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

October 24, 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 70-27/2018-004

Dear Mr. Burch:

This letter refers to the inspections conducted from July 1 through September 30, 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 July 26 and October 15, 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, 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 70-27/2018-004
w/Attachment: Supplementary 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
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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 70-27/2018-004

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U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No:	70-27
License No:	SNM-42
Report No:	70-27/2018-004
Licensee:	BWX Technologies, Inc. (BWXT)
Facility:	Nuclear Operations Group, Inc. (NOG)
Location:	Lynchburg, VA 24505
Dates:	July 1 through September 30, 2018
Inspectors:	C. Stancil, Senior Resident Inspector, RII/DFFI/PB2 R. Gibson Jr., Senior Fuel Facility Inspector, RII/DFFI/SB G. Goff, Fuel Facility Inspector, RII/DFFI/PB2 K. Kirchbaum, Fuel Facility Inspector, RII/DFFI/PB1 N. Peterka, Fuel Facility Inspector, RII/DFFI/PB1
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 70-27/2018-004
July 1 – September 30, 2018

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

Safety Operations

- No violations of more than minor significance were identified related to Plant Operations and Safety System Walkdowns. (Paragraphs A.1 and A.2)

- No violations of more than minor significance were identified related to the Fire Protection Program. (Paragraph A.3)

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

Radiological Controls

- No violations of more than minor significance were identified related to the Radiation Protection Program. (Paragraphs B.1 and B.2)

- No violations of more than minor significance were identified related to the Radioactive Waste Processing, Handling, and Transportation. (Paragraph B.3)

- No violations of more than minor significance were identified related to the Effluent Control and Environmental Protection Program. (Paragraph B.4)

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)

Other Areas

- No violations of more than minor significance were identified related to observations of security personnel and activities. (Paragraph D.1)

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. 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 (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.

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 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;” 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. Safety System Walkdown (Inspection Procedure 88135.04)

a. Inspection Scope

The inspectors inspected low-level radioactive waste processes and waste operations, safety-significant systems involved with the processing of SNM to verify compliance with the license 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.

The inspectors reviewed procedures, drawings, related ISAs, and regulatory requirements such as Title10 of the *Code of Federal Regulations* (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
- 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 RTR Bays 15 and 16 to verify compliance with the license and National Fire Protection Association 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 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 those 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 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. 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.

B. Radiological Controls

1. Radiation Protection Quarterly (Inspection Procedure 88135.02)

a. Inspection Scope

The inspectors performed a review and observation of posted radiologically controlled areas for Radiation Work Permit (RWP) 18-0053, "Old High-Level Dissolver Demolition Work Associated with SER 17-55," to verify compliance with BWXT License 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, the inspectors performed partial reviews of select RWPs during the inspection period in different operational areas to verify RWP compliance.

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.

2. Radiation Protection (Inspection Procedure 88030, Appendix A, "Program, Monitoring, and Controls")

a. Inspection Scope

The inspectors reviewed BWXT's radiation protection program to verify compliance with License Application Chapter 4, "Radiation Protection;" Chapter 11, "Management Measures;" license conditions; select chapters of the safety analysis report (SAR); and 10 CFR 20 requirements. Additionally, the inspectors reviewed radiation protection program documents, observed activities, and conducted interviews to verify that the program was being implemented in accordance with the aforementioned documents.

The inspectors reviewed the 2017 ALARA (As Low As Reasonably Achievable) report and the 2017 and 2018 ALARA meeting minutes to verify that the program was being documented and implemented in accordance with 10 CFR 20.1101(a). The inspectors also reviewed audits and assessments to verify that the program content and performance was being reviewed in accordance with 10 CFR 20.1101(c). The inspectors interviewed a front line manager and observed radiation protection activities to verify the radiation protection program's functions and responsibilities were independent from operations.

The inspectors reviewed the organizational chart to observe personnel changes in the radiation protection organization and to verify that new personnel were undergoing the required training and qualification as required by the license application. The inspectors also reviewed training records to determine whether senior personnel were satisfying the refresher training requirements in the license application. The inspectors also interviewed a front line manager to verify that radiation protection employees received and completed required training at the frequency specified in the license and as required by 10 CFR 19.12. The inspectors reviewed radiation protection tests, qualification cards, and general employee training content to verify that the training was in compliance with license requirements.

The inspectors reviewed changes to procedures to verify that any change did not reduce the effectiveness of the safety. The inspectors also reviewed these procedures to verify that the review frequency and revision process were in compliance with license requirements.

The inspectors also reviewed survey records, training records, ALARA documents, and audits/assessments to verify that BWXT maintained such records for at least three years after the record was created as required by 10 CFR 20.2102 and 10 CFR 20.2103.

The inspectors reviewed CAP entries associated with the radiation protection program to determine whether BWXT was identifying issues at an appropriate threshold and entering them into the CAP as required by the license. The inspectors reviewed selected events related to the radiation protection program to verify that BWXT entered the issues into the CAP in a timely manner, considered the extent of condition, identified the root and contributing causes, classified and prioritized the resolution of the problem commensurate with its safety significance, and identified CAs to correct the problem and prevent recurrence as required.

The inspectors reviewed selected RWPs to verify compliance with the license. While there was no work being performed under a RWP at the time of inspection, the inspectors reviewed recently completed work under RWPs to verify that BWXT followed their RWP process as required by procedure.

The inspectors reviewed select calibration records (sticker labels and computer records) and calibration procedures for instruments for each type of nuclear radiation to verify that BWXT had equipment readily available for quantitative radiation measurements. The inspectors observed instrument response checks to sealed sources (alpha, beta, and gamma) to verify operability. The inspectors also reviewed the process for when an instrument was due for periodic calibration or functional testing to verify that a notification system was in place as required by 10 CFR 20.1501(c). The inspectors observed the personnel monitoring stations such as hand-and-foot monitors and whole body counters to verify that the devices were within calibration.

The inspectors observed that the sealed sources used for in-house calibration and response checks utilized National Institute of Standards and Technology traceable sources. The inspectors reviewed leak test survey records for sealed sources to verify that BWXT was in compliance with license requirements for radiation protection. The inspectors reviewed dose rate measurements and postings to verify that the storage of the sealed sources was in accordance with 10 CFR 20.1903(c).

The inspectors observed fixed air sampler filter change-out and contamination surveys to verify that BWXT performed scheduled contamination surveys in accordance with procedures and the requirements of 10 CFR 20.1501(a). The inspectors toured SNM processing areas and reviewed radiation survey records to verify that the radiological posting out in the field complied with 10 CFR 20.1902 and 10 CFR 20.1903. The inspectors observed select radioactive material containers in the areas above to verify that the containers were labeled in accordance with 10 CFR 20.1904 and 10 CFR 20.1905.

The inspectors reviewed the total effective dose equivalent results to verify that they were less than the regulatory limit of 5 rem/year. The inspectors verified that the lens dose equivalent and shallow dose equivalent results were less than the regulatory limits of 15 and 50 rem/year, respectively. Through interviews, the inspectors verified that exposure records were maintained in accordance with 10 CFR 20.2106.

b. Conclusion

No violations of more than minor significance were identified.

3. Radioactive Waste Processing, Handling, and Transportation (Inspection Procedure 88035)

a. Inspection Scope

The inspectors reviewed the radioactive waste processing, handling, storage, and transportation program at BWXT to determine compliance with the requirements of the license, 10 CFR 20, and 10 CFR 61, “Licensing Requirements for Land Disposal of Radioactive Waste,” as applicable to low-level radioactive waste form, classification, stabilization, and shipment manifests/tracking.

The inspectors reviewed procedures and observed associated activities to verify that the procedures were clearly written, delineated responsibilities, and were effective at accomplishing the tasks as written and required. Specifically, the inspectors observed operators performing radioactive waste activities to verify that the operators were familiar with their responsibilities as they performed their tasks in accordance with on-site procedures.

The inspectors reviewed the quality assurance program for radioactive waste management to verify that the required audits were being performed and that associated audit findings were entered into the licensee’s CAP for resolution as required.

The inspectors reviewed the licensee’s program for classifying low-level radioactive waste and mixed waste. Specifically, the inspectors reviewed procedures for classifying waste as well as records relating to waste. The inspectors reviewed the licensee’s program for ensuring that waste was properly packaged to verify that the waste form met the requirements of 10 CFR 61.56.

The inspectors reviewed the licensee’s procedures for labeling waste shipments and tracking radioactive waste to verify that radioactive waste was properly labeled, and that the procedures specified actions to be taken should the shipments not reach the intended destination in the time specified. Specifically, the inspectors observed

preparation of radioactive waste compacted in drums for shipment to a waste broker. The inspectors also reviewed the procedures for placement, inspection, and repackaging of radioactive waste to verify that they were in accordance with the license application.

The inspectors performed walkdowns of select radioactive material storage areas to verify material condition and postings which included inspecting for accurate labeling and adequate physical condition as required.

b. Conclusion

No violations of more than minor significance were identified.

4. Effluent Control and Environmental Protection (Inspection Procedure 88045)

a. Inspection Scope

The inspectors reviewed the licensee's environmental protection program to verify compliance with License Application in Chapter 9, "Environmental Protection;" Chapter 11, "Management Measures;" and 10 CFR 20 and 70 requirements as applicable.

The inspectors reviewed the quality assurance program for effluent control and environmental protection to verify that BWXT was performing the required audits and presenting the annual audit results to the management team. The inspectors reviewed the findings from these audits to verify that they were entered into BWXT's CAP for resolution. The inspectors reviewed events identified in the CAP to verify that deviations from procedures and unforeseen process changes were documented and investigated as required by procedure.

The inspectors reviewed procedures and observed operations related to effluent control and environmental protection to verify that the procedures were clearly written and adequately delineated responsibilities related to effluent controls. The inspectors also observed radiological control (RADCON) technicians and environmental operators performing effluent controls and environmental protection activities to verify that the technicians and operators were familiar with their responsibilities as they performed their tasks in accordance with onsite procedures. In addition, the inspectors reviewed training records to verify that the technicians and operators were trained in accordance with the license and procedure RP-10-001, "Radiation Control Supervisor and Technician Training."

The inspectors reviewed the semi-annual effluent reports for calendar year 2017 to evaluate BWXT's compliance with effluent requirements of 10 CFR 70.59. Specifically, the inspectors reviewed the semi-annual effluent reports that were used to calculate the maximum possible dose to a member of the public at BWXT's fence line from the normal gaseous effluent release to verify compliance with the regulatory limits specified in 10 CFR 20.1101(d). The inspectors reviewed a sample of the calibration and control program for stack velocity measurements on effluent stack differential pressure indications to verify that effluent stack filters were being replaced within the required frequency in accordance with procedure RP-08-004, "Exhaust Stack Velocity and Filter Pressure Differential Measurements," and ambient air procedure RP-08-002, "Environmental Air Sample Collection and Analysis."

The inspectors conducted a walkdown of ventilation stacks and ambient air stations and observed a RADCON technician collecting samples from both systems to verify that effluent equipment and systems were operable and maintained in accordance with the requirements of the procedures; and that the exhaust stack samples were collected in accordance with procedure RP-08-003, “Sample Collection from Exhaust Stacks and Their Analysis.” The inspectors also conducted a walkdown of the Waste Treatment facility and the retention tanks and observed a waste treatment operator collecting samples from the plant and recovery tanks to prepare the tanks for release to the effluent ponds to verify compliance with procedure EP-321, “Sampling, Analysis, Reporting, and Release of Retention Tanks for Dynamic U-235 Inventory.” The inspectors reviewed records of and discussed with BWXT staff the weekly reference checks and 6 months calibrations of the in-line monitors to the retention tanks to verify that the checks and calibrations were in accordance with procedure RP-07-079, “Calibration and Operation of the Canberra In-Line Liquid Waste Monitors,” (SAR 15.12, “Liquid and Solid Waste Handling Processes in Uranium Recovery”). The inspectors reviewed the effluent monitoring results to verify that the values specified in 10 CFR 20, Appendix B, were not exceeded.

The inspectors reviewed records for soil, sediment, and river sample collection results and discussed the results with BWXT staff to verify that the levels were within regulatory limits. The inspectors observed an environmental operator collecting soil and vegetation samples to verify that the samples were collected and analyzed in accordance with procedure RP-08-001, “Collection and Analysis of Environmental Soil, Surface Water, Sediment, Vegetation, and Fallout Samples.” The inspectors interviewed an environmental engineer and other associated staff to verify their knowledge regarding effluent systems operation and sampling requirements and activities conducted in accordance with approved procedures. The inspectors discussed the identification of new contamination in the environment or subsurface of the facility or surrounding environment to verify that the licensee conducted operations to minimize the introduction of radioactivity into the subsurface, as required by 10 CFR 20.1406(c).

The inspectors reviewed the Lynchburg Technology Center (LTC) isotopic analysis data of effluent samples, discussed the analysis with the chemist, and walked down the laboratory facilities where the samples are analyzed to verify that the equipment was functional and calibrated at the required frequency. The inspectors walked down the Liquid Waste Disposal facility effluent collection tanks located in the basement of Building ‘B’, reviewed records of samples from batch effluent liquid discharges, and discussed the sampling requirements with the RADCON engineer to verify that the samples were collected, as required by procedure, prior to discharging the collection tanks to the Waste Treatment facility (SAR 15.40, “Lynchburg Technology Center”).

The inspectors reviewed the public dose assessment to verfiy that the average annual effluent concentrations released in 2017 did not exceed the values specified in 10 CFR 20, Appendix B; and that the total dose to a member of the public likely to receive the highest dose from the licensed operation did not exceed the 10 CFR 20.1301(a)(1) limit for 2017. The inspectors reviewed the airborne portion of the public dose assessment to verify that the results were in compliance with the ALARA requirements in 10 CFR 20.1101(d).

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 verify that 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 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 20246853, CA-2018-0942, LEL Detector, SAP 10004143 non-alarm trend that failed calibration, performed calibration per Maintenance Plan (MP) 1910, "Calibration Test of Trough Dissolver LEL Detectors," and functional test per MP 1465, "Functional Test of the HLD ZR Glovebox Gas Detectors"
- WOs 20248890 and 20248943, CA-2018-1116, SAP 10004144 failed functional test, performed calibration and functional test per MP 1910 and MP 1465, respectively
- WO 20248168, CA-2018-1150, MP 579 "Contactor System Raffinate Waste Column Low-Level Probe" failure, relay adjustment performed and tested per MP 579

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 test listed below to verify that the 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 also 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 3370, "High-Level Sensor at the Low-Level Dissolver Storage Columns," WO 20244227

b. Conclusion

No violations of more than minor significance were identified.

3. Corrective Action Program (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 closure as required. 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. 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."

Additionally, the inspectors conducted periodic reviews of BWXT audits and third party reviews of safety-significant processes to verify effectiveness and the entry's alignment with requirements of the CA program. Specifically, the inspectors reviewed the following:

- 2017 ALARA Report
- Fatigue Management Program 6-Month Performance Data Report
- LMS-2018-003, "RP Audits, Inspections, 2nd Quarter 2018"
- Semi-Annual Effluent Monitoring Report

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.

The inspectors observed a tactical response exercise conducted on the evening of August 15, 2018, to assess the effectiveness of BWXT's implementation of protective strategies in accordance with the NRC-approved security plan and procedures. The inspectors also observed the critique process to verify that BWXT identified and captured weaknesses noted during the exercise as required.

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.

E. Exit Meeting

On July 26 and October 15, 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.

SUPPLEMENTARY INFORMATION

1. KEY POINTS OF CONTACT

Licensee Personnel

Name	Title
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
R. Harvey	Manager, Waste Operations
J. Howard	Manager, Waste Treatment Facility
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

None

3. INSPECTION PROCEDURES USED

88015	Nuclear Criticality Safety
88030	Radiation Protection
88035	Radioactive Waste Processing, Handling, and Transportation
88045	Effluent Control and Environmental Protection
88135	Resident Inspection Program for Category I Fuel Cycle Facilities
88135.02	Plant Status
88135.04	ISA Implementation
88135.05	Fire Protection
88135.19	Post-Maintenance Testing
88135.22	Surveillance Testing

4. DOCUMENTS REVIEWED

Records

258-3B, Radiation Protection (Transportation and Waste Disposal of NOG-L and LTC)
261-6B1, Nuclear Materials Control (Radiological Materials Transportation and Waste Disposal) 4th Quarter, October 2017
Apex-Alpha/Beta Efficiency Reports, January to June 2018
Boundary Air Samples, Quarterly
Effluent Release Monitoring Dose, Annual
Energy Solutions Clive Facility, Bulk Waste Disposal and Treatment Facilities, Waste Acceptance Criteria, Revision (Rev.) 10, October 2015
Fatigue Management Program 6-Month Performance Data Report dated July 23, 2018
Final Liquid Effluent Composite, Monthly
Flowmeters Calibration, Quarterly
Pressure Differentials across HEPA [High-Efficiency Particulate Air] Filter, Quarterly
HS-2012-056, Evaluation of Hydrogen Evolution Resulting from Bay 5A Pickling Process dated June 21, 2012
Internal Audit Summary Reports, January, May, June, and October 2017; January 2018
Letter from K. Conway to H. Hudson, J. McNeel, D. Spangler, and C. Terry dated August 3, 2018, Autoclave Meeting Notes from August 2, 2018
LMS-2017-003, RP Audits, Inspections, 2nd Quarter 2017
LMS-2017-004, RP Audits, Inspections, 3rd Quarter 2017
LMS-2018-001, RP Audits, Inspections, 4th Quarter 2017
LMS-2018-002, RP Audits, Inspections, 1st Quarter 2018
LMS-2018-003, RP Audits, Inspections, 2nd Quarter 2018
NCS-1996-103, NCS Analysis Re-Evaluating the U235 Dynamic Inventory Mass Limit at Waste Treatment dated May 13, 1996
NCS-1998-11, NCS Evaluation for SER 98-7 Packaging of NMC Drums, Phase I, dated January 29, 1998
NCS-2001-92, Nuclear Criticality Safety Analysis Supporting OBS-2001-003, “Drum Count Area Posting Changes”, dated March 19, 2001
NCS-2018-054, Safety Concern Analysis for Overloaded TP Drums at the Drum Counter (CA 2018-0500) dated April 12, 2018
NCS-2018-110, Safety Concern Analysis for Damaged/Bulging Can in Vault 6 dated July 25, 2018
NCS-2018-115, Safety Concern Analysis for Small Amount of Water in Contact with Fuel Can dated July 23, 2018
NCS-2018-128, Safety Concern Analysis for Three A1B F8 Fuel Elements Stored on Side Railing of Element Cart dated August 22, 2018
NCS-2018-130, Safety Concern Analysis for Water Above Pharmacy Ceiling dated August 29, 2018
NCS-2018-135, Safety Concern Analysis for Unnecessary Moderator Addition to RTR Four Tier Plate Rack dated August 24, 2018
NCS-2018-149, Safety Concern Analysis for A1G Sub-Assembly on a Non-Fuel Rack dated September 26, 2018
Nuclear Material Control Transportation, Radioactive Material Packaging List, E4-2, Rev. 21, Bill of Lading 1564 on December 18, 2007; Bill of Lading 1591 on April 16, 2018; and Bill of Lading 1601 on May 10, 2018
RP-02-006, Form 1, Personnel/Item Contamination Report, Rev. 17, dated May 7, 2018
RP-07-001, Form 1, Ludlum Model 2360 Digital Rate Meter with Scintillation Detector – Calibration, Rev. 5, dated February 27, 2018

RP-07-010, Form 1, Ludlum Model 2241 Digital Rate Meter with Alpha Scintillation Probe, Rev. 5, dated June 19, 2018
RP-07-015, Form 1, Eberline RM-20 with an AC-3 Alpha Probe Calibration, Rev. 12, dated June 9, 2017
RP-07-034, Form 1, DMC 2000S Electronic Dosimeter Calibration and Operation, Rev. 13.0, dated September 12, 2017
RP-07-042, Form 1, Ludlum Model 2360 Digital Rate Meter with G-M Detector Probe, Rev. 6, dated March 21, 2018
RP-07-043, Form 1, Ludlum Model 2241 Digital Rate Meter with G-M Pancake Probe, Rev. 5, dated February 5, 2018
RP-07-053, Form 1, Gilian Gilair-5 Air Sampler Calibration, Rev. 14, dated May 31, 2018
RP-07-057, Form 1, Instrument Service Log, Rev. 22, dated May 11, June 14, July 20, and September 12, 2017
RP-07-057, Form 1, Instrument Service Log, Rev. 24, dated February 22 and 27, March 2 and 22, June 12 and 19, 2018
RP-07-105, Form 1, Canberra LB4200 Calibration, Rev. 4.0, dated May 2, 2016
RP-10-001, Form 1, Documentation of Training, Rev. 14, December 4, 2016, dated May 23 and October 31, 2017
RP-13-002, Form 1, Technician's Daily Inspection Report, Rev. 13, dated July 23, 2018
RP-15-002, Form 1, Radiation Source Leak Check, Rev. 5.0, dated June 22 and December 19, 2017
RPTWR 12-002, Zirconium Pickling Review dated May 8, 2012
RWP 18-0041, RTR Desiccant Deactivation for One Bottle per Details Specified in RWP, Rev. 00
RWP 18-0050, CSV-General Maintenance Activities in the Central Vault and Associated Activities, Rev. 00
RWP 18-0051, Repackage Uranium Bearing Solutions, Rev. 00
RWP 18-0052, Fuel Breach Decontamination, Rev. 00
RWP 18-0053, Old High-Level Dissolver Demolition Work Associated with SER 17-55
RWP 18-0056, Add Material into a Platinum Crucible during WS-401 Corrosion Operation, Rev. 00
Stack Velocity Measurements, Quarterly
Survey Instrument Calibrations, July 17 and 20, 2017; April 20, 2018
TP-ML-0007, Training Plan for Element Layout, Rev. 0
Vegetation and Soil Samples, Quarterly
Well Water Samples, Monthly and Quarterly

Procedures

E41-25, Operating Instructions for the Drum Counter, Rev. 39
E41-90, Sampling and Analysis of Low-Level Radioactive Waste Solids, Rev. 20
E46-22, Calibration and Measurement Uncertainty for U235 in Scrap Determined by Gamma Counter, Rev. 15
E46-56, Training Procedure for NDA Systems Operators, Rev. 07
E46-77, Preparation of U 235 Standards for NMC Measurement Systems, Rev. 9
E46-78, Initial Set-Up and Calibration of NMC NDA Systems, Rev. 9
E61-643, Column Dissolvers Process Variable Specification Sheet, Rev.2
EP-301, LLR Sludge Processing System, Rev. 17
EP-321, Sampling, Analysis, Reporting, and Release of Retention Tanks for Dynamic U235 Inventory, Rev. 21, Rev. 23, and Rev. 24
EP-719, Super Compactor Operations, Rev. 14
EP-722, Waste Preparation Area, Rev. 07

EP-723, Mixed Waste Storage Area, Rev. 04
OP-0061234, Operating Procedure for Maintenance in UPRR, Rev. 54
OP-1010419, Sectioning of A1B DE Fuel Elements, Rev. 14
OP-1016621, TID Reporting Req and Computer Application and Removal Program, Rev. 5
OP-1027271, Operating Procedure for Low-Level Rad Waste Loaders Training/Testing, Rev. 4
QWI 14.1.4, Reporting Unusual Incidents, Rev. 12
QWI 14.1.10, Safety Evaluation of Unusual Incidents, Rev. 17
QWI 15.1.8, Packaging and Measuring of Scrap and Waste, Rev. 12
RP-02-001, Contamination Control Procedure, Rev. 15
RP-03-010, Plant-Wide External Radiation Surveys, Rev. 9
RP-06-001, Radiation Protection Responsibilities of a Radiation Work Permit, Rev. 14
RP-07-011, Re-Calibration/Inspection of Radioactive Calibration Sources, Rev. 10
RP-07-015, Eberline RM-20 with AC-3 Alpha Probe Calibration and Operation, Rev. 12
RP-07-021, Eberline RM-20 with GM Pancake Probe Calibrated and Operation, Rev. 11
RP-07-079, Calibration and Operation of the Canberra In-Line Liquid Waste Monitors, Rev. 8
RP-08-001, Collection and Analysis of Environmental Soil, Surface Water, Sediment, Vegetation, and Fallout Samples, Rev. 19
RP-08-002, Environmental Air Samples Collection and Analysis, Rev. 14
RP-08-003, Sample Collection from Exhaust Stacks and Their Analysis, Rev. 28
RP-08-004, Exhaust Stack Velocity and Filter Pressure Differential Measurements, Rev. 14
RP-08-006, Final Liquid Effluent Preparation and Analysis, Rev. 17
RP-10-001, Radiation Control Supervisor and Technician Training, Rev. 14
RP-10-006, Developing and Presenting Nuclear Safety Training Programs, Rev. 10
RP-12-004, Notifications and Reports to Individuals per 10 CFR 20 and 10 CFR 19 and Termination of IRMs, Rev. 8
RP-12-005, Retention of Records and Procedures, Rev. 9
RP-14-001, Area Radiation Postings, Rev. 9
RP-15-002, Leak Testing of Sealed Sources, Rev. 5
RP-15-003, Handling of Radioactive Sources, Rev. 4

Other Documents
2017 ALARA Report
2017 Quality Assurance Quarterly Audits
2017 Semi-Annual Effluent Monitoring Report
ALARA Meeting Minutes, July/August 2017, October/November 2017, and January to June 2018
Evaluation of Potential Powder Spills dated March 2, 2005
Facility Siting Review 2, Waste Treatment Facilities (Retention Tank building, LLRW/Decon facility, outside storage areas, Super Compactor building, mixed waste storage area), Rev. 1
Fatigue Management Program 6-Month Performance Data Report dated July 23, 2018
General Purpose and Safety Class Maintenance Activities, July 2017
MP 1465, Functional Test of the HLD ZR Glovebox Gas Detectors
MP 1910, Calibration Test of Trough Dissolver LEL Detectors
MP 3370, High-Level Sensor at the Low-Level Dissolver Storage Columns

Mt. Athos Site Pre-Fire Plan, Section 12, RTR Controlled Area dated January 17, 2014
N-79, Evaluation of Unusual Incidents (for Fuel Breach in Bay 1A), Rev. 11
Photos of Fuel Elements (including one incorrectly cut)
Radiation Control Technician On-The-Job Training Checklist, January 2 and May 23, 2017
Radiation Control Technician Initial Training Test, December 4, 2016; May 23, 2017; and March 31, 2018
Radiation Control Technician Initial Practical Performance Checklist, December 23, 2016 and May 23, 2017
RMS-17, Training, Rev. 13
RMS-21, Classification, Characterization, Packaging, and Preparation of Low-Level Radioactive Waste and Mixed Waste, Rev. 22
RMS-22, Low Specific Activity Shipments, Rev. 10
RMS-23, Low-Level Radioactive Waste Administrative Procedure, Rev. 11
SAR 15.7, General Purpose Reclamation Area Processes in Uranium Recovery, Rev. 51
SAR 15.12, Liquid and Solid Waste Handling Processes in Uranium Recovery, Rev. 79
SAR 15.14, Scrubber Ventilation and Vacuum System in Uranium Recovery, Rev. 73
SAR 15.20, U235 Counting Process in Nuclear Materials Control Operations, Rev. 45
SAR 15.21, Low-Level Radioactive Waste Processes Waste Operations, Rev. 72 and Rev. 75
SAR 15.22, Research Test Reactor Target (RTRT) Fuel Powder and Compact Processes, Rev. 87
SAR 15.23, Fuel Plate and Element Fabrication, Processes, RTRT Operations, Rev. 107
SAR 15.40, Lynchburg Technology Center, Rev. 46
SAR 15.44, Research and Test Reactors (RTR) Uranium Molybdenum (U-Mo) Foil Production, Rev. 9
Semi-Annual Effluent Monitoring Report dated August 28, 2018

Work Orders

20244227	20244958	20246853	20248168	20248890	20248943

Corrective Actions

2005-0073	2014-1729	2014-1999	2015-0385	2017-0316	2017-1040
2017-1403	2017-1653	2018-0052	2018-0187	2018-0297	2018-0472
2018-0500	2018-0579	2018-0615	2018-0895	2018-0896	2018-0921
2018-0931	2018-0942	2018-1001	2018-1056	2018-1067	2018-1083
2018-1099	2018-1105	2018-1116	2018-1118	2018-1150	2018-1164
2018-1184	2018-1244	2018-1283	2018-1284		