistry Laboratory, Rev. 29
 SAR Appendix 15.29, Rev. 10
 SAR 15.34, Conventional Filler Operations, Rev. 70
 SCA 19-335, AGR Fuel Found in Bottom of SFF Furnace after Burnback

Drawings

13AE4_1040C, Chem. Lab. Waste Dissolution Column, Rev. 1
 12AM9_1001E, Bay 12A Sections and Details, Rev. 3
 LP4153, Anocut Saw Filter System dated April 2, 1990
 BCC-9-26-89, Anocut Saw Filtration System dated September 26, 1989
 BCC-053090, Anocut Saw Filter dated May 30, 1990

Work Orders

20189546	20221044	20223422	20224520
20244208	20245504	20254543	20255163
20255165	20255305	20255994	20258767
20259232			

Corrective Actions

2016-0841	2016-1072	20161184	2018-0208
2018-0556	2018-0561	2018-0639	2018-0751
2018-0922	2018-0931	2018-1056	2018-1083
2018-1237	2018-1581	2018-1683	2018-1704
2018-1730	2019-0077	2019-0130	2019-0162
2019-0167	2019-0195	2019-0225	2019-1433
COM-65131	COM-74524		