



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

April 25, 2018

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 70-27/2018-002**

Dear Mr. Burch:

This letter refers to the inspections conducted from January 1 through March 31, 2018, 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 January 25 and April 18, 2018.

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 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 and its enclosure 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/ Noel Pitoniak for

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

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

Enclosure:
NRC Inspection Report 70-27/2018-002
w/Attachment: Supplemental Information

cc:
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SUBJECT: BWXT NUCLEAR OPERATIONS GROUP – NUCLEAR REGULATORY
COMMISSION INTEGRATED INSPECTION REPORT 70-27/2018-002

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No: 70-27

License No: SNM-42

Report No: 70-27/2018-002

Licensee: BWX Technologies (BWXT)

Facility: Nuclear Operations Group, Inc. (NOG)

Location: Lynchburg, VA 24505

Dates: January 1 through March 31, 2018

Inspectors: C. Stancil, Senior Resident Inspector, RII/DFFI/PB2
K. McCurry, Fuel Facility Inspector, RII/DFFI/SB
N. Peterka, Fuel Facility Inspector, RII/DFFI/PB1
T. Sippel, Fuel Facility Inspector, RII/DFFI/SB
T. Vukovsky, Senior Fuel Facility Inspector, RII/DFFI/PB2
K. Womack, 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 70-27/2018-002
January 1 – March 31, 2018

Inspections were conducted by the senior resident inspector and regional inspectors during normal and off-normal hours in safety operations, radiological controls, and facility support. 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. (Paragraph A.3)
- No violations of more than minor significance were identified related to the Nuclear Criticality Safety Program. (Paragraphs A.4 and A.5)
- No violations of more than minor significance were identified related to the Operational Safety Program. (Paragraph A.6)

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 Plant Modifications Program. (Paragraph C.4)
- No violations of more than minor significance were identified related to the Emergency Preparedness Program. (Paragraphs C.5 and C.6)

Attachment

Supplemental 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, inline 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 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 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 (OPs), 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 as required by procedure.

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 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 preparation of chemical reagents and the liquid and solid waste handling processes in UR, safety-significant systems involved with the processing of SNM to verify compliance with the license application and procedures. As part of the walkdowns, the inspectors verified 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 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 reviewed the selected system 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.

To determine the correct system alignment, the inspectors reviewed procedures, drawings, related ISAs, and regulatory requirements such as Title 10 of the *Code of Federal Regulations* (10 CFR) 70.61, "Performance Requirements." During the walkdowns, the inspectors verified 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 installed and documented
- 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

The inspectors performed an inspection of Recovery Bays 13A, 14A, and 15A 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 as required.

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 as required.

b. Conclusion

No violations of more than minor significance were identified.

4. Nuclear Criticality Safety (Inspection Procedure 88135.02)

a. Inspection Scope

- The inspectors reviewed the nuclear criticality safety (NCS) program to verify compliance with BWXT License SNM-42, 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 onsite, the inspectors reviewed corrective action program (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 assess the safety significance and verify compliance with procedures.

b. Conclusion

No violations of more than minor significance were identified.

5. Nuclear Criticality Safety (Inspection Procedure 88015)

a. Inspection Scope

The inspectors reviewed the NCS program to verify compliance with 10 CFR 70 and the license application. The inspectors reviewed selected NCSEs to verify that properly reviewed and approved evaluations 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 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 reviewed include those listed in Section 4 of the attachment and focus on RTR operations with furnaces and autoclaves, as well as factors such as whether or not they were new and/or revised, complexity, unusually heavy reliance on administrative controls, and operating history.

The inspectors reviewed BWXT's generation of accident sequences to verify that the associated 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 upsets that BWXT determined to be not credible to verify that the bases for incredibility were consistent with commitments, definitions, and methodologies in the license application and were documented in sufficient detail to permit an independent assessment of credibility.

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

The inspectors performed walkdowns of the RTR, special fuel facility (SFF), and filler 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 engineered controls reviewed included over-temperature and over-pressure controls, as well as spacing, geometry, neutron absorber, and piece count controls. The inspectors reviewed OPs and postings to verify that selected administrative controls established in the NCSEs were included. The administrative controls reviewed included piece count, moderation, and spacing controls. The inspectors interviewed operators, engineers, and maintenance personnel to verify that controls 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 NCS-related training records and material to verify that operator training included instruction in criticality hazards and control methods as required. Additionally, the inspectors interviewed operations staff to verify that they were cognizant of NCS hazards and control methods as they relate to their specific job

function as required. The NCS-related training records reviewed included general employee safety training, annual refresher training, as well as specialized NCS training for various areas.

The inspectors reviewed the applied management measures for selected NCS controls to determine whether the management measures were sufficient to ensure the availability and reliability of NCS controls. The management measures and NCS controls reviewed were selected from the NCSEs listed above and included controls on geometry, spacing, piece count, and moderation, as well as selected management measures for these controls such as maintenance and calibration, procedures, postings, and configuration control.

The inspectors conducted interviews and reviewed records to verify that NCS staff reviewed new and/or revised fissile material operations and procedures including maintenance plans consistent with program procedures and at a level commensurate with their significance as required. The inspectors reviewed the selected NCSEs listed in the attachment to verify that they were performed in accordance with NCS program procedures and received appropriate independent review and approval. Additionally, the inspectors reviewed records to verify that NCS staff members only performed those functions for which they were qualified.

The inspectors also verified no changes were made to applicable NCSE procedures since the last NCS inspection.

The inspectors performed interviews and reviewed evacuation training material to determine whether BWXT trained personnel to evacuate to accountability points in the event of a criticality accident alarm, whether evacuation routes and accountability points are designed to minimize the potential for exposing evacuating personnel to radiation, and whether evacuation drills were conducted routinely consistent with license commitments. The inspectors conducted interviews and walked down BWXT equipment to verify that BWXT had monitoring instrumentation to aid in safe re-entry and recovery and whether provisions were in place for the prompt decontamination of exposed individuals.

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 as required. Additionally, the inspectors reviewed NCS-related CAP entries (CA-2107-1586, CA-2017-1606, CA-2017-1608, and CA-2017-1661) to assess compliance with NRC reporting requirements.

The inspectors also reviewed NCS-2017-119, "NCS Safety Analysis Supporting the Existence of a Hard-Piped Waterline Connection on the SFF Waste Columns," to support review of BWXT's response to an unanalyzed condition identified in the plant. Specifically, the inspectors reviewed the analysis to verify the appropriate assumptions, methodology, and controlled parameters were used to adequately identify and analyze the accident scenarios. The inspectors also reviewed supplemental documentation to verify the newly credited IROFS and management measures were added to the updated

safety analysis report (SAR), no changes to equipment or existing configuration of the system were needed or made, and the reporting requirements were met. Lastly, the inspectors performed a walkdown of the SFF system, specifically the hard-piped process water lines, to verify the as-built configuration matched the associated drawings and system description in the safety analysis, as well as to determine that no other unanalyzed conditions existed in the field.

b. Conclusion

No violations of more than minor significance were identified.

6. Operational Safety (Inspection Procedure 88020)

a. Inspection Scope

The inspectors reviewed site requirements contained in BWXT's license application, Chapter 3, ISA. The inspectors focused on the UR area and interviewed staff to verify plant status. The inspectors also reviewed records associated with the UR area to verify compliance with procedures. The UR area was conducting normal plant operations.

The inspectors reviewed select engineered controls for UR to verify that the controls were present and capable of performing their intended safety functions as required. Specifically, the inspectors verified the physical presence of passive and active engineered safety controls, evaluated the safety controls to determine their capability and operability, and verified that potential accident scenarios identified in the ISA were covered for the recovery furnace and the recovery high-level dissolver.

The inspectors observed the operation of the new UR area scrubber system per procedure OP-0061143, "Uranium Recovery Scrubber Operation System," Rev. 32. Additionally, the inspectors performed walkdowns of the new scrubber and verified the presence of passive and active engineering safety controls.

The inspectors observed recovery furnace operations per procedure OP-0061556, "Furnace Operations," Rev. 19, following maintenance on the furnace. The inspectors reviewed ISA scenarios RECF1-3 per SAR 15.25, "Furnace Process Recovery Operation," Rev. 37, associated with furnace operations in the UR area. The inspectors interviewed two technicians regarding container and moderator control inside the furnace and reviewed mass logs associated with furnace operations.

The inspectors observed dissolution operations per procedure, OP-1018680, "Recovery High-Level Dissolution," Rev. 39. The inspectors interviewed the operator to verify the operator was knowledgeable of the system safety controls and IROFS associated with the dissolver.

The inspectors reviewed BWXT's CAP entries since the last operational safety inspection to verify that deviations from procedures and unforeseen process changes affecting nuclear criticality, chemical, radiological, or fire safety were documented and investigated promptly.

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) 17-87, "Remove Hammer Mill, Motor, Motor Cover, PVC Vent Line, and Glovebox Bubblers, and Restore/Install Boxline Purge Controls" to verify compliance with BWXT License SNM-42, Chapter 4 Radiation Safety; the Radiation Protection Manual; and implementing procedures. 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.

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.

- WO 20234895, "Caulk High-Level Dissolvers 1, 2, 3, and 4"
- CHG-3212, "Remove the Desiccant System from Recovery Blend Box" per WO 20235593, "Remove Dri-Train System on Blend Box"
- SER 17-38, "RTRT Fuel Fabrication Glove Box Upgrade" per WO 20233824, "RTR HEU Fabrication Line Purification System Removal and New System Installation"

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 that these risk-significant and safety-related systems met the requirements of the ISA, commitments, and procedures. 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. 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.

- Maintenance Plan 2556, "Annual Calibration of the AB Area Uranium Monitor Inline", Work Order 20234374, "Calibration of Inline Monitor" per OP-61137, "General Purpose Area A/B (Recovery)"
- Maintenance Plan 3151, WO 20238654, "Test of Primary Condensate Tank High-Level Sensor B"
- Maintenance Plan 3168, WO 20238573, "Test of Primary Condensate Tank Inline Monitor #2 Alarm"

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 conducted interviews with BWXT staff and reviewed document 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. 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 in accordance with implementing procedure, QWI 14.1.1, "Preventive/Corrective Action System," Rev. 34.

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:

- Semi-Annual Effluent Monitoring Report, dated February 23, 2018
- 258-3C, Radiation Protection (Respiratory Protection)
- 259-4B, EP/Facilities and Equipment

b. Conclusion

No violations of more than minor significance were identified.

4. Permanent Plant Modifications (Inspection Procedure 88135.17)

a. Inspection Scope

The inspectors reviewed the risk-significant plant modifications listed below for compliance with the license application 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 the change request packages for accuracy and adherence to BWXT's change management process, QWI 5.1.12, "Change Management," Rev. 31. The inspectors verified that applicable post-maintenance installation and testing requirements were identified in the change request documentation as required. The inspectors verified that BWXT identified and addressed any impacts to the ISA/SAR resulting from modifications.

- CHG-3212, "Remove the Desiccant System from Recovery Blend Box"
- Change Request 1045341, "Replace Recovery Furnace Exhaust Galvanized Duct with Stainless Steel Duct"
- SER 17-26, "Phase 1 Recovery Evaporator Upgrades – Evaporator 2 Upgrade"
- SER 17-38, "RTRT Fuel Fabrication Glove Box Upgrade," OP-0006056, "Crushing and Blending Box Operations"

b. Conclusion

No violations of more than minor significance were identified.

5. Emergency Preparedness (Inspection Procedure 88135)

a. Inspection Scope

On March 29, 2018, the inspectors observed the BWXT first quarter emergency team exercise to verify compliance 10 CFR 70. Specifically, 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, Emergency Preparedness (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 required.

b. Conclusion

No violations of more than minor significance were identified.

6. Emergency Preparedness (Inspection Procedure 88050)

a. Inspection Scope

The inspectors reviewed the BWXT Emergency Preparedness Program to verify compliance with 10 CFR 70, the license application, Emergency Plan and procedures. The inspectors toured the emergency operation center (EOC) and the off-site EOC to verify that the areas were readily assessable, maintained the appropriate amount of functional communication equipment, and contained up-to-date and accessible EP procedures as required. The inspectors reviewed multiple EP procedures listed in Section 4 of the Attachment that were new or had been revised since the last inspection in order to verify that changes made to EP procedures were in compliance with the Emergency Plan.

The inspectors reviewed training records and interviewed BWXT staff regarding EP training. The inspectors verified that BWXT provided training for their personnel and that the training material was consistent with the performance objectives required in the Emergency Plan.

The inspectors discussed BWXT's emergency call list and verified that the list was current. The inspectors reviewed written agreements with off-site agencies and verified that the organizations required by the Emergency Plan had up-to-date agreements. The inspectors also verified that BWXT communicated training and exercise opportunities with off-site agencies and invited the organizations to participate in exercises on an annual or more frequent basis as required by the Emergency Plan.

The inspectors reviewed change management documentation that captured lessons learned from past EOC activation events and EP exercises that had occurred since the last EP inspection. The inspectors also reviewed the internal audits of the EP program since the previous inspection to verify that BWXT was meeting requirements in the Emergency Plan. The inspectors reviewed BWXT commitments to verify that problems or deficiencies associated with the EP program or implementing procedures were corrected.

b. Conclusion

No violations of more than minor significance were identified.

E. Exit Meeting

On January 25 and April 18, 2018, 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.

SUPPLEMENTAL INFORMATION

1. KEY POINTS OF CONTACT

Licensee Personnel

<u>Name</u>	<u>Title</u>
J. Burch	Vice President and General Manager
J. Calvert	Manager, Corporate EH&S Audit Program
D. Faidley	Nuclear Criticality Safety Manager
V. Mauney	Department Manager, UPRR
L. Ragland	Unit Manager, Recovery and Maintenance
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

None

3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88020	Operational Safety
88050	Emergency Preparedness
88135	Resident Inspection Program for Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.17	Permanent Plant Modifications
88135.19	Post-Maintenance Testing
88135.22	Surveillance Testing

4. DOCUMENTS REVIEWED

Drawings:

13AD21007, Sodium Carbonate System, Rev. 0
13AD21010, Strip Tank (06-17), Rev. 3P
13AD21013, Organic Make-Up System, Rev. 3
15AD21000, Raffinate Waste Collection, Rev. 10
STECS1003, BWXT Fire Valve and Hydrant Locations, Rev. 4
UPRR 10079D, SFF Liquid Waste System Flow Diagram, Rev. 2
UPRR 30042, Primary and Secondary Scrub Column Supply Systems, Rev. 0
UPRR-30053, Recovery Evaporators 2, 3, 4, and 5, Rev. 1

UPRR 30116, Annular Waste Tank, Rev. 2

UPRR-30125, Evaporators 2, 3, 4, 5, and 6 System Assembly and Parts, Rev. 1

Records:

2017 Annual Emergency Management Training

2017 Annual Evacuation and Tornado Alarm Drill Results

E61-061, Scrubber Sampling Record, Rev. 6

Internal Audit Report 259-4A, Emergency Preparedness (Plans and Procedures),
3rd Quarter dated July 2017

Internal Audit Report 259-4B, Emergency Preparedness (Facilities and Equipment),
1st Quarter dated January 2017

Internal Audit Report 259-4D, Emergency Preparedness (Training, Drills, and Exercises)
2nd Quarter dated June 2017

NCS-1983-008, HFIR Plates Annealing dated February 7, 1983

NCS-1984-070, Aluminum Shop Pickling Operation dated November 7, 1984

NCS-1985-051, RTRFE – Anneal Furnace dated August 28, 1985

NCS-1986-044, ATR Plates in Blister Anneal Furnace and Trays on Cart dated
May 20, 1986

NCS-1986-048, ATR Plate Pickling dated June 6, 1986

NCS-1994-073, Nuclear Safety Release: LER 94-01, Design Requirements Phase –
Oxide Layer Applied to ATR Fuel Elements dated July 26, 1994

NCS-1994-124, Corrosion/Oxide Layer Applied to ATR Fuel Elements dated May 26,
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NCS-1995-092, Nuclear Criticality Safety Release: Corrosion/Oxide Layer Applied to
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NCS-1999-127, Safety Concern: RTRFE/HFIR Program Annealing Cart and Furnace
dated January 12, 1999

NCS-2004-152, Nuclear Criticality Safety Analysis Supporting Phases 3A through 3H of
SER 03-3, "Relocation of the Chemical Prep Room-Phase 3-Chemical Preparation
Process Piping/Equipment, Etc. (May 26, 2004)," dated May 27, 2004

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NCS-2008-143, IROFS Verification Project – SAR 15.23, Fuel Plate and Element
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NCS-2012-037, NCS Safety Analysis for SER 11-24 Phase 1 - Annular Organic Tank
dated March 14, 2012

NCS-2013-94, NCS Analysis to Update SAR 15.12 for Inline Monitor #4 per
CR-1041381 dated November 15, 2013

NCS-2014-087, NCS Safety Analysis to Revise SAR 15.23 and Scenarios Addressing
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NCS-2016-127, NCS Safety Analysis to Revise SAR 15.23 to add Overpressure
Protection for RTR Element Autoclaves dated October 28, 2016

NCS-2017-011, Supplemental Evaluation to NCS-2016-2016-056 for U-Mo Plate
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Mini-Plates, and Phase 3 LEU U-Mo FSP-1 and Reactor Plates dated February 6,
2017

NCS-2017-055, Nuclear Safety Analysis to Revise the ROL Limit of the Recovery
Annular Waste Tanks and Organic Tanks dated January 8, 2018

NCS-2017-119, NCS Safety Analysis Supporting the Existence of a Hard-Piped
Waterline Connection on the SFF Waste Columns dated December 7, 2017

NCS-2017-178, NCS Safety Analysis to Delete the Ventilation Water Trap from SAR 15.34 and Scenarios dated October 24, 2017
 NCS-2017-188, Criticality Safety Assessment of a Rapid Depressurization of an Autoclave dated January 23, 2018
 NCS-2017-189, NCS Violation and Observation Summary – 3rd Quarter 2017 dated November 10, 2017
 NCSE-02, Nuclear Criticality Safety Analyses and Quality Assurance Reviews, Rev. 45
 NCSE-03, Nuclear Criticality Safety Audits and Inspections, Rev. 28
 NCSE-07, Qualification and Training Requirements for a Nuclear Criticality Safety Engineer, Rev. 17
 Security Exercise 3-17 Final Report
 SER 17-26, Phase 1-Recovery Evaporator Upgrades-Evaporator 2 Upgrade
 SER 17-38, RTRT Fuel Fabrication Glove Box Upgrade

Procedures:

EPR-01-01 (EP-HS-002), Emergency Plant Evacuation, Rev. 20
 EPR-01-10, Issuance of News Media Statements, Rev. 9
 EPR-02-03, Radiological Procedure for an Unannounced Sounding of the Howlers, Rev. 13
 EPR-02-04-02, Off-Site Notifications Alert, Rev. 17
 EPR-02-04-03, Off-Site Notifications Site Area Emergency, Rev. 16
 EPR-02-04-04, Off-Site Notifications Courtesy Notification, Rev. 19
 EPR-02-06, Emergency Communication Plan, Rev. 11
 EPR-03-07, Response to Severe Weather, Rev. 20
 EPR-03-12, Decontamination of Personnel during HazMat Response, Rev. 7
 EPR-03-14-02, Health Risks Associated with Receiving Radiation Exposures Greater Than 25 rem, Rev. 4
 EPR-03-16-01, Notifications of Off-Site Transportation Emergency, Rev. 3
 EPR-03-27, Response to a Bomb Threat, Rev. 4
 EPR-03-28, Initial Response to Report of Smoke/Fire, Rev. 0
 EPR-06-04-01, Emergency Drill Critique, Rev. 4
 EPR-06-05-01, Emergency Operations Center Readiness Checklist, Rev. 2
 EPR-06-05-03, Quarterly Check of Emergency Phone Listings for Outside Agencies, Rev. 2
 HS-03-02, Fire Prevention, Rev. 7
 HS-03-03, Ignition Source Permit, Rev. 19
 HS-03-08, Employee Fire Response and Fire Fighting, Rev. 7
 HS-FP-17, Inspection, Test, and Maintenance of Fire Alarm System, Rev. 10
 OP-0000272, Liquid Handling at the Retention Tank Inline Monitoring System, Rev. 8
 OP-0006115, Boehmite Pre-Filming of ATR Elements, Rev. 4
 OP-0061110, Cyclone and All-Purpose Pump Station Operations, Rev. 16
 OP-0061115, Operating Procedure for Primary Extraction System, Rev. 47
 OP-0061120, 3-Inch Uranium Extraction System, Rev. 20
 OP-0061121, Primary Evaporator System, Rev. 30
 OP-0061122, Secondary Evaporator System, Rev. 16
 OP-0061123, Contractor Evaporator System, Rev. 25
 OP-0061128, Identification of Process Scrap and Waste Material, Rev. 18
 OP-0061137, General Purpose Area A/B (Recovery), Rev. 43
 OP-0061141, Low-Level Leach Hood Operation, Rev. 64
 OP-0061143, Uranium Recovery Scrubber Operation System, Rev. 32
 OP-0061144, Low-Level Storage Column Operation, Rev. 21

OP-0061150, Inspection and Cleaning of Recovery Ducts, Rev. 31
 OP-1001944, Furnace Testing for RTRT General Shop Area, Rev. 8
 OP-1004612 Ultrasonic Inspection of Annular Tanks and Cylindrical Columns, Rev. 6
 OP-1016621, TID Reporting Requirements and Computer Application and Removal Program, Rev. 5
 OP-1018680, Recovery High-Level Dissolution, Rev. 39
 OP-1046056, Crushing and Blending Box Operations, Rev. 0
 QWI 2.1.3, Integrated Safety Analysis Methodology, Rev. 16
 QWI 2.1.3, Integrated Safety Analysis Methodology, Rev. 18
 QWI 4.1.5, Design Criteria for NRC Licensed Activities, Rev. 20
 QWI 5.1.7, Safety Evaluation Requests, Rev. 34
 QWI 5.1.12, Change Management, Rev. 32
 QWI 14.1.1, Preventive/Corrective Action System, Rev. 34
 QWI 14.1.4, Reporting Unusual Incidents, Rev. 12
 QWI 14.1.10, Safety Evaluation of Unusual Incidents, Rev. 16
 SC-AUTOCLV-ELECT-001, Autoclave Furnace Over-Temperature Alarm and Shutdown Test Electrical, Rev. 7

Other Documents:

2017 Annual Ductwork Survey, dated October 24, 2017
 2017 NCS Annual Refresher Training
 E41-134, Annual Ductwork Survey, Rev. 16
 Emergency Plan, Rev. 31
 Emergency Preparedness Manual, Rev. 0
 Fatigue Management Program 6-Month Performance Data Report dated February 27, 2018
 General Employee Safety Training – 2017 Nuclear Criticality Safety
 Historical Incidents Review Summary and Statistical Analysis, Updated Analysis of PHA #05-00001, Generator Power, and UPS Systems dated March 2, 2018
 Posting 15-23-007, Autoclaving RTR Fuel Elements, Rev. 3
 Posting 15-23-920, RTR UMo – Mini-Plate/Capsule Autoclaving, Rev. 00
 Pre-Fire Plan Section 13, Bays 12A, 13A, 14A, & 15A Recovery Building, dated March 23, 2015
 SAP Maintenance Plans 456, 768, 2251, 2355, and 2356
 SAR 15.5, High-Level Dissolver Process in Uranium Recovery, Rev. 136
 SAR 15.6, Low-Level Dissolver Process in Uranium Recovery, Rev. 72
 SAR 15.7, General Purposes Reclamation Area Processes in Uranium Recovery, Rev. 50
 SAR 15.8, Preparation of Chemical Reagents Process in Uranium Recovery, Rev. 41
 SAR 15.8, Preparation of Chemical Reagents Process in Uranium Recovery, Rev. 42
 SAR 15.9, Main Extraction and Drum Dryer Processes in Uranium Recovery, Rev. 99
 SAR 15.12, Liquid and Solid Waste Handling Processes in Uranium Recovery, Rev. 75
 SAR 15.12, Liquid and Solid Waste Handling Processes in Uranium Recovery, Rev. 78
 SAR 15.20, U235 Counting Process in Nuclear Materials Control Operations, Rev. 45
 SAR 15.23 Fuel Plate and Element Fabrication Processes in RTRT, Rev. 102
 SAR 15.30, NMC Vaults, Storage Rooms, and Carts, Rev. 90
 SAR 15.32, Pharmacy Operations, Rev. 37
 SAR Appendix 15.23, Rev. 43, dated November 13, 2017
 Specialized NCS Training – NR Shop, Recovery, RTR, and Security
 Training Completion Log

Corrective Actions and Commitments:

2017-786, 2017-1586, 2017-1606, 2017-1608, 2017-1661, 2018-385, COM-65115, COM-66695, COM-66697, COM-66704, COM-66705, COM-66710, COM-66775, COM-68317, COM-68700

Change Requests:

CHG-1734, CHG-2156, CHG-2713, CHG-2735, CHG-3212, CHG-3440, CHG-3480, CHG-3521, CHG-3656, CHG-3738, CHG-4154

Work Orders:

20233824, 20234374, 20234895, 20235593, 20238573, 20238654, 20239838